

Preface

This book developed from a strong attraction to the incredible illuminated manuscripts produced during the Middle Ages and the early Renaissance. With a background in the history and philosophy of science, and the history of astronomy, in particular, astronomical manuscripts inspired a more concentrated interest and desire to understand the long transmittal of astronomical knowledge. When beginning this study, 10–12 years ago as a doctoral dissertation, the amount of scholarly information published on medieval astronomical manuscripts was rather scant and most focused on specific details of particular manuscripts. Upon deciding to revise and update the initial research, I was blissfully unaware of the enormous amount of academic interest and current research readily available on astronomical manuscripts and associated art. Not only have there been dozens and dozens of scholarly articles written and scientific books produced on all aspects of medieval astronomy, many of these illuminated manuscripts are now freely available for viewing and research on line.

The author's interest, more precisely fascination, with astronomy and its historical transmission through the millennia began quite unexpectedly. Having lived among the towering smokestacks of Pittsburgh, with uninterrupted steel mills lining the rivers and emitting thick ashen clouds, with coke ovens smoldering, and industrial trains piled high with coal and steel lumbering in every direction, the night skies glowed gray suspending the aftermath of the day's heavy pollution. An evening's entertainment was often spent watching steel carts pour fiery residue down mountainous dumps of slag which spewed and sparkled brighter than fireworks; barely a star could be seen. As an adult, a trip to Jamaica transformed that usual expectation of a cloudy, steel-gray sky that hardly differed, day from night. After a pleasant island dinner with friends and steel drums setting the mood, we stepped outside to stroll along the Caribbean beach. Overhead the crystal-clear moonless sky danced with millions of glittering, breathtaking lights. Having never before experienced such a smoke-free starry night, the nocturnal vision was a shocking and exhilarating sight that demanded gazing late into the night. That sudden revelation of a previously unknown world ignited a lifelong study of celestial phenomena.

The resultant monograph recounts the process of knowledge transmission through time, through cultures, and through exceptional individuals, not focusing on the physical data or textual material but on the actual means of this transference. Many medieval scholars spent their lives gathering and protecting earlier knowledge; some, like Bede in the seventh century, observed and experimented, then recorded their ideas; some merely copied the ancient texts in danger of being lost. As an art historian, the role that images and diagrams, preserved in medieval manuscripts, played in that long period of transmittal from ancient Greece to the Renaissance became a vital concern along with the determination of exactly how the illustrations of constellations functioned in transmitting that knowledge. There existed times of stagnation and times of remarkable progress in the advancement of astronomical knowledge. One of the most important mechanisms in the transmission of astronomy can be credited to the poem of Aratus of Soli and the *Aratea* tradition with its texts and illustrations which became the main vehicle for conducting this search.

The history of astronomy does not begin in Greece but much, much earlier; the formal story could begin in Mesopotamia, but that part of the process has not yet been told. Hundreds of thousands of cuneiform tablets survive but remain to be read, analyzed, and published. The informal story of the role of cultural astronomy from prehistoric ages, and how detailed celestial knowledge and understanding accumulated bit by bit, can never be told in any detail. No wonder astronomy, that fascination with the motions of the Sun, Moon, planets, and stars, became the first science and, as demonstrated by the long investigation of worldwide astronomical myths by historians De Santillana and Von Dechend in *Hamlet's Mill*, the cosmos was the most dominate aspect of almost every early culture's myths, religious rites, most secret knowledge, and kingship rituals.¹

Many scientific books have been written tracing the transmission of astronomy but not in light of the illustrated manuscripts, the material means by which this knowledge was held, protected, and passed on, which of course, after oral transmission, was on papyrus and parchment. This study investigates that process, pulling together and organizing a synopsis of the research currently available, concentrating on the role of astronomical art in the transmission of that knowledge.

The story of the over two-thousand-year transmission of the *Aratea* manuscripts bridges many disciplines and includes much more than the history of astronomy. The survey encompasses aspects of classical poetry, manuscript production, historical and religious events, artistic advancements, and cultural clashes when West finally meets East. The highly advanced Arabic manuscripts introduced both new ideas and ancient accomplishments drawn from the writings of Greece, Mesopotamia, India, and Persia and turned the state of astronomical knowledge in the Latin West upside down. Another crucial factor in this long story of astronomy

¹*Hamlet's Mill: An Essay on Myth and the Frame of Time* (1969) was not well-received initially but has garnered support through time and with new anthropologic discoveries and research in cultural astronomy or archaeoastronomy.

is apparent in the influence of astrology, as this practice pushed in and out of the scientific traditions, especially influential in the history of medicine. Researching these closely connected fields has shown that a far greater wealth and range of material relevant to the *Aratea* investigation exists than imagined at the outset. It would be impossible to give full justice to every aspect, follow every thread, or discuss all relevant material effectively in a volume of this length. What follows is by no means a comprehensive study of knowledge transmission, but concentrates on the most significant manuscript traditions. This book grew out of that varied research and provides a basic overview of these interrelated fields; the more complex, in-depth details of each discipline are left for specialists more qualified; their knowledge exceeds anything written here. The writing is intended for students of the past, for an educated, nonspecialist reading audience interested in astronomy and the process of its transmittal.

In following the tortuous path of scientific history, this survey provides a brief description of the various medieval authors who played an influential role in the transmission of astronomical knowledge and mythology addressing the essential nature of each one's contribution. In more detail, it traces the history of the *Phaenomena* of Aratus from its composition in ancient Greece, to its reception and Latin translations in imperial Rome, and then its trajectory through the thousand years of the Middle Ages. The textual format and constellation illustrations of the *Aratea* became significantly modified and interest very nearly died out through the passage of time and through societal advances and declines. The medieval transmission culminated in an explosion of illustrated astronomical manuscripts, including the original poem of Aratus and the *Aratea*, during the fifteenth-century Italian Renaissance and has never ended even through the age of printing and still instigates investigation in the present day.

"The long record of achievement in astronomy has very few intellectual parallels in the whole of human history" (North 2008: 3). This monograph presents a general explanation of how we attained possession of these texts and illustrations today, considering the importance they held to those who cherished and retained that knowledge, almost as sacred as religious texts, and why these manuscripts still speak to us.

Chapter 1 discusses the history and text structure of the ancient poem, the *Phaenomena*, and explains the text of its Latin translators, Cicero, Germanicus, and Avienus and their reception in ancient Greece and Rome. This section also speaks to the utilization of celestial symbolism among the nobility to enhance political and personal power beginning with Caesar Augustus in imperial Rome. Chapter 2 examines the many early sources and motifs found in astronomical art that were available as models for manuscript illustrations and comparisons with the few extant classical illustrated manuscripts. Chapter 3 lists the additional early sources of astronomical information in the Middle Ages and follows the thread of transmission through various authors, their content, survival numbers, and the illuminations of their manuscripts from classical antiquity through the early Renaissance. Chapter 4 investigates the translations of Greek texts in Arabic educational centers in Persia and Baghdad in the ninth century. The enormous Islamic contributions to

the development of themes, information, experimentation, and instruments pertaining to astronomical and astrological knowledge are discussed. The writings of some vital individual Islamic astronomers and astrologers are included along with the advancements brought to astronomical art by their manuscript traditions.

Continuing on, Chap. 5 surveys the translations of those Arabic astronomical writings into Latin by medieval scholars, mostly monks with the aid of Islamic and Jewish translation teams that began in the twelfth century, mainly in Spain and Sicily. How those translations introduced the advanced knowledge of Islamic astronomers to Western educational centers is also discussed. In addition, a few examples of astrological manuscripts commissioned in royal courts of Europe are included. Chapter 6 supplies essential historical information and conditions that influenced the production of astronomical manuscripts. In particular, this section concentrates on the *Aratea* manuscripts produced by the Carolingian kings and their appropriation of astronomical symbolism to re-enforce their power and legitimacy, and presents other examples of royal astronomical art. Chapter 7 concentrates on the history and illustrations of a few exemplary *Aratea* manuscripts from the ninth, twelfth, and fifteenth centuries and discusses their contents and influences. Chapter 8 analyzes and draws conclusions on the various functions of the *Aratea* manuscripts, including their role in conveying scientific knowledge, classical poetry, ancient myths, and the iconography of its constellation illustrations. Appendix A lists the surviving *Aratea* manuscripts by country and by century; Appendix B provides elementary descriptions of the manuscripts; Appendix C includes pertinent verses of the *Phaenomena*, describing each constellation and discussing the mythology of the 46 or so constellations that Aratus identified and described so eloquently.

In this work, I have used a simplified system to transcribe Arabic names and words, giving common English equivalents where possible and avoiding special characters or placing blank spaces instead of vowels, i.e., al-Sufi rather than _l-S_f_. I hope that specialists will pardon my sometimes sweeping generalizations for the sake of making this important subject matter more accessible to a wide audience.

In bringing this large selection of intriguing material together, much has been gained from the work of scholars present and past whose publications I have pondered and quarried. I owe a large debt of gratitude to my mentors, Profs. Alison Stones for her illustrated manuscript expertise, Mark Possanza for his expert knowledge of classical poetry and the *Aratea*, and Peter Machamer for his vast proficiency in the history and philosophy of science, and to colleagues at the University of Pittsburgh: Chair of the History of Art department Barbara McCloskey, visual resource expert Veronica Gazdig, and library specialist Marcia Rostek. I am also indebted to my four beautiful daughters who encouraged my work and to the historian of astronomy, Clifford Cunningham Ph.D., who inspired me and offered much assistance in bringing this project to completion. I alone am responsible for its errors.

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