

**FOREWORD TO *ADVANCES IN COMBINATORIAL
MATHEMATICS: PROCEEDINGS OF THE
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ANDREW ODLYZKO

This volume commemorates and celebrates the life and achievements of an extraordinary person, Herb Wilf. The planning of the book started while he was still alive. It was planned to present it to him in person, but unfortunately he passed away before that could happen. While he was brought down by a neuromuscular degenerative disease, he had been active in research until shortly before his death, and this volume even contains a paper he coauthored.

Among the most prominent qualities that endeared Herb to his many students and colleagues was his warm personality. Deeply devoted to mathematics, he was an enthusiastic supporter of other researchers, especially of young students struggling to establish themselves. Always generous with suggestions and credit, he delighted when others improved on his own results. He was also very supportive of women mathematicians at a time when they faced high barriers, and had an unusually large number of women among his PhD students.

Herb Wilf was a superb teacher and writer. His books have had extensive impact on a variety of fields. His many publications with their lucid explanations of abstruse mathematical results give a taste of his abilities as an expositor. He received a variety of teaching prizes, including the Deborah and Franklin Tepper Haimo Award of the Mathematical Association of America, which is given to “teachers of mathematics who have been widely recognized as extraordinarily successful.” He devoted substantial effort to editorial activities, including a stint as the Editor-in-chief of the *American Mathematical Monthly*, and was a co-founder of the *Journal of Algorithms* and of the *Electronic Journal of Combinatorics*.

However, Herb was foremost a researcher, driven by the desire to discover the inner workings of the mathematical world, as expressed by Hilbert’s famous quote, “We must know. We will know.” This volume consists of high-quality refereed research contributions by some of his

colleagues, students, and collaborators. The origins of this book project were in the conference held on the occasion of Herb's 80th birthday in May, 2011. But this is not a conference proceedings, in that many of the papers presented at that meeting are not included, and some papers here were not part of the conference program. They are meant as a tribute to Herb Wilf's contributions to mathematics and mathematical life. Some are very close to areas he worked in, some are further apart. But they are all on topics he knew well and cared deeply about.

Although all the papers in this volume have some connection to Herb, they touch mostly on the last (although longest) phase of his career, that associated with combinatorics. It therefore seems appropriate to say a few words about his development as a mathematician. One of the many notable features of his life was the willingness to undertake new projects and change directions. Thus, in the 1990s, while he was already in his 60s, and well-established as an author and editor in the traditional print world, he saw the promise of electronic communication, and moved to set up the free and completely scholar-operated *Electronic Journal of Combinatorics*. In the spirit of practicing what he preached, he also arranged for as many of his books as possible to be available for free downloads. In a rare case of a good deed being properly rewarded, he found, contrary to predictions, that sales of print copies of those freely-downloadable books increased! This flexibility and willingness to experiment extended to research directions. Even close to the end of his life, he was always open to new ideas, and wrote some papers in mathematical biology. But this was just a continuation of a lifelong pattern.

The repeated appearance of certain intellectual themes in Herb's work is illustrated nicely by one of his most famous contributions, namely the work with Doron Zeilberger on automated proofs of identities. The computational aspect of this research offers a link to the start of Herb's professional career, which was closely linked to computers. He did direct hands-on programming of some of the first electronic digital computers, in order to implement early optimization algorithms. He then went on to write a PhD thesis on numerical analysis, and carry out a substantial research program in that field, including producing books on mathematical models. Later yet he moved on to more theoretical work on complex analysis and inequalities. And then he was smitten by the charms of combinatorics, and this became the main passion for the rest of his life. Not that he forgot or abandoned his earlier interests completely. Computers, for example, continued to play a major role in his life. As just one example, in 1975 he and Albert Nijenhuis published *Combinatorial Algorithms*. It is not used as widely

as it used to be, since the methods it contains are incorporated into standard software programs, such as Maple, Matlab, and Mathematica. But for that time, it was a tremendously useful collection that not only explained the methods, but provided working code that could be used when needed. Another illustration of his later work drawing on earlier experience is provided by his work on complex analysis, which played a role in his extensive involvement with generating functions in combinatorics.

In conclusion, we can say that it is difficult to give a full picture of the many facets of Herb Wilf's life and work. There will be more formal obituary notices that will cover his contributions in detail. The brief sketch here serves only as an introduction to this collection of papers, original research contributions by some of Herb's many students, collaborators, and other admirers and beneficiaries, who dedicate their works to his memory. Herb heard presentations of some of these papers at his 80th birthday conference. What is certain is that he would have loved to read them all and appreciate the advances they represent in penetrating ever deeper into the mysteries of mathematics.