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THE HAROLD JANTZ MEMORIAL LECTURE

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ANTHONY GRAFTON



*Johannes Petreius (c. 1497-1550):  
A Study in the History of Learned  
Publishing*

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*Anthony Grafton*

*Dodge Professor of History  
Princeton University*

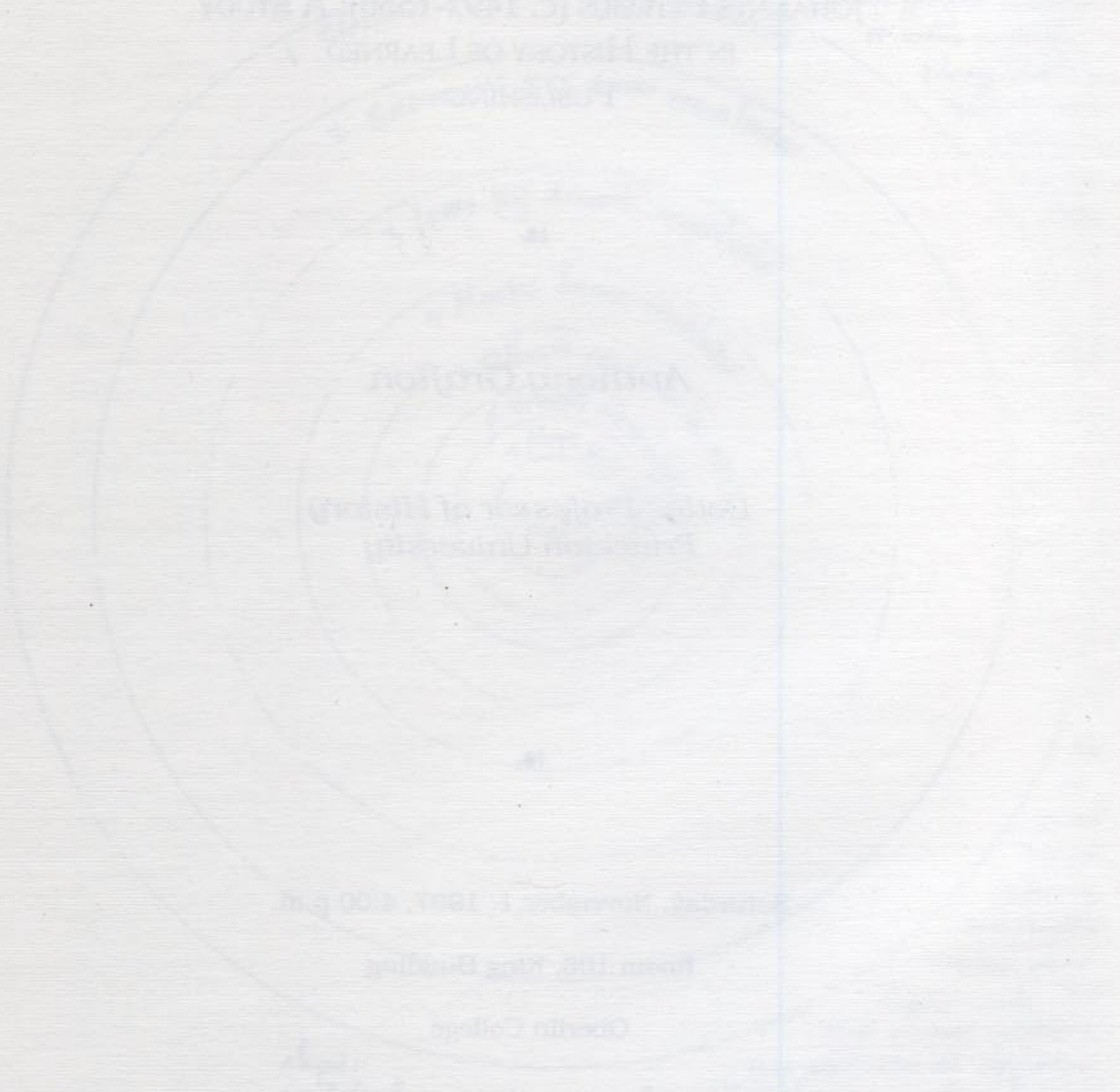
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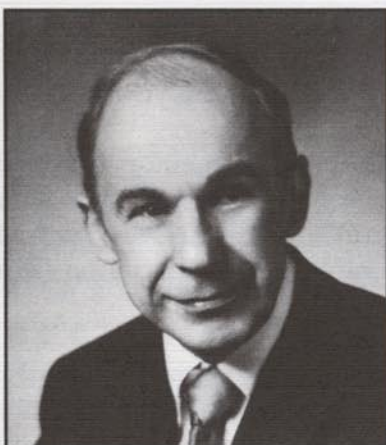
Saturday, November 1, 1997, 4:00 p.m.

Room 106, King Building

Oberlin College

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Harold Jantz '29

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H A R O L D J A N T Z M E M O R I A L L E C T U R E S H I P

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O B E R L I N C O L L E G E

The Harold Jantz Memorial Lectureship honors the memory of one of the most distinguished literary scholars among Oberlin graduates. Established in 1988 through the generosity of family, friends, colleagues, former students, and Oberlin classmates of Professor Jantz, the endowed lectureship fund supports public lectures and symposia in the fields of Professor Jantz's primary professional interests—German literature and literary history, German and American literary relations, art and art history, and bibliophilism. Lectures and programs are selected by the Chairperson of the German Department, the Director of Libraries, and the Director of the Allen Memorial Art Museum in regular rotation.

The Harold Jantz Memorial Lectureship provides a lasting tribute to Professor Jantz on behalf of the many people who loved and admired him. A fitting testimony to the important influence of Oberlin College on his life and career and to his affection and esteem for the College, the lectureship insures that present and future generations of Oberlin students and faculty will have the opportunity to discover and explore interests similar to those which distinguished Professor Jantz's remarkable career.

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## INTRODUCTION

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Good afternoon. Welcome to this year's Harold Jantz Memorial Lecture.

This lectureship honors the memory of one of Oberlin's most distinguished alumni scholars. Harold Stein Jantz, a native of Elyria, graduated *magna cum laude* from Oberlin in 1929. Four years later, he earned his Ph.D. in Comparative Literature with a focus on German literature from the University of Wisconsin in Madison.

In the course of a remarkably distinguished scholarly career that spanned five decades, Harold Jantz achieved international stature as a Goethe scholar and an authority on early American literature. He also was a superb and much beloved teacher at some of the world's most distinguished universities, including Princeton, Northwestern, Johns Hopkins, and Duke Universities; and the Universities of Hamburg and Vienna. A prolific scholar, Professor Jantz authored nine books and over seventy articles on subjects ranging from German literature and seventeenth- and eighteenth-century literary history, to German-American literary relations, and art and art history. Professor Jantz was also a lifelong book collector, assembling the largest private collection of German Baroque literature, a collection now housed at Duke.

Professor Harold Jantz's family, friends, colleagues, former students, and Oberlin classmates established the Harold Jantz Memorial Lectureship in 1988. The lectureship supports an annual public lecture by a leading scholar in one of the fields of Professor Jantz's primary professional interests: German literature and culture, art history, and the history and culture of books and libraries. The lectureship is sponsored on a rotating basis by the Oberlin College Department of German, the Oberlin College Library, and the College's Allen Memorial Art Museum. This year, the German Department is hosting the event.

Before I introduce Professor Anthony Grafton, our 1997 Jantz Lecturer, I want to thank the members of the Harold Jantz Memorial Lectureship Committee for their efforts in organizing this year's program. Of those whose contributions make this lectureship possible, I want especially to say a word about the dedication and generosity of Dr. Eleanore Jantz, Professor Jantz's wife of many years, who is with us this afternoon. I want, too, to thank the Oberlin College Class of 1929, Harold Jantz's classmates, who endowed this lectureship as a gift to the students and faculty of Oberlin.

It is now my pleasure to introduce our speaker this afternoon. Anthony Grafton is the Dodge Professor of History at Princeton University, where he has taught since 1975. He is an extraordinarily gifted scholar of the

European Renaissance. Professor Grafton's scholarly achievements are immense. In 1993, he served as guest curator of the highly acclaimed Library of Congress exhibition of the Vatican Library, and authored the exhibition catalog entitled *Rome Reborn: The Vatican Library and Renaissance Culture*. He also curated the 1992 New York Public Library exhibition documenting the ways in which the discovery of the Americas influenced European culture. His exhibition catalog, *New Worlds, Ancient Texts: The Power of Transition and the Shock of Discovery*, won the *Los Angeles Times* Prize for History.

Anthony Grafton has authored seven major books, including a study of Joseph Scaliger and the history of classical scholarship published by Oxford University Press; a book entitled *From Humanism to the Humanities*, published by Harvard; *Forgers and Critics: Creativity and Duplicity in Western Scholarship*, published by Princeton; *The Transmission of Culture in Early Modern Europe*, published by the University of Pennsylvania Press, and *Defenders of the Text: The Traditions of Humanism in an Age of Science*, published by Harvard University Press. His most recent book bears the magnificent title, *The Tragic Origins of the German Footnote*. Originally published in Germany in 1995, this book will appear this year in English, published by Harvard University Press.

Tony Grafton is a wonderfully fitting choice as the Harold Jantz Lecturer. Like Professor Jantz, Professor Grafton is a scholar whose intellectual and humanistic commitments are at once deep and wide, and whose work both cuts across and pulls together the humanities. And like Professor Jantz, Anthony Grafton has a deep commitment to the teaching of undergraduate students. At Princeton, Professor Grafton, as a Professor of History, designed and implemented the Freshman Seminar Program, which subsequently became a model for such programs throughout American colleges and universities.

Professor Grafton is speaking to us this afternoon about the German Renaissance printer, Johannes Petreius. I hope that, if you have not already had a chance to view the Petreius exhibition in Mudd Library that accompanies his talk today, you will do so soon. It is my distinct pleasure to welcome Professor Anthony Grafton, our 1997 Harold Jantz Memorial lecturer.

Nancy S. Dye  
President  
November 1, 1997

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JOHANNES PETREIUS (c. 1497-1550):  
A STUDY IN THE HISTORY OF LEARNED  
PUBLISHING

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Publishing fascinates and puzzles us. Article after article confronts the many contradictions of its current state. "All is well," cry some observers. Editions of classical texts like the Library of America flourish, difficult writers like Don De Lillo produce best-sellers, and university presses churn out thousands of technical and demanding monographs. To be sure, these last usually sell in the high two figures. Even so, they represent a continued commitment to the difficult, the unusual, and the dissident. In every American suburb, massive bookshops leaven the cultural lump of highway strips and shopping malls. Amid the faux-wood panels and bubbling cappucino machines, browsers cast nervous glances upwards at shelves bowed under enough heavyweight literature to exterminate the entire cast of *Howards End*. At one end, a chef demonstrates her art; at the other, a group of local poets read their work aloud. The great wheels of commerce turn endlessly, as vast and arbitrary as the zodiacal signs of ancient astrology, ruling our lives and our culture. But their spokes still contain channels up and down which the most radical messages may run.

For every optimistic voice, however, two or three pessimistic ones resound. Literature, they tell us, still exists—but it literally occupies less space in the megastores than something sinisterly labelled "fiction," which has brighter covers and fewer pretensions. "Fiction" is flanked in its turn by other, even more saleable genres, from the dry-biscuit English mysteries supposedly beloved of critical, Anglophile New Yorkers and Angelenos, to the moist and heaving romances, known in the trade as bodice-rippers, which the same urban readers sneak home in much greater numbers.

Neither the scale nor the pretensions of the new bookshops impose respect on their critics. The chain stores are larger, less dusty, and often more enterprising than the old independent bookshops they have driven out of business. They sell CDs, coffee beans, and cookies; they provide a clean, well-lighted place for the hip young to read and flirt. But they have also become an out-of-control cart that drags the horse of publishing wherever they want it to go. They pay little attention and give even less window and front table space to demanding books—as opposed to the Near Death Experiences of the celebrated old and the anti-feminist broadsides of the attractive young.

Publishing, for its part, has become almost completely detached from its onetime mission of helping writers and forming tastes. Maxwell Perkins—as everyone knows—fostered the talent and bore with the failings of Scott Fitzgerald and Thomas Wolfe, spending his own money to support the former when he could no longer earn enough by writing and applying his own taste and talent to make the latter publishable. Modern editors, by contrast, spend their days lunching expensively and their houses' money on advances that the ghosted celebrity memoirs they lust for will never earn back. These tactics would cause them career problems, if they had any intention of remaining at one house long enough to see a given title through from optimistic contract to publication to the remainder market. (Simple arithmetic explains this phenomenon: the average trade book takes 5 years to complete, from the signing of the contract to publication day; the average editor stays two and a half years in each job). No wonder that when so fine a spirit and writer as Cynthia Ozick recently took part in a forum on the publishing industry, she ended up humiliated by the public revelation of her own low sales, which the head of Barnes & Noble cited as part of a reply to her critique. Publishing, as now practised, fits all too well into the New York society and culture which were themselves so well described by Tina Brown's *New Yorker*. The story was nicely epitomized by a recent, amusingly sleazy movie in which Jack Nicholson played a dedicated literary editor who turned into a werewolf.

In fact, of course, neither the cries of satisfaction nor the groans of dismay are new. Two generations ago Herman Wouk devoted a thick, stirring novel, later turned into a goopily romantic Hollywood movie, to the career of Thomas Wolfe, which he replayed under the thin disguise of *Youngblood Hawke*. The swarming cast of characters represented both the fine literary vision of some New York publishers and the fanged rapacity of agents, editors and hangers-on. Long before Wouk, George Gissing staged memorably depressing conversations between Edwin Reardon and Jaspar Milvain in his novel *New Grub Street*, that gripping demonstration of how the three-decker novel and circulating-library system of high Victorian England crushed the life out of a modestly talented writer, while the sleazy, gossip-choked magazines of the same period gave a more ambitious and realistic colleague the means to climb. In every period of modern history, in fact, some authors and readers have praised, and others damned, the publishers with whom they had to work. One can trace the same antiphonal patterns back from the modern age of the rotary press and the mass novel to the heroic age of handmade books and learned publishers, the early sixteenth century. The great Erasmus lavished kind words on Aldo Manuzio, whose pretty Italic type had made his reputation, and whose Greek editors had opened



up to him the rich stores of their literature. But his fellow northern scholar Johannes Trithemius denounced the printers for producing work so sleazy, and of so little durability, that it could never outlast the magnificent work of the scribes. Even Martin Luther, famed for his use of printing to advance the cause of Protestantism on every level from the political to the pedagogical, lost no chance to express his irritation at the ignorance, greed and fatuity of the printers he worked with.

Publishing naturally evokes radically divergent reactions. For it is itself hardly simple or seamless. At once an economic and a cultural activity, publishing seeks both to make money and to achieve intellectual and artistic ends, to give an audience something it already wants and to let an author say something never said before. Publishing, in other words, necessarily serves both God and Mammon; in fact, it cannot serve one without serving the other. This inevitable conflict of ends, moreover, goes with an unavoidable conflict of means. For publishing requires collaborative efforts from radically different people of radically different social and intellectual types—intellectual and manual workers, creators and gatekeepers, Eugene Gants and Willy Lomans. These efforts often take place in conditions of high difficulty and strain. Large investments must be made with no assurance of return, vital decisions must be taken with little time for thought, and commercial and intellectual considerations may suggest conflicting, or even contradictory, decisions. Economic pressures condition publishing in modern America and England. But ideological pressures also play some role even in these relatively open markets of ideas—and they play a much larger one in the dictatorships, rightwing and leftwing alike, that still cover so much of the globe, as they did through much of the past in western Europe and America. No wonder, then, that publishing calls forth, in modern New York and Paris as in Renaissance Nuremberg and Naples, cries of wonder and lamentation at one and the same time.

My subject today—the Nuremberg printer Johannes Petreius, who lived from around 1497 to 1550—offers us the chance to undertake a particularly informative case study in the splendors and miseries that accompany publishing at its highest level. For Petreius has been famous, from his own time down to ours, as both one of the most public-spirited and one of the most chicken-hearted of learned printers in the great age of learned printing. An impresario of erudition, he both promoted and subverted the most radical intellectual messages of his time.

Like many great publishers, Petreius entered the field as a dropout from graduate school. A relative of the Petri family of Basel, which became one of the longest-lived and most productive publishing dynasties of the sixteenth century, he entered the University of

Basel in 1513, receiving a BA in 1515 and an MA in 1517. By 1519 he was already working as a corrector—a learned editor, responsible for preparing copy and reading proofs—in the house of his relative Adam Petri. Like most correctors, he evidently took this post to support himself while preparing to win a doctorate and seek an academic or professional post. Early in the 1520s, however, Petreius inherited a printing-house in Nuremberg from a friend. In 1523 he took the oath that made him a citizen of Nuremberg, and in 1524 he brought out a list of 16 books. By his death in 1550, Petri would publish some 800 titles—an extraordinary series, which included, as we will see, some of the most innovative books of the sixteenth century in a wide variety of fields.

Petreius' success resulted, in large part, from the location of the press he inherited. Nuremberg occupied an unusual position among the 130 or so free cities of the Holy Roman Empire. Its population of 45 to 50 thousand included many of the most skillful of those extraordinary craftsmen who made German material culture, before the Thirty Years' War, so spectacular. The city's strategic location, the spiderweb of mercantile and financial connections that bound it to other centers of trade and industry from Plymouth to Prague, and the high quality of its artisans made it a natural center for publishers at every level. Fifteenth-century Nuremberg housed the largest and best-organized printing house in Europe, that of Anton Koberger, who had 24 presses, sent out travelling salesmen equipped with broadside advertisements of his products, and kept his workforce under severe and constant discipline, silent and sober. Painters and graphic artists pullulated in Nuremberg's alleys, even if the greatest of them, Albrecht Dürer, complained that he had to go to Italy to be treated as a gentleman. In the later fifteenth century, moreover, Nuremberg's artisans collaborated to make the city itself more splendid: stone bridges replaced wooden ones, the steeple of the St. Sebaldus church rose higher into the South German sky, and church interiors swarmed with magnificent new limewood sculptures of Christ and the Holy Family.

Literary life in Nuremberg took the form of the vernacular comedies of Hans Sachs, which only a Germanist can love. But intellectual exchange became livelier and livelier towards the end of the fifteenth century. True, this prosperous and cosmopolitan city had no university. But by the 1490s it was becoming a center of privately conducted humanistic scholarship. The patrician Willibald Pirckheimer, who studied Greek texts and wrote Latin ones at a level that won the respect of Erasmus, built a great library and tried to convince the emperor Maximilian that Egyptian hieroglyphs were the first and most profoundly symbolic kind of writing, and that Maximilian himself was a successor to the Egyptian pharaohs (Maximilian was

apparently convinced, despite his tendency to remember the humanist's name as Pitzinger).

But Petreius also brought great and unusual personal gifts to the task of learned publishing. Like that later paragon of learned printing, Benjamin Franklin, Petreius knew the virtues of early rising and hard work. His varied and complex business—which can be reconstructed both from its products and from his letters to some of his customers—involved not only the discovery of titles to print and the production of books, but also the selling of old and new books. He took a personal interest in every detail. To his customer Stephan Roth, a notary in Zwickau, for example, he wrote to explain why he could not immediately deliver a set of the *Corpus iuris* of Justinian (“You should know that there is not a single copy of the *Corpus* here, and we are waiting every day for copies to arrive from France; if they come, I will send one immediately, if not you must have patience”). The *Corpus*, a large and expensive book, was worth any publisher's time. But Petreius also took the time to advise his customer on the choice of less expensive books (“There is no copy of the Basel edition of Josephus for sale here, but it's no better than the Cologne edition; it's just a translation [‘dann es ist ein translatz’]”). Petreius had books bound for him, sent him a missing gathering from a new publication that had been shipped prematurely, and regularly passed on the worrying or inspiring news items he had gleaned from the recent *Zeitungen*, or short printed newsletters, that he evidently sold along with the learned Latin books in his shop (“according to the newsheets that have arrived today, the Turk will certainly invade”). The printer's shop, as Elizabeth Eisenstein emphasized in her classic survey of the impact of print, became a principal node on the rapidly growing information networks of Renaissance Europe.

If Petreius sometimes passed along political and religious gossip, he did not print it himself. His 800 titles were for the most part costly, technical and demanding books, often on the cutting edge of taste and learning. Though his own archives do not survive, his letters to customers and authors show the depth of his concern for the scholars whose work he used and the minute detail in which he negotiated with them about every detail of their work. The Geheimes Preußisches Staatsarchiv in Berlin-Dahlem, for example, contains a wonderful unpublished letter of 1549 from Petreius to the Wittenberg astronomer Erasmus Reinhold. Reinhold was then at work on compiling the first set of astronomical tables based on the new astronomy of Copernicus—a task, as he regularly complained, which took a very long time and cost a great deal of money to carry out, since Reinhold had to pay for young students to do the thousands of repetitive computations it required. Petreius showed unbounded enthusiasm for this taxing project. He begged Reinhold to send him

the manuscript, or part of it. In fact, Petreius went so far as to urge the astronomer to come to Nuremberg, where he could work in “his own parlor and apartment,” [“ein eigen stublin und gemach,”] in Petreius’ house. And he also suggested a plan for a new work on astrology—one which, unlike the other works then on the market, would explain in simple, practical terms how to erect a horoscope (a job at which, as we will see, Reinhold was quite expert). Few publishers before or after have rivalled Petreius’ dedication to obtaining and publishing the best books, however costly they might be.

Printers, as I have already suggested, did not work alone. They needed workmen to produce their books, clerks to make and record sales, and learned correctors to turn the messy copy authors produced into something legible enough to print from as well as to read the proofs that the workmen created. Nowadays we marvel that French printers who knew no English produced one of the founding masterpieces of twentieth-century English prose, Joyce’s *Ulysses* (and introduced scores of errors into it). To understand the world of early printers like Petreius, we must bear in mind that if they wished to reach a buying public larger than the small group who spoke their dialect of German or French, they had to publish in Latin—a language their workmen usually knew no better than the Dijon printers who set the first edition *Ulysses* for Sylvia Beach knew English. In these circumstances, the quality of a given printer’s team of collaborators mattered immensely.

Petreius was an idealistic Protestant. In Wittenberg—the “mighty fortress” of Lutheranism, and the site of a small but very active university—he found highly qualified intellectuals ready to collaborate with him. Philipp Melanchthon, Luther’s devoted collaborator, chose texts and wrote dedicatory letters for him. So—much more frequently—did Melanchthon’s learned son-in-law Andreas Osiander, who worked closely with Petreius for a decade and a half, helping him snare promising texts and authors from around the European world. And so did one of the most brilliant young intellectuals of the Holy Roman Empire, the Wittenberg professor of astronomy Georg Joachim Rheticus. This fiery young man published in 1540—not with Petreius—the *Narratio prima*, a phosphorescent piece of fine Latin prose which also offered the European public its first account—hence the title—of the planetary theory of Copernicus. Petreius, as we have seen, was always alert to developments across Europe. But he could also draw on the efforts of brilliant teammates as he developed his lists of texts and authors.

Publishers, finally, also need a market, and here too Petreius showed great insight and ability. He worked with his readers, offering them detailed information about his plans. For example, as he

published the first parts of his great edition of psalm motets—a work of enormous importance for the diffusion of music by Josquin and many others—he explained that he would release the material in segments so as not to overtax the purses of potential buyers. The preface to a later edition thanked his readers for showing such enthusiasm—and for sending in so much new material that Petreius had been forced to delay publication of later parts in order to incorporate it. Yet he was also willing to push his audience, to induce them to develop new tastes—as he did with his magnificently illustrated edition of the architectural work of Vitruvius in German, which did so much to spread the taste for Renaissance classicism in the Holy Roman Empire.

One small case in point will give a sense of the way that Petreius and his editorial team went about their work—and about their remarkable effectiveness in making matches among refractory authors, texts, and readers. No Italian author of the sixteenth century achieved a wider European fame, or did so in more fields, than the medical man, astrologer, and natural philosopher Girolamo Cardano, to whose medical career Nancy Siraisi has just dedicated a splendid book. Cardano, who lived from 1501 to 1576, makes appearances in histories of mathematics, as one of the creators of modern algebra; also in histories of technology, as one of the creators of what Europeans call “le cardan” or “das Cardangelenk,” the universal joint. His books eventually sold well, not only in Italy, but throughout Europe; some became best-sellers which received the highest literary compliments of the period, ferocious attacks and shameless plagiarism. The most important natural philosophers of the sixteenth and early seventeenth centuries mentioned and cited him regularly. He even received and accepted an invitation to travel to far-off Paris—and then, to distant and barbarous Edinburgh—to provide medical advice for Hamilton, the last Catholic archbishop of St. Andrews. Cardano saved the Archbishop’s life, receiving an enormous honorarium and giving his lucky client fifteen more years to enjoy before Protestants executed him.

Cardano devised many of the customs and practices of modern academic life. He drew up, for example, a list of the 73 important writers who had cited him, or mentioned him with praise. He thus deserves the credit (if credit is due) for a device most people wrongly think of as a creation of the modern sociology of science, the citation index. Cardano even anticipated many of the new scientific and literary possibilities offered by the computer. To readers of his *On subtlety*, for example, he offered an easy recipe for writing a new book or revising an old one. Simply take two copies of the written text; cut them up into sections and try them in new sequences until satisfied; glue the results into a stout notebook made of cardboard and give it

to the publisher. Anyone who has read two texts, or two versions of one text, by Cardano knows how seriously he took his own advice—and how well he would have used the merge function of a personal computer.

Cardano regularly revealed the vanity that marks all great professors. He wrote not one, but four versions of his autobiography, as well as several analyses of his own horoscope. He interpreted the myth of Narcissus in a novel way: the youth who fell in love with his own reflection in the water stood, he thought, for the scholar who lost himself in pleasure reading his own work. Cardano prided himself on the fact that—at least in the virtual form of his own books—he was regularly loved by beautiful readers (“women read too,” he reminded his own, presumably male, gentle reader). And like all good heroes of satirical novels, he paid the price, and more than the price, for his misdeeds, as we will see. Cardano, in short, cut a heroic figure even in the mid-sixteenth-century’s heroic age of polymathic scholarship.

In the late 1530s, however, Cardano did not bestride the world of letters like a colossus. Impoverished and isolated, humiliated—like Erasmus—by his illegitimate birth, he could find no way to publish his demanding works of science and scholarship in war-ravaged Milan. In fact, he could barely make a living. He did, however, also manage to print a few short books. In one of these, he appended a long privilege. This sixteenth-century form of copyright took the form of a legal document, granted by the local political authority, which gave an author or publisher sole right, for a term of years, to bring out editions of a given book or books. Unusually, Cardano’s privilege asserted his sole right to publish not only the short text on mathematics in which it appeared, but a whole series of other books in every field of learning. Cardano’s list caught Osiander’s eye. He brought Cardano to Petreius’s attention; and in 1543 Petreius brought out a whole series of Cardano’s books. It is not hard to see the guiding Protestant hand of Petreius and his collaborators in the form some of these took.

Cardano, for example, had a collection of horoscopes that he wished to publish. And horoscopes mattered deeply in the sixteenth century Holy Roman Empire. Erudite professors, saturnine princes and hard-driving businessmen had elaborate genitures drawn up for their children so that they could know in advance what talents and life chances they had. In Wittenberg, moreover, horoscopes mattered for public as well as private reasons. The leading Italian astrologer, Luca Gaurico, a consummate curial insider who set the time for laying the foundation stone of the Farnese wing of the Vatican, came to Wittenberg and Nuremberg in the spring of 1532. Luther’s birth year—like that of many prominent sixteenth-century figures—was uncertain; he himself thought he had been born in 1484, but his

brother set the birth in 1483. Gaurico—according to Melanchthon—approved the date 1484. But he did so for nefarious reasons, as his own publication of Luther's horoscope made clear. In 1484, as all astrologers knew, a threatening conjunction of Saturn and Jupiter had taken place; many writers had predicted that an evil prophet would arise then. Gaurico's horoscope made clear that the Protestant prophet—not the pope he condemned—was the Antichrist.

Cardano's collection of horoscopes—which Petreius printed in 1543—refuted both Gaurico's dating and his interpretation of it. He set Luther's birth in 1483, and praised the dedication and fortitude which the stars attributed to this radical reformer. Himself a Christian humanist of an old-fashioned kind, Cardano warmly admired Erasmus, a suspect figure in the Counter-Reformation, and probably sympathised to some extent with the Reformers. But his horoscope for Luther also reveals the collaborative effort of the author and his publisher to produce a text that would be saleable in the Protestant north. They certainly succeeded; annotated copies of Cardano's book appear in every major European library. Melanchthon read the work avidly. So did the Wittenberg astrologer Erasmus Reinhold, whose astrological casebook, now in Leipzig, shows him using Cardano to correct what he described as Gaurico's "conjectural" 1484 horoscope for Luther. Petreius published two editions of Cardano's work, in 1543 and 1547. In each of them Cardano printed, for the first time, materials that Petreius' team gave him: for example, the horoscope of the Nuremberg artist Albrecht Dürer.

Cardano's collaboration with Petreius did not limit itself to the dubious zone of astrology, moreover. A brilliant mathematician, Cardano played an active part in the great burst of algebraic discovery that took place in the Po valley in the early sixteenth century. In 1545, he published—again with Petreius—the first large-scale Latin work on algebra, the *Ars magna*. Sixteenth-century books had no jackets. But Petreius found a place for what is unmistakably the ancestor of a modern publisher's blurb: the bottom of the title page itself [FIGURE 1]. In this text Petreius described Cardano's work as book ten, only, of a still larger work on all of arithmetic. He also brilliantly combined praise for what Cardano revealed in the book with teasing references to the treasures still to come in later works:

In this book, learned reader, you will find the rules of algebra (which the Italians call the rules of the coss)—and so enriched by the author's new discoveries and proofs that the few little algebraic rules previously published have here become seventy in number. They explain not only the problems where one term equals another, or two equal one, but also those where

two equal two or three equal one [Cardano's book offered, in modern terms, the first full classification of and rules for solving cubic and biquadratic equations.] We decided to publish this book separately. For once this incredibly complex and inexhaustible mathematical treasure has been brought to light and set out, as if in a theatre, for everyone to see; readers might be stirred up to embrace even more eagerly the remaining volumes of the complete work, which will be published separately, and to feel less distaste for the task of working through them in a thorough manner.

The rest of Cardano's mathematical work did not reach print until many years later. But the *Ars magna* was a great and provocative book on its own. Its appearance stimulated one of Cardano's chief Italian rivals, Niccolò Tartaglia, to claim that Cardano had plagiarized him. Like a mathematical counterpart to the touchy, duel-happy courtiers of the same period, so brilliantly described by Cardano's fellow citizen of Milan, Baldesar Castiglione, Cardano's student Lodovico Ferrari decided that honor must be satisfied. He printed a challenge to Tartaglia, demanding that Cardano's accuser meet him to dispute scientific topics in public, for a large money prize. Counter-challenges and counter-counter-challenges, pamphlets and polemics flew. The mathematical duel actually took place, in 1548; Ferrari apparently won. More important, Cardano's book and the media events surrounding it made algebra, for the first time, into a pursuit of wide interest to the entire European learned world. The new mathematics of the Italians made its way into university curricula. It supported the claim of the moderns to have invented sciences unknown to the ancients. And as developed by Bombelli, Viète and others, it became a fundamental tool of the New Philosophy of the seventeenth century. All of this Petreius' collaboration with Cardano made possible.

Even now the collaboration did not end. In 1550, at the very end of his life, Petreius brought out Cardano's massive compendium on natural magic and philosophy, the *On subtlety*. This spectacular book bore another clever blurb on its title page, and neat woodcuts illustrated Cardano's brilliant technological devices, which ran from the practical sublime (like a chimney that would not smoke) to the ambitiously ridiculous (like his device for floating sunken ships). More accessible than Cardano's work in mathematics, more alluring than his astrology—this is the work in which Cardano explained why candles made from the fat of dead men burst into especially bright flame in the presence of gold—*On subtlety* survived the death of its publisher, going through edition after edition. Success, unfortunately, breeds jealousy. *On subtlety* became the object of the worst



book review in the history of European letters. Julius Caesar Scaliger, another vain and articulate natural philosopher of Italian origins, devoted more than 900 quarto pages to refuting it, and promised to return to the subject at still greater length. Though Scaliger died without producing more than a fragment of this promised polemic, his *Exercitationes* became a standard work in university curriculums—perhaps the only book review ever known to undergo transformation into a textbook. Yet Scaliger's attack did nothing to harm Cardano's own great success as an author—a success that Petreius still furthered, long after his own death. For once Cardano lost his publisher in Nuremberg, he simply turned to Petreius' relatives in Basel, the Petri, with his later works.

Petreius turned a failed Milanese doctor into a figure with a European reputation. He brought Cardano to readers, literally, from London to Vienna. He enabled Cardano to escape the slowly but unmistakably growing parochialism of Italian intellectual life in an age of war and poverty, and to avoid the increasing rigors of Italian censorship as the Counter-Reformation finally took hold. Above all, he made it possible for Cardano to bring out, in a correct and attractive form, one of the great scientific works of his or any other age—a work both far too expensive and far too technically difficult for the printers of Cardano's own region. It would be hard to imagine a more benign or exemplary relation between author and editor than this one—even if Petreius did, apparently, make Cardano's works a vehicle for his own particular economic and religious ends. The complementary evidence of archival documents, books and manuscripts shows that Petreius played an essential role in the making of new authors and the creation of new kinds of public discussion and debate.

Cardano, moreover, was not the first innovative scientific writer to appear on Petreius' list. In 1543, the same year that he published Cardano's collection of horoscopes, Petreius also published the *De revolutionibus* of Copernicus—the audacious book which asserted, on the basis of exhaustive study of the astronomical evidence, that the sun, rather than the earth, was at the center of the universe [FIGURE 2]. Few books in human history have contained anything more revolutionary than the diagram in which Copernicus reversed the traditional cosmologies, which put the earth in the lowest, but also the most interesting, of situations, the central stage for dramas of salvation and damnation [FIGURE 3]. Copernicus' work spelled the gradual but inevitable doom of a whole picture of the world. It also proclaimed the arrival on the literary scene of a new kind of author: the professional expert whose technical knowledge entitled him to pursue his arguments wherever they might go, however radical their conclusions.

Petreijs, moreover, played a very active role in bringing Copernicus' work into print. Copernicus, after all, lived not at a university or in one of the Holy Roman Empire's lively cities, but at Frauenburg, deep in Ermland, not far from Danzig and Königsberg. A busy cathedral canon, he spent much of his time on the administration of the lands, bakeries and breweries of the Bishop of Warmia; he also worked as a physician. Only in his spare time—as when Albrecht von Hohenzollern and the Teutonic Knights invaded Ermland—did Copernicus manage to continue carrying out the kinds of astronomical observations he had learned to make as a student in Bologna. He claimed, in the preface to his work, that he had waited not only for the nine years recommended by the Roman poet Horace in his *Ars poetica*, but for three times nine years, before daring to publish his work, and that he did so only because friends had urged him to do so. This modest, even hackneyed disclaimer seems to have been utterly sincere in Copernicus' case. For though he had established the outlines of his theory by around 1514, he did not submit his finished work for publication until 1542.

Copernicus decided to publish, moreover, only because Petreijs and his team forced his hand. In 1539, Rheticus—who was making a kind of scientific pilgrimage, which included a stop in Nuremberg—came to visit him. He brought several of Petreijs' scientific books to give Copernicus, with whom he studied, learning the basics of his new system. From friends Rheticus heard how Tiedemann Giese, once the astronomer's closest friend—formerly a fellow canon in Frauenburg, now bishop of Kulm—had urged him to publish his theories. He himself somehow persuaded Copernicus to give him the manuscript of his great work, and in March 1540 he published, at Danzig, the *Narratio prima*. In this pamphlet, which took the form of an open letter to the astronomer Johannes Schöner, Rheticus described the Copernican system with great precision and considerable literary charm. Even this limited publicity worried Copernicus, however. In July 1540 he wrote to Osiander, asking his advice about the opposition which, so he anticipated, theologians and philosophers might show to his new theory. Evidently he was still hesitating.

Petreijs, however, now jumped in. In August 1540 he printed a fourteenth-century astrological work from the library of Regiomontanus. As a preface to this he wrote an open letter to Rheticus, whose unusual devotion to learning he warmly praised: "the men of our time," wrote Petreijs, "do not value what is beneficial for the common good, but as is customary to the greedy sort of merchants, they concentrate upon money and profit. Therefore, my Joachim, I congratulate you for your discernment: though you could follow others' example and pursue the lucrative arts, you have set yourself a different course." In particular, he praised the devotion to

astronomy that had led Rheticus “to the farthest corner of Europe, to a distinguished gentleman [Copernicus] whose system, by which he observed the motion of the heavenly bodies, you related to us in a splendid description.” Petreius acknowledged that Copernicus did not follow “the common system by which these arts are taught in the schools.” But he said that he would consider it “a glorious treasure” if Rheticus could somehow arrange to have Copernicus’ “observations” communicated to him. After all, they would be of great value for astronomy and astrology—an art, as Petreius pointed out, “which has sure and great advantages for conducting one’s life properly and without superstition.” No publisher could have made a more aggressive advance towards a coy author—or have done so in terms better calculated to win assent.

Copernicus’ opposition ebbed away. He worked away, revising his book. Rheticus—with the help of a letter of recommendation from Albrecht of Hohenzollern—managed to obtain a period of leave from his teaching post at Wittenberg to put Copernicus’ book through the press. He delivered the fair copy in May 1542, and spent much of the summer correcting the proofs. When he had to go to Leipzig in October 1542, Osiander took over. For Copernicus—though he wrote a preface to Pope Paul III in June—could not come to Nuremberg. By December 1542 he was mortally ill, stricken by the cerebral hemorrhage and paralysis that would cause his death in May 1543. The book, which appeared by 21 March 1543, was his work in an intellectual, but not in a practical sense.

And here is—as the Germans would say—“*der Witz an der Sache*.” For the book, as it appeared, belied its author’s intentions in at least one crucial respect—and did so so radically that his friend Giese and Rheticus actually tried to sue Petreius before the Nuremberg town council, demanding that he issue a corrected edition. Copernicus firmly believed that he had identified not a possible but the only true cosmology—the plan that God had actually followed in creating the world. His hesitation to publish stemmed not from any sense that his work was technically incomplete but rather from a fear that theologians and philosophers would attack him, citing the physics of Aristotle and the miracle of Joshua in the Old Testament to refute his theory. These fears were not unjustified, as everyone knows. Philosophers and theologians found it hard to swallow the new cosmology. Many religious and political authorities reacted to it with all the tolerance one might expect. “*Der Narr*,” snorted Luther, when he heard of Copernicus’s theory in 1539, “*will die ganze Kunst Astronomiae umkehren*.” In the Catholic world, Copernicus’ book and theory were soon condemned—a condemnation that would cost Galileo his freedom and eventually weigh heavily on the intellectual life of the whole Catholic world. How then to publish without causing

a scandal that might prevent the new theory from being considered on its merits?

Osiander, whom Copernicus consulted, suggested an adroit solution to Copernicus's dilemma: "I have always been of the opinion that hypotheses are not articles of faith, but bases for calculation, so that even if they are false it does not matter provided that they yield the phenomena of the motions exactly." To Rheticus, he urged that "the peripatetics and theologians will be easily placated if they hear that there can be diverse hypotheses about the same apparent motion and that they are not advanced as being certainly so, but rather as governing the calculation of apparent and composite motion as expediently as possible." Copernicus and Rheticus rejected this solution out of hand. But Osiander, not Rheticus, oversaw the final production of the book. And he inserted into it an anonymous preface, headed "To the reader, on the hypotheses in this work," in which he argued that readers would be wrong to take offense at Copernicus's book. For it offered only something in the best tradition of astronomy: a set of hypotheses, or models, better adapted than the traditional ones to the data and the techniques of computation. Petreius—or Osiander—added a blurb to the title page which echoed, in advance, the preface, with its effort to make this radical book harmless [FIGURE 2]:

In this work, studious reader—one both written and published in the very recent past—you will find the motions of the fixed and wandering stars [in modern terms, the stars and the planets] restored, on the basis of both ancient and modern observations. They are also adorned with new and remarkable hypotheses. You will also find very handy tables, with which you can compute these motions very easily for any given time. Therefore buy, read, enjoy.

Nothing could sound more innocent—or more in contrast with the Greek motto drawn from Plato just below the blurb, which warned that "no one ignorant of geometry may enter here." The revolutionary book on revolutions had its sting drawn, at the very start. Copernicus, in other words, reached the world thanks to Petreius and his team of advisers—but he also reached it *en travesti*, because of them.

No wonder that local readers—like the Nuremberg Senator Hieronymus Schreiber, to whom Petreius gave this copy of the work—reacted with irritation, striking known additions from the text and inserting Osiander's name before the anonymous preface. Though Petreius never issued a revised edition of the text, his and Osiander's conduct has repeatedly been the object of sharp criticism—for example, from the great Johannes Kepler, who also saw the Coper-

nican theory not as one model among many but as the simple truth, and who reconstructed the history of the first edition in order to show that Copernicus had regarded his own work as Kepler did. Should we—like Copernicus' friends—condemn Petreius?

I would hesitate to do so. In the first place, Copernicus himself—like any author, now or then—had ideas of his own about how to position his work so that it and he could 'scape whipping. Where Osiander tried evasive philosophical action, Copernicus fired preemptive rounds of counter-authority at the authorities he feared would condemn him. He wrote a long letter of dedication to Paul III, in which he insisted that he had derived his heliocentric hypothesis from ancient authorities of his own, Heraclides of Pontus and Ecphantus the Pythagorean—and thus could not be condemned as a wild innovator. He also supplied Petreius with a supportive letter he had received some years before from a German cardinal, Nicolaus Schoenberger. Though less flexible than his editors, in short, Copernicus had no objection to disguising his work as less radical than he knew it was. His tactics are perfectly understandable, moreover: the intellectual climate was growing ever chillier, and innovative books required protective coverings of a sort that would have been less necessary in his youth.

Petreius and his staff, moreover, did a remarkable job on Copernicus' book. Editing this required more than simple reproduction of his manuscript—though that was a demanding task in itself, which they carried out very deftly. Only in Nuremberg, in all of northern Europe, could one have found printers and editors on this level. The city had a strong tradition of interest in the mathematical sciences. In the fifteenth century, the brilliant astronomer Joannes Regiomontanus had settled there, attracted by the skills of the local printers and instrument-makers—as well as by the fact that Nuremberg had no stuffy, tradition-bound university, whose professors might interfere with his plans. He intended to bring out a whole series of classical and modern works on mathematics, astronomy and geography. The plan failed when Regiomontanus, called to Rome to consult on the reform of the calendar, died suddenly (supposedly by the poison so often administered to heroic individuals in Renaissance Italy). But his books and a few disciples remained in Nuremberg, which gradually became something like the center of scientific work and publishing Regiomontanus had hoped to create. Nuremberg was one of the few cities where men like Bernhard Walther could continue Regiomontanus' effort to correct the astronomy of the ancients by making systematic observations of stars, planets and comets. It was also one of the few places where one could publish—as Johannes Schöner did, in 1544—detailed diagrams and instructions for making and using astronomical instruments.

Petreijs and his team, moreover, did more than simply correct printers' errors, as Noel Swerdlow has demonstrated in detail. They drew up lists of errors of substance in the work—errors which they corrected, sometimes entering the correct readings in ink in certain copies of the text, but also listing many of them in a printed sheet of errata which accompanies some but not all copies of *De revolutionibus*. The heading of this sheet deserves special attention. It states that the errors were listed after the printed text of Copernicus' work had been "critically reviewed and compared with the author's manuscript" [FIGURE 4]. And in fact, a number of the corrections amount not to the rectification of typographical errors but to the emendation of Copernicus' own long and complex text. These corrections, moreover, unlike stylistic ones, are demonstrably correct, since they follow from the parameters given elsewhere in the text. Rheticus and Osiander—themselves experts in astronomy—evidently wrestled with the text in such detail that they not only printed Copernicus; they edited him. The most correct text of his work—like the misleading version Petreijs printed—is a social, not a purely individual, product. Authors, as Michel Foucault taught with his characteristic combination of penetrating insight and wild exaggeration, are always the creations of social and economic systems. Copernicus makes no exception to this rule: but let us note that the system did not only distort what he wrote, but also literally made it clearer.

In one crucial case, indeed, the publisher made Copernicus' theory look more radical than its author had ever intended. The diagram of the cosmos in the surviving manuscript of *De revolutionibus* [FIGURE 5] makes clear that Copernicus, for all his radicalism, did not mean to abandon the traditional theory that solid, transparent crystalline spheres held the stars and moved the planets. The printed version clarified his system in one respect, by making room, within the sphere of the earth, for the moon. But it also confused matters, by placing the labels of the spheres of the superior planets and the fixed stars outside, not inside, the spheres that held them [FIGURE 3]. The diagram could easily make an unwary reader think that Copernicus had envisioned not a relatively thin sphere holding the fixed stars, but an infinite cosmos. From the late sixteenth century on, many readers, like Robert Recorde and Giordano Bruno, read exactly that message into the complex hieroglyph of the printed text. Petreijs' version of Copernicus was probably radicalized inadvertently, in this instance, but it was radicalized nonetheless.

In the end, Petreijs' achievement in this case outweighs the wrongs that prudence led him and Osiander to commit. He made Copernicus' radical book available, and gave it a protective coloration that enabled it to avoid at least some of its natural predators. From the moment it appeared, the best astronomers in Europe—as Owen

Gingerich and Robert Westman have shown—read *De revolutionibus* with unremitting patience and care, line by line and number by number. Whatever the authorities might say, the astronomers found themselves wrapt in dialogue with their dead hero. In fact, they confided their arguments with the text chiefly to the margins of their own copies. Kepler's personal copy of the book—the very one first annotated by Hieronymus Schreiber—and others became palimpsests, recording two and three generations of discussion and debate. Tycho, Galileo, Maestlin, Bruno, Kepler himself—all owed their knowledge of astronomy and their commitment to Copernicus to Petreius' compromised but provocative book. More than a hundred copies of the first edition of *De revolutionibus* survive. Their margins are the archive of a conversation too extended and intensive for any authority to close off, a readership too wide for any form of repression to eliminate.

Historians of early printing have concentrated their attention on heroic figures like Sweynheym and Pannartz or Aldo Manuzio, men who printed what they believed in without reckoning the odds, only to find themselves—as Sweynheym and Pannartz bitterly complained—in houses “full of gatherings but empty of food,” fobbing off their learned correctors with low pay and bad dinners—but doing so in order to make the classics available, beautifully printed, in too many copies for any future barbarian invasion to destroy. Petreius, by contrast, was human—perhaps all too human. Just for that reason, however, he claims our attention even more than the heroes whose purism he could not bring himself to share. In his mixed motives and flawed actions, the dilemmas and achievements of publishing stand out as vividly as the features in a woodcut portrait of the time, challenging us to ask if we could hope—not to do better, for no modern publisher, commercial or academic, comes close to doing so—but to do as well.

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### A NOTE ON FURTHER READING

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This informal lecture presents the results of research which I have been carrying out for some time; a more detailed account will form part of *Cardano's Cosmos: The World and Work of a Renaissance Astrologer*, to be published by Harvard University Press in 1999. On the general situation of publishers, writers and readers in modern America, see the contrasting accounts of Sven Birkerts, *The Gutenberg Elegies: The Fate of Reading in an Electronic Age* (Boston, 1994) and James O'Donnell, *Avatars of the Word: From Papyrus to Cyberspace* (Cambridge, Mass., 1998). On the larger History of Reading see the entertaining and informative survey by Alberto Manguel (London, 1996). And on the invention of printing see Elizabeth Eisenstein, *The Printing Revolution in Early Modern Europe* (Cambridge, 1993) and Michael Giesecke, *Der Buchdruck in der frühen Neuzeit* (Frankfurt, 1991).

On Johannes Petreius see Mariko Teramoto, *Die Psalmmottendrucke des Johannes Petreius in Nürnberg (gedruckt 1538-1542)* (Tutzing, 1983), which offers the most up-to-date account of his life and a full bibliography, and her *Katalog der Musikdrucke des Johannes Petreius in Nürnberg* (Kassel and New York, 1993). Noel Swerdlow has shed light on Petreius' efforts to bring the work of Copernicus to public attention in "Annals of Scientific Publishing: Johannes Petreius's Letter to Rheticus," *Isis* 83 (1992), 270-274, and on his actual dealings with the text of *De revolutionibus* in "On Establishing the Text of *De revolutionibus*," *Journal of the History of Astronomy* 12 (1981), 35-46. On the errata list see also Owen Gingerich, "An Early Tradition of an Extended Errata List for Copernicus' *De revolutionibus*," *ibid.*, 47-52. More generally, on Petreius' dealings with Osiander, Rheticus and others, and on way readers used Copernicus' book, see Gingerich, *The Eye of Heaven: Ptolemy, Copernicus, Kepler* (New York, 1993), esp. 221-268, and Gingerich and Robert Westman, *The Wittich Connection: Priority and conflict in Late Sixteenth-Century Cosmology* (Philadelphia, 1988).



FIGURE 1

HIERONYMI CAR  
DANI, PRÆSTANTISSIMI MATHE  
MATICI, PHILOSOPHI, AC MEDICI,  
ARTIS MAGNÆ,  
SIVE DE REGVLIS ALGEBRAICIS,  
Lib. unus. Qui & totius operis de Arithmetica, quod  
OPVS PERFECTVM  
in scriptis, est in ordine Decimus.



**H**Abes in hoc libro, studiose Lector, Regulas Algebraicas (Itali, de la Cosa uocant) nouis ad inuentionibus, ac demonstrationibus ab Authore ita locupletatas, ut pro pauculis antea uulgo tritis, iam septuaginta euaserint. Neque solum, ubi unus numerus alteri, aut duo uni, uerum etiam, ubi duo duobus, aut tres uni æquales fuerint, nodum explicant. Hunc autem librum ideo seorsim edere placuit, ut hoc abstrusissimo, & planè inexhausto totius Arithmetice thesauro in lucem eruto, & quasi in teatro quodam omnibus ad spectandum exposito, Lectores incitarentur, ut reliquos Operis Perfecti libros, qui per Tomos edentur, tanto auidius amplectantur, ac minore fastidio perdiscant.

FIGURE 2

**NICOLAI COPERNICI TORINENSIS**  
**DE REVOLUTIONIBVS ORBI-**  
**um cœlestium, Libri VI.**

.Habes in hoc opere iam recens nato, & ædito, studiose lector, Motus stellarum, tam fixarum, quàm erraticarum, cum ex ueteribus, tum etiam ex recentibus obseruationibus restitutos; & nouis insuper ac admirabilibus hypothesibus ornatos. Habes etiam Tabulas expeditissimas, ex quibus eosdem ad quoduis tempus quàm facillime calculare poteris. Igitur eme, lege, frueri.

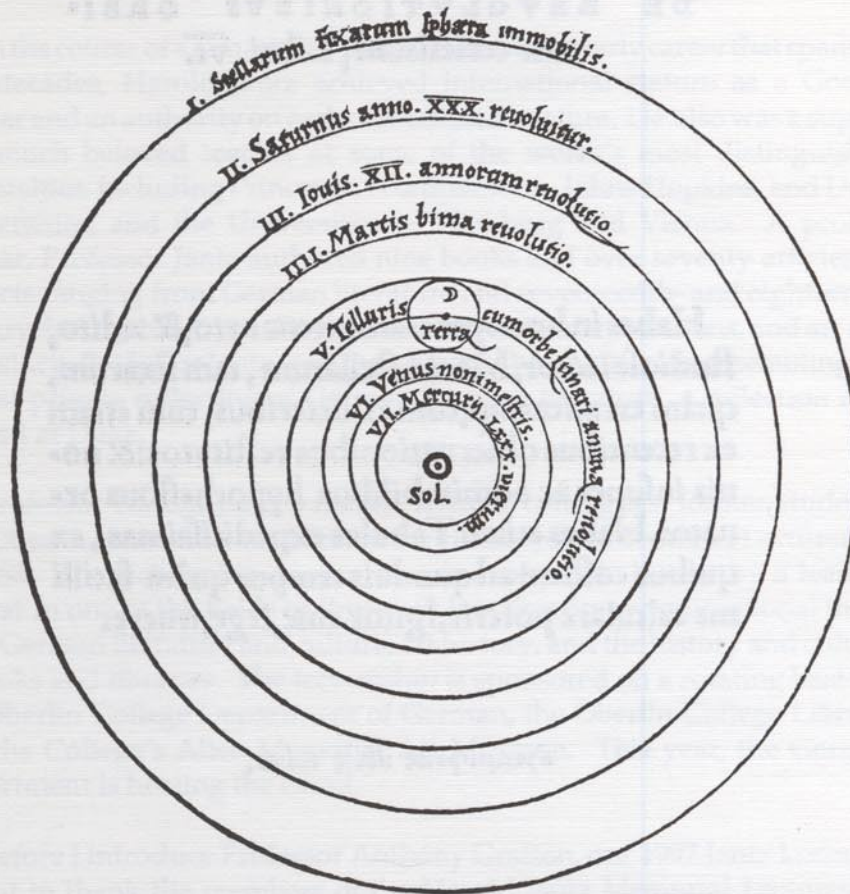
*Ἀγαμέμνωνος ὕδατος εἰσὶ τῶ.*

**Norimbergæ apud Ioh. Petreium,**  
**Anno M. D. XLIII.**

FIGURE 3

## NICOLAI COPERNICI

net, in quo terram cum orbe lunari tanquam epicyclo contineri diximus. Quinto loco Venus nono mense reducitur. Sextum denique locum Mercurius tenet, octuaginta dierum spacio circumcurrens, in medio uero omnium residet Sol. Quis enim in hoc



pulcherimo templo lampadem hanc in alio uel meliori loco poneret, quàm unde totum simul possit illuminare? Siquidem non inepte quidam lucernam mundi, alij mentem, alij rectorem uocant. Trimegistus uisibilem Deum, Sophoclis Electra intuentem omnia. Ita profecto tanquam in solio regali Sol residens circumagentem gubernat Astrorum familiam. Tellus quoque minime fraudatur lunari ministerio, sed ut Aristoteles de animalibus ait, maximam Luna cum terra cognationem habet. Concipit interea à Sole terra, & impregnatur annuo partu. Inuenimus igitur sub  
hac

## FIGURE 4

Recognito & ad autographum opere impresso iterum collato, sequentia emendare curabis. Numerus primus est foliorum, Secundus uero uersuum. Puncti adiecti facies foliorum denotant, unus scilicet primam, duo alteram.

Folio 4. uersu 10 lege posset. 6.33. agitentur. 7.19. terræ. 8.14. quidam. 13.18. circulum. 20.12. quam. 22.7. Si ex K signo. 22.20. duplam. 23.14. rectum E angulum. 23.15. E habens, dele E. 23.9. pro B I, lege E I. 26.35. sub tendentis duplum. 30. pro K in polo antarctico, reponere H, figuræ primæ. 30. 30. pro 19 reponere 29. 31.1. in prima differentiarum pro 55.50. 45.40. 35.3. pone pro singula. 0. 35.13. pro perpendicularare, pone ad angulos rectos. 45.15. com pertam. 50.29. minor. 50.35. pro  $1\frac{1}{4}$  lege  $0\frac{1}{4}$ . 50.20. pro  $20\frac{1}{2}$  lege  $29\frac{1}{2}$ . 51.17. p.5. lege 3. 54.23. maior adñciat. Ibidem linea 26. p. 269  $\frac{1}{6}$  lege 169  $\frac{1}{6}$ . 55.6. pro 165  $\frac{1}{6}$  lege 165  $\frac{1}{12}$ . 55.16. pro  $12\frac{1}{4}$  lege  $327\frac{1}{6}$ . 61.22. pro 196  $\frac{1}{6}$  lege 186  $\frac{1}{6}$ . 61.32. pro  $41\frac{1}{3}$  lege  $40\frac{1}{3}$ . 65.30. semper per Albategnium, intellige Machometem Aracensem. 66.35. unitur I medio. 72.26. pro quibus, lege Nam hic, Hæc quæ sequuntur usq; ad, Sed quoniã, folio 73.13. reñcienda sunt in finem capituli septimi, reliqua consequenter sic emenda. 72.33. pro dextrantes graduum, lege 1. grad. & sextantem. 72.34. pro unius partis & scrup. XL. lege duarum part. & scrup. XX. 73.9. p. scrup. L. lege LXX. 73.11. p. scrup. XX. lege XXVIII. 73.13. p. scrup. XX. lege XXVIII. 74.14. p. XXVIII, lege XLVIII. 75.1. existunt. 77.9. p. dies C I. lege C I s. 77.32. p. V anomaliz, lege LV. 79.26. quadrãs. 84. 29. lege Homocentricus A B C. 86.20. pro E D B lege E D F. 87.4. pars diei, lege partibus. 90.31. loca, æquinoctialium. 91. in hac figura coniunge D I & O I lineis rectis. 93.35. coagmentatos lege. 96.2. pro sunt lege fiunt. Ibidem linea 10. pro motu pertransire, lege motu composito pertransire. 96.18. naturalium. 100.11. autem atq; in F, lege autem in F. 101.31. ipis. 102.8. pro CLXVIII lege CXLVIII. Ibidem linea 12. pro in lege non. Ibidem linea 22. abundant. 106. 18. pro XXXII. lege XXXIII. 107.21. pro B C, C D, lege B E, C E. Ibidem linea 24. pro E C lege B C. 108.3. pro scrup. II. I. Ibidem linea 33. lege quod sub FL. 109.4. pro D F L, lege D E L. Ibidem linea 12. pro G B C, lege G C B. Ibidem linea 24. pro motus lege locus. Ibidem linea 26. pro CLXX. lege CLXXVII. Ibidem linea 29. longitudinis & anomaliz. 109.5. quatuor unius gradus. 110.20. pro XXXIX, lege XXXVIII. 111. in hac figura connectantur E M, E L, lineis rectis. 116.18. pro XI. lege XVI. Scorpñ. 117.6. pro scrup. LVI. lege LV. 119. 18. pro autem lege etiam. 119.12. lege eius à uertice. 120.4. pro XII. lege VII. 121.19. pro quo lege qua. 121.1. prima ad scrup. 122.22. lege 1000000. Ibidem linea 32. lege 1000000. 123.24. scrup. secundorum XXXII. 124. linea 27. pro differentiz quinto, lege differentias, quibus. 125. in hac figura R E circumferentia, à dextris accipienda erat. 127.17. lege, Luna si latitudinis. Ibidem linea 26. lege D B E & sumpta. Ibidem linea 33. lege, breuiora angulos. 128.25. pro A B, D A recto, lege A B D à recto. 129.4. lege in fine horæ. 130.35. pro horarium, lege horarum. 131.11. pro illic lege hic. 134.17. lege reperiuntur. 134.3. lege p. LXIX, LIX. Ibidem linea 19. lege diei scrupulus. Ibidem linea 21. pro XXI, lege XXXI. Ibidem linea 32. pro III. lege XL. 140.29. lege sin deferentis. Ibidem linea 32. lege, at iam in Mercurio, ac magis accidere. 141.30. lege addet medio. 142. in hac figura pro T, lege R. 142.12. lege differentia tamen insensibili. Ibidem linea 27. pro erit lege erat. 144.3. pro 864, lege 854. Ibidem linea 18. pro XXVI lege XXXVI. 145.1. lege perueniret. 145.13. p. CCLXXII. lege CCLXXIII. Ibidem linea 7. pro A D E, lege A E D. Ibidem linea 18. pro LXXVIII. lege LXVIII. Ibidem linea 25. pro ei, lege si, pro dimetientis, lege dimeriens. 146. 30. lege quod sub G D, D H, sed quod sub G D. Ibidem linea 36. pro S T lege F D.

FIGURE 5

