

Preface

The essays in this volume were written to celebrate the seventieth birthday of Professor Joseph W. Dauben, who for four decades has played a pivotal role for historians of mathematics around the world. Many other historians would surely have been pleased to contribute to this *Festschrift* as well, but the response we received from those initially invited was so unanimously enthusiastic that practical reasons, including a tight time schedule, precluded expanding our original list of invitees. The seventeen papers that appear here, which cover a wide variety of themes relating to the history of mathematics in both western and eastern cultures, reflect many sides of contemporary research that Joseph Dauben helped to pioneer. It would take another whole book to describe all of his many scholarly contributions and organizational activities in the course of a singularly rich career. While we cannot begin to do justice to all that here, we have appended a selected bibliography of his major publications, about which we will restrict ourselves to some brief remarks in the course of discussing his many achievements.

Before commenting further on Professor Dauben's scholarly and professional work, however, a few words must be said about how this *Festschrift* project first began. Its moving spirit was our dearly missed colleague, Xu Yibao. In July 2013 we met with him in Manchester at the 24th International Conference of the History of Science, Technology, and Medicine. Shortly afterward, the three of us agreed that a *Festschrift* would be an ideal way to celebrate Joe's forthcoming birthday. Yibao's idea was to present Joe with this volume as a surprise at the 6th International Symposium on Ancient Chinese Books and Records of Science and Technology, which he and Joe were organizing together. This would take place at Yibao's home institution, the Borough of Manhattan Community College, CUNY, from 2–8 October 2014.

So in August 2013, the three of us sent out a letter of invitation to potential contributors, historians of mathematics on the three continents represented in this book. That letter began:

There is a long tradition in Germany that calls upon former students of a distinguished professor to pay tribute to an esteemed mentor in the form of a *Festschrift*. This practice is viewed with sympathy in China, where Confucianism teaches people to honor their teachers as sincerely as they honor heaven, earth, the state, and their parents. As former students of Joseph W. Dauben, the three of us would like to follow these traditions by showing our appreciation to Joe through a *Festschrift* in his honor. . . . We believe a *Festschrift* would be a meaningful token of our appreciation.

The response we received was overwhelmingly positive, despite the time constraints, so that we were soon able to submit a tentative table of contents to Birkhäuser in Basel. They agreed to publish the book, and so by October Yibao's plan was already off to a smooth start. Then, in early November, we received the

tragic news that he had suddenly died after suffering a massive cerebral hemorrhage. This came as a terrible shock, a tragedy especially for his wonderful family, but also a deep loss for all of us who knew him well. He will be memorialized in a special session in his honor at the symposium he helped organize, but was unable to attend.

Yibao had been Joe Dauben's closest collaborator and a dear friend, so with his death we felt both obligated and determined to carry on with the project he initiated. We are especially pleased that this volume contains an English translation of an earlier paper by Xu Yibao that was originally written and published in Chinese. Fittingly, it deals with the interests of an American historian of mathematics, David Eugene Smith, in a collaborative project with Li Yan, an expert on Chinese mathematics. Although he did not live to see the final outcome of his initiative, we feel certain that Yibao would have been very pleased by the response it produced. Now a few words about the man the three of us have known, first as a mentor, but always as a friend for many years.

Joseph Dauben was born in Santa Monica, California on 29 December, 1944. He studied mathematics and English literature at Claremont McKenna College in southern California, graduating in 1966 with a scholarship to study the history of science at Harvard University. He was joined there by another graduate student, Wilbur Knorr, who went on to become a leading authority on the history of Greek mathematics. Both benefited from tutorials with John Murdoch and Judith Grabiner, who prepared them for their oral examinations prior to beginning work for a Ph.D. Joe's dissertation topic, "The Early Development of Cantorian Set Theory," was written under the direction of Erwin Hiebert and Dirk Struik. At Harvard, he also had the opportunity to work with the distinguished algebraist, Richard Brauer, who had been forced to leave Nazi Germany and who took a personal interest in Joe's thesis research.

Thanks to grants from Harvard and the NSF, in 1970-71 Joseph Dauben had the opportunity to spend a year in Europe doing archival research in Germany, Sweden, and Italy. A good deal of that year he spent in the divided city of Berlin, where memories of President Kennedy's visit shortly before his assassination were still vivid. Berlin's mayor then was Willy Brandt, subsequently Chancellor of West Germany, and the architect of the country's new *Ostpolitik*. Joe Dauben's stay there thus came at a perfect time. He could travel freely back and forth, and was soon befriended by the East German historian of mathematics, Kurt R. Biermann, director of the Alexander von Humboldt Forschungsstelle at the Deutsche Akademie der Wissenschaften. In West Berlin, he gained similar support and sympathy from Herbert Meschkowski at the Freie Universität and Christoph Scriba at the Technische Universität. Joe's friendship with Scriba would in the years ahead become especially important for linking the research communities in Europe and North America.

Within the West German community of historians of mathematics, a fairly tight-knit group of researchers gathered for annual meetings at the Mathematisches Forschungsinstitut at Oberwolfach in the Black Forest. Its leading figure was

Joseph Ehrenfried Hofmann, a well-known expert on Leibniz, who established a tradition of seminars focused on what was known as *Problemgeschichte der Mathematik*. Following Hofmann's death in 1977, Christoph Scriba took over direction of these sessions, which over the years evolved into truly international conferences, though no longer with a core group that received invitations automatically.

Joe Dauben was the first American to attend these meetings on a regular basis in the 1970s and 80s. Through Oberwolfach meetings he soon got to know nearly all the leading Western German historians: Menso Folkerts, Ivo Schneider, Eberhard Knobloch, Herbert Mehrrens, among many others. He and Christoph Scriba also conceived of a project that took advantage of this setting in order to produce a book that aimed to provide an anchor for the modern field of historical studies in the mathematical sciences by presenting a larger picture of the discipline from an historical perspective. Their efforts led to the publication of *Writing the History of History of Mathematics: an Historiography Project of the International Commission on History of Mathematics*, (Basel: Birkhäuser, 2002), edited by Dauben and Scriba. This large-scale undertaking, led by a core group that also included Hans Wussing, Jeanne Peiffer, and Ivor Grattan-Guinness, ultimately involved a large number of other scholars from literally all parts of the world. This novel historiographic venture posed numerous challenges, yet succeeded in gathering together a wealth of documentation relevant for understanding how the history of mathematics emerged as a discipline in various countries at different times, and often influenced by complex cultural and political factors.

Returning to his days as a graduate student, Joe felt lucky back then that his interests in Cantor's life and work came just at the time when Ivor Grattan-Guinness had broken new ground in these areas. The advice and encouragement he received from him initiated a lifelong friendship and collaboration. Needless to say, Ivor's name figures prominently, along with many others, in the acknowledgments at the front of Joe Dauben's groundbreaking study, *Georg Cantor: His Mathematics and Philosophy of the Infinite* (Cambridge, Mass.: Harvard University Press, 1979). From the wider vantage point of historiography, this book marks only the beginning of an ongoing effort to explore Cantor's ideas and their impact in shaping modern mathematics. Joe Dauben's contributions in that regard are amply documented in the selected bibliography appended to this Festschrift. In particular, he took a strong interest in understanding how the "Cantorian revolution" could best be understood in light of Thomas Kuhn's ideas regarding scientific revolutions. Two essays dealing with these themes were written for a volume edited by Donald Gillies, entitled *Revolutions in Mathematics* (Oxford: Clarendon Press, 1992): "Conceptual Revolutions and the History of Mathematics: Two Studies in the Growth of Knowledge" and "Revolutions Revisited." These represent only one aspect within Joe Dauben's larger interest in historiographical issues and problems specific to the history of mathematics.

After taking his doctorate in history of science at Harvard in 1972, Joseph Dauben began his long association with Herbert Lehman College, part of the City University of New York system. He has now taught there for over four decades,

first as assistant professor of history, then joining the faculty at the CUNY Graduate Center as associate professor in 1977, and from 2002 till now as a CUNY distinguished professor. Throughout those years, however, he had many visiting appointments elsewhere, far too many to recount here. Already during the academic year 1973-74, he spent a year in Italy as a fellow of the National Endowment for the Humanities. His research project at that time dealt with "Science and Art in the Renaissance, with Special Attention to Mathematics and Perspective." In many subsequent years, he returned to Italy during the summer months, maintaining an affiliation with the American Academy in Rome.

From the beginning and throughout his early career, Lehman College generously supported his research, including the demands of editorial work. More than anyone, Joseph Dauben was responsible for nurturing and sustaining the fledgling journal founded in 1974 by Kenneth O. May, *Historia Mathematica*. Joe entered that venture as managing editor in 1976, and then after May's sudden death the following year, took over as editor. It was under his editorship that *Historia Mathematica* began to be published by Academic Press, from which time it could establish itself as a mature scholarly journal. This year now marks the fortieth anniversary of its founding, and having now established its place in the world of international scholarship, historians of mathematicians can only be grateful to Ken May and Joe Dauben for their foresight and unstinting commitment to this vision. After stepping down as editor, Joe afterward served as Chair of the ICHM from 1986 to 1994.

From his biography of Cantor, Joe turned to the career of Abraham Robinson and the history of nonstandard analysis, or as one might say, he left the mathematics of the infinitely large to pursue the newest chapter in the history of the infinitely small, which Cantor, ironically enough, had completely rejected. In fact, Joe had the ideal background to enter into these waters, which had never been seriously explored by an historian. For he had written his senior thesis as an undergraduate mathematics major on nonstandard analysis, so the topic was a familiar one in which he had a longstanding personal interest. Since many who knew Robinson were still alive, including his widow, he made ample use of oral interviews for this project. Harvard's Garrett Birkhoff proved very helpful, not only because he had known Robinson, but also due to his own interests in the historical implications of nonstandard analysis. Joe also spent time talking with Wim Luxumburg at Caltech and George Seligman at Yale, both former colleagues and good friends of Robinson. In the case of Georg Cantor, the historian faces the problem of a dearth of primary source material to work with, which helps to explain why his life remains a topic of debate. With the life of Robinson, a more contemporary figure, Joe faced just the opposite problem, namely too much information. His definitive biography of 550 pages, *Abraham Robinson. The Creation of Nonstandard Analysis, A Personal and Mathematical Odyssey*, (Princeton: Princeton University Press, 1995), actually involved making deep cuts in the original manuscript. This was not always a labor of love, but the end result was greatly appreciated, above all by the American mathematical community.

Joe Dauben has long played a major part in promoting the history of mathematics within both the American Mathematical Society and the Mathematical Association of America. He has regularly attended the annual joint meetings, and on numerous occasions served as co-organizer of special sessions on history of mathematics. In 2012 Professor Dauben was awarded the American Mathematical Society's Albert Leon Whiteman Memorial Prize for "his contributions to the history of Western and Chinese mathematics and for deepening and broadening the international mathematical community's awareness and understanding of its history and culture." His impact on the American mathematical community has, indeed, been both deep and broad, as was duly noted in the citation:

In the United States, the history of mathematics, once an excellent but eclectic collection of teaching tools and post-retirement projects, has in the last decades become an integral component of the mathematical community, with well-attended sessions at major meetings. Joe Dauben has spurred this professionalism by his scholarly example and through his service to the profession, which includes organizing international workshops and symposia and editing *Historia Mathematica* for a decade.

In 1988 Joe spent six months in China as part of a program jointly sponsored by the Chinese Academy of Sciences and the U.S. National Academy of Sciences. In Beijing he joined the seminar on history of Chinese mathematics taught by Du Shiran at the Institute for History of Natural Sciences. It was there that he also met Guo Shuchun and Liu Dun, who helped sustain his growing interest in the history of Chinese mathematics. At this time, he had begun an intensive study of Chinese and was working on the *Ten Classics of Ancient Chinese Mathematics*. Thus began a new phase in Joe Dauben's remarkably productive career.

One of the striking qualities of his scholarship that has been deeply appreciated, both in the PRC and Taiwan, is his sensitivity to the distinctive aspects of Chinese mathematics. As a Westerner, someone who thus has the "advantage" of being able to compare very easily Liu Hui's work with Euclid's, he still manages to avoid the standard tendency of portraying Chinese mathematics in a Western light, and thereby losing touch with the intrinsic qualities of the Chinese tradition. This aspect of his research can be seen in his critical investigations of mathematical texts like the *Suanshu shu* and the *Jiuzhang suanshu*, as well as his work on secondary literature dealing with texts from the Qin-Han period, in particular those written by historians of mathematics. These studies are quite unique, and have enabled Joe Dauben to attain a special reputation all his own within the community of historians of Chinese mathematics.

The twenty-first century has made global understanding a major part of (and need within) today's world, and this obviously entails an interest in and respect for the cultural histories of its peoples. Western historians of mathematics have taken new initiatives in this direction, a striking example being the essays in the sourcebook recently edited by Victor Katz, *The Mathematics of Egypt, Mesopotamia, China, India, and Islam* (Princeton: Princeton University Press,

2007). Each was written by an expert on the mathematical cultures represented therein: Annette Imhausen (Egypt), Eleanor Robson (Mesopotamia), Kim Plofker (India), J. Lennart Berggren (Islam), and J. W. Dauben, whose contribution on “Chinese mathematics” provides Western readers with 200 pages of well-chosen source material that reflects the themes and methods of that tradition.

His most recent contribution to Western understanding of Chinese mathematics also represents his single most important achievement in this connection. This is the monumental new edition of the *Jiuzhang suanshu*, undertaken in collaboration with Xu Yibao and Guo Shuchun: *Nine Chapters on the Art of Mathematics. A Critical Edition and English Translation based upon a New Collation of the Ancient Text and Modern Chinese Translation*, Library of Chinese Classics, 3 vols., (Shenyang: Liaoning Education Press, 2013). Thanks to this work, English readers now have ready access to this great classic, and with it they can now truly comprehend how Chinese mathematics, especially as exemplified by Liu Hui, is clearly distinguishable from that of the ancient Greeks or other Western civilizations.

Joe Dauben began his career with special training as an historian of science whose interests from the very beginning went far beyond the realm of modern mathematics. These broader interests are, of course, reflected in his many varied publications, lecture topics, and also the numerous projects he has been pursuing with other scholars. Looking back, his career mirrors some of the major shifts in world affairs over the last four decades. Back in the 1980s, before the fall of the Berlin Wall, he established close friendships with leading historians of mathematics in both East and West Germany. Joe never let politics get in the way, and the same holds for his many friendships with Chinese historians, both in the People’s Republic as well as in Taiwan. The breadth of his scholarship has been most impressive, though for us who have enjoyed the rewards of studying under him, his many publications only reflect a small part of his truly astounding range of knowledge and interests. Yet just as impressive, and no less important for the history of mathematics, Joe Dauben has, more than anyone else, helped to establish a professional world-wide community of historians of mathematics through his work as an editor, conference organizer, and tireless spokesman for the discipline. He has been a true global player, who has cultivated a lifetime of friendships around the world like no one else before him. As one of our contributors, the Spanish historian of mathematics Elena Ausejo, so aptly put it, he has been a “bridge-builder of intercultural understanding and friendship.” He has created something like a multiplier effect for the history of mathematics, a fragile and rather esoteric field that could never have done so well without him.

The articles this volume contains have been loosely arranged in thematic sections, in part to reflect Joe Dauben’s own intellectual journey, starting with his work on Georg Cantor, which broke new ground for the history of modern mathematics. Without any input from us as editors, our authors managed to touch on many of the topics and themes that we have all learned more about by reading Joe Dauben’s books and articles. We thank all of them warmly for

their steadfast support and cooperation throughout. Our thanks also go to Dr. Anna Mätzener at Birkhäuser in Basel for her help in producing this volume under unusual circumstances. Further thanks go to Philip Wang, for translating Xu Yibao's paper from the Chinese, and to Cheng-Hung CHEN and Jyun-Wei HUANG in Taiwan, for offering technical support in helping prepare the papers by Asian scholars. In Mainz, we were most ably assisted at various stages in the production process by Renate Emerenziani and Matthias Kapffer, who deserve special thanks for their efforts in helping to realize this project.

David E. Rowe
Wann-Sheng Horng



Joseph W. Dauben, June 2014

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