

Preface

AS THIS FIFTH EDITION OF *RNA Worlds* goes to press, it is the eve of the 90th anniversary of the discovery of RNA. To gain perspective on the quickening pace of RNA research, consider the rate of subsequent seminal discoveries. After strong earlier indications, definitive proof that RNA can carry genetic information emerged 62 years ago. Insightful suggestions about a primordial role for RNA were made 50 years ago but languished until the discovery of catalytic RNA 36 years ago. RNA splicing, unknown before 1977, quickly exploded to dominate RNA research in the 1980s. The discovery of telomerase and its essential RNA subunit provided an important new example of RNP enzymes (1986). Forms of RNA interference, including siRNAs, microRNA, and piRNAs, were discovered 20 years ago and became household terms within a few years. The structural biology of RNA, initially limited to small motifs, exploded in the 1990s, leading to high-resolution views of the RNA basis of ribosome function. And CRISPR genome editing burst onto the scene around 2010.

This quickening pace of RNA research has been echoed in this series. The first editions, entitled *The RNA World*, were firmly centered on the RNAWorld hypothesis for origins of life, to the extent that all authors were instructed to relate their systems to the origins problem. By the 2011 edition, this vision had evolved with more chapters on contemporary RNA biology and technology, thus justifying the new title—*RNA Worlds*.

So, what's new in the 2018 edition? The RNAWorld hypothesis still fascinates, and it is well represented. Yet the explosion of new information about RNAs, especially noncoding RNAs, stimulated us to rethink the thrust of this edition. Understanding RNA function has been continually propelled by new technologies—next-generation sequencing and genomics, imaging down to the single-

molecule level, CRISPR to precisely perturb function, and cryo-EM to visualize large RNP complexes that have not been amenable to X-ray crystallography. Thus, we chose authors who are experts in these and other transformative technologies. We asked them to explain their technology and how it is driving understanding of RNA biology, structure, and function. Although different authors have been differentially faithful to this mandate, it serves to tie the chapters together, as well as providing, in many cases, a glimpse into the future.

This fifth edition has also involved editor transitions. A founding editor, Ray Gesteland, has said farewell to the series. As we wish Ray well, we welcome Joan Steitz, whose knowledge and wisdom of all things ribonucleic has helped shape this volume. Together we have recruited a superb group of authors, the majority being first-timers to the series.

In the last edition we noted the passing of our friend and colleague Leslie Orgel, a giant of the RNA World. Since then, we have lost other major figures, including Aaron Shatkin (2012), Don Crothers (2014), Alex Rich (2015), Nacho Tinoco (2016), and Elisa Izaurralde (2018). The students and postdocs they trained and inspired continue to move the field forward.

Finally, we thank Cold Spring Harbor Laboratory Press, and especially John Inglis, for long and steady support for the *RNA Worlds* series. Special thanks to Inez Sialiano and Kathleen Bubbeo, who kept this fast-moving train on track, and to Susan K. Roberts and Denise Weiss for their roles in preparing the cover.

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