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Ribosome Biogenesis

Methods and Protocols

Edited by

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Dedication

This book is dedicated to my wife Heike Grüter and my son Christoph Grüter for all their great support and understanding.

Preface

Ribosomes are the organelles that synthesize proteins according to the genetically encoded information. Whereas prokaryotic ribosomes were even reconstituted in vitro, eukaryotic ribosomes are more complex. In yeast—as a eukaryotic model organism—about 5–10% of the genomic capacity is needed for the biogenesis of a ribosome. Worldwide a remarkable number of laboratories is investigating all aspects of ribosome biogenesis. As shown by the increasing number of participants in the respective meetings, approximately 3,000 scientists are working on structural, functional, and biomedical aspects of ribosome biogenesis. This book covers most of the significant steps during eukaryotic ribosome biogenesis. The research areas are introduced by reviews followed by chapters covering the respective methods of investigation.

A comparative survey about the unity and diversity of ribosome biogenesis in pro- and eukaryotic cells is provided in Part I (Chapter 1). The genomic organization of eukaryotic rDNA and the role of RNA polymerase I in ribosome biogenesis are summarized in Part II (Chapters 2 and 3). *In vitro* methods to study RNA polymerase I structure and its function are outlined in Part III (Chapters 4–6). Ribosome assembly in the nucleolus and a method to analyze the nucleo-cytoplasmic transport of assembled ribosomes and RNP complexes are dealt with in Part IV (Chapters 7 and 8). Various modifications increasing the complexity of rRNAs and the methods to analyze these modifications are given in Part V (Chapters 9–12). Finally, Part VI provides a review of eukaryotic translation and several methods to analyze translation *in vivo* (Chapters 13–16). Remarkably, for the first time a fully reconstituted eukaryotic yeast translation system is described together with the methods to purify the respective proteins.

This book is a valuable resource for scientists and all those interested in key questions in ribosome biogenesis. It provides an overview of the abundant literature and is supposed to stimulate collaborations.

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