

PREFACE AND ACKNOWLEDGMENTS

MY interest in the history of chronobiology began unexpectedly in the autumn of 2008 with a telephone call from an elderly colleague at the University of Minnesota. The voice was clear, and the articulation distinct, given an aura of clarity and precision by a hint of a German accent, or so it seemed to me at the time. The speaker wondered if he could use an image I had posted on my personal website, which depicted the Danish astronomer Tycho Brahe in conversation with the Italian astronomer Giovanni Battista Riccioli—a photograph of a mural detail on the ceiling of the Clementinum in Prague that I took on the occasion of the four-hundredth anniversary of Tycho's death. I had studied Tycho Brahe's scientific ideas and practices as part of my doctoral research and published several papers on his alchemical interest and was accordingly invited to participate in a conference on his life and work in the former imperial capital, where he had died in 1601. I was at home in Prague; a student of late medieval and early modern European science and medicine sharing ideas in one of Europe's great centers for this history in my period of specialty. I could not have imagined then that this photograph would lead me to spend more than a decade immersed in the modern biology that lies behind the volumes of this current work. The path from early modern European science and medicine to nineteenth- and twentieth-century biology has led me into historiographical territory that my graduate training in the history of science and medicine did not specifically prepare me for and warrants some explanation, not least for younger colleagues who might balk at stepping off their own familiar paths to follow new guides.

Tycho Brahe is well-known to historians of science for his place in the development of modern astronomy. Riccioli is less famous, but he is noted for his early investigation of sunspots. The image in the Clementinum is fanciful, since owing to their difference in age the two astronomers cannot possibly have met in real life, the painting being an emblem of the Counter-Reformation Catholic church's resistance to Copernicus's heliocentric planetary system. But this did not matter to the man on the phone. He said that he had looked in vain for a suitable image of Riccioli, which he wished to use for

a publication on sunspot cycles that he was just then completing, and somehow found his way to my website. I explained my photograph and welcomed him to use it as he wished.¹ He closed this conversation with the suggestion that someone should look into the history of chronobiology.

"What is chronobiology?" I asked.

"You will find out," he said.

This was my first contact with Franz Halberg, an MD physiologist who coined the term *circadian rhythm* in 1959, who was the moving force behind reframing the study of biological rhythms as chronobiology, and who was responsible for placing the University of Minnesota on the map of the world of biological rhythms research. At the time of Halberg's mandatory retirement in 1990, his Chronobiology Laboratories, as he styled his academic domain, was regarded worldwide as an important resource for data analysis and advice on experimental design for chronobiological investigations, especially those that were medically oriented. His name was closely identified with biological rhythms and in particular with the term *chronobiology*.

I do not recall what prompted me to follow up on my question, but I sampled the web and made a handful of keyword searches in the history of science, medicine, and technology database, finding only one scholarly article on the subject of chronobiology or biological rhythms, a 1983 article by Alberto Cambrosio and Peter Keating.² This is a fine piece of academic work, which uses Franz Halberg's efforts to define chronobiology as a discipline as a case study in the sociology of science. But it was unique in the scholarly database for my field, and by that time it was twenty-six years old and had missed important developments in the research area after 1983. Moreover, it was focused on disciplinarity and not on the history of the scientific study of biological rhythms more broadly. It was clear to me that there was interesting historical work to be done on this subject, and I began to dig deeper into general scientific presentations of biological rhythms and the popular-scientific characterizations that this science has attracted, with the aim of understanding enough about the subject to present the history of biological rhythms research to my colleagues and our graduate students at the University of Minnesota as a subject needing scholarly attention. But, it is difficult to undertake the history of a novel subject, in large part because there are few guides or signposts to guide the journey, and I found no takers among my colleagues. Meanwhile, for many reasons—intellectual curiosity, surprising connections with neglected or forgotten pieces of my childhood and undergraduate years studying science and engineering at the University of Wisconsin, my subsequent training as a historian of science and medicine, and a fascination for the story as I became more familiar with it—the history

of chronobiology has preoccupied my life since the first days of 2009, not long after my impromptu conversation with Halberg.

I might have stepped off the path in the spring of 2009, as my teaching resumed and pulled me back into the world of the premodern, but my colleagues at the University of Minnesota encouraged me to pursue an application to the National Science Foundation for a grant to explore what the history of chronobiology might entail (NSF/SES-0958974). Two of them—Jennifer Gunn and Sally Gregory Kohlstedt—joined me in the application as coinvestigators and, when we were awarded funds, helped me hire a postdoctoral researcher, Tulley Long, who had recently completed the PhD in history of science at Johns Hopkins University. Together we began to discuss the history of chronobiology, benefiting in particular from conversations with Franklin Barnwell, a biological rhythms researcher at the University of Minnesota. Our grant supported a small conference that Tulley named “Fascinating Rhythms,” which we convened on the University of Minnesota Minneapolis campus on May 11–12, 2012. This brought together a number of scientists and the few historians and philosophers of science we could entice to join us, and the conversations that this conference provoked have proved fruitful in giving direction to my work as I became further immersed in the history of rhythms research—continuing conversations with Barnwell, in particular, but also with Michael Smolensky and occasionally with other chronobiologists. I should acknowledge here, too, the beneficial effect of many conversations with cell biologist Robert McKinnell over lunch at work. After I began writing this history, Franz Halberg passed away in the summer of 2013, bringing closure to a very long career as a chronobiologist but not to my research. It is fitting, then, that this work be dedicated in the first instance to the memory of Franz Emanuel Halberg, who placed the glowing ember of an idea in my head, a *gnistlein* or *scintilla* to be kindled and stirred into flame through conversations with those in the field who knew him.

Two additional figures from my past helped prepare me to undertake the study of chronobiology, to explore an unexpected path, and deserve special acknowledgment in this preface: one a biologist and the other a historian of biology. The biologist is my father, Richard Max Shackelford. Minor in endocrinology and majoring in genetics, he was the last advisee of Leon Cole, the founding chairman of the first department of genetics in the United States, at the University of Wisconsin. He may long ago have deplored the fact that I would show so little interest in biology and would look instead to historical scholarship, but if so, he never let on. It was by watching him and listening to him as I grew up that I eventually understood how important Charles Darwin’s work was in forming the deep-seated worldview of many biologists.

This has helped me grasp some of the passion evoked by the biologists whose stories are in part told in this book. My father was a mink geneticist but also an avid gardener and lover of the diversity of the world of plants and animals. For all of the years of my childhood and a good part of my adult life he bred canaries, by the hundreds at a time. He seldom recorded any data about these pairings, and when I asked him once if he intended to publish any research findings, he merely smiled and indicated that he found canaries to be fascinating. Visitors to our rural home were also variously greeted by flocks of guinea hens and the primeval-sounding calls of peacocks, on occasion rounding a corner of the house to be surprised by a fully deployed peacock tail, shaking vigorously to gain the attention of competitors and the more peaceful peahens. He also tried ruffed grouse for a while, and pigeons, but a rogue wild mink or other weasel quickly put these attempts to an end. The canaries were more ubiquitous to my childhood, and their singing was beautiful. I understood his interest in the guineas and the peafowl—they were exotic and tasted good. But I did not get the pigeons until I began to read Darwin and about Darwin. Of course, my father had to raise canaries (finches) and pigeons!

The historian of biology I am indebted to is William Coleman. Bill joined the faculty of the History of Science Department at the University of Wisconsin (also a first in the United States) while I was an undergraduate student, and I already knew him when I took my first graduate course in the department, the obligatory proseminar in historiography. I later took a seminar with him that was devoted to close reading and discussion of the first and last editions of the *Origin of Species* and consideration of what Darwin's work had meant to Ernst Mayr and other twentieth-century biologists. I sought a broad education in the history of science but was at that time determined to be a medievalist, leaning into the early modern period slightly, and I put off taking Coleman's general history of biology course until it was too late. Were he alive today, I imagine that he would find my engagement with the history of biology amusing. I am certain that he would be supportive, but perhaps lamenting that I had not attended to the subfield earlier and trained in it more rigorously. Nevertheless, I see some of the roots of this project in his *Origin of Species* seminar and in the mammoth history of biology by Erik Nordenskiöld that he set me to reading back then.

Beyond the people mentioned above, many other individuals have contributed to my work on the history of chronobiology. Foremost among these is Lois Hendrickson, curator of the Wangensteen Historical Library of Biology and Medicine, whose broad knowledge of librarianship and archives has been a great and sustaining resource for me. But more importantly, Lois's genuine curiosity about all kinds of history and her willingness to share her ideas and reactions to my questions have provided context for my thinking about chro-

nobiology and the sources I might explore to document its past. In a project of this breadth, many other archivists, librarians, and subject specialists are too numerous to recall in this short space, both at my "home" libraries and archives at the University of Minnesota and University of Wisconsin and at those I have visited for access to special collections at the University of Virginia and the University of California at Irvine. And then there are the many others who have helped with interlibrary loan and the other information services that the historian requires. Finally, the many hours that Frankie Shackelford has spent reading my prose and listening to me drone on about chronobiology must be warmly acknowledged.

Translating an idea and years of reading and writing into an expansive multivolume publication is no small matter and is a rarity in the history of science and medicine these days. I am grateful for early conversations with University of Pittsburgh Press editor Abby Collier and for her sustained interest in this project, which has benefited from the useful perspectives and comments on this long text that were provided by two anonymous readers, whose patience my attention to detail surely tested. Such service from friends and colleagues is what makes the intellectual life of the academy special.