

Preface

The field of RNA degradation has attained significant recognition over the past decade for many reasons. One is that new technologies and methods have been devised that allow detailed molecular mechanisms to be elucidated and another is the success of using the genetically tractable budding yeast. During this period, investigators have noted the differences as well as the similarities between yeast and mammalian mechanisms of RNA turnover. One common feature is that the RNA processing machinery is localized to cytoplasmic particles that regulate mRNA translation and decay. These include most prominently the cytoplasmic glycine-tryptophan-motif-containing “GW Bodies,” also called “Processing Bodies,” and the stress granules. As was true of nuclear foci called “nuclear speckles” that were studied in the 1980s and 1990s, the discovery of GW/P bodies and stress granules is driving much biological research in the first decades of the twentieth century. Therefore, the publication of the book entitled: “Ten Years of Progress in GW/P Body Research” is very timely.

Both nuclear and cytoplasmic ribonucleoprotein foci are biologically intriguing, in part, because of the mere beauty of the microscopic images that when combined with molecular tools can be surmised to carry out essential cellular functions. Therefore, while the internal molecular workings indicate key roles for GW/P bodies and stress granules in gene expression, both have been challenging to dissect. The discovery of GW/P bodies described in this book occurred as a co-discovery of the GW bodies and P bodies by Fritzler and Chan at the University of Calgary and the Scripps Research Institute and Sheth and Parker at the University of Arizona, respectively. There had been earlier indications of localized RNA decay/translation granules by Wolf-Dietrich Heyer and by Satoru Kobayashi as well as others, but the concepts solidified in 2003 with the combined biochemical and visual data are described in this book.

When the first images of GW bodies in mammalian cells and P bodies in yeast cells were observed, the experience must have been aesthetically quite pleasing. Yet, few could have imagined at the time that these cell foci held the core RNA processing machinery central to gene expression that would go on to occupy the efforts of hundreds of biologists. The GW/P bodies contain RNA regulatory factors,

including RNA-binding proteins, enzymes and small noncoding RNAs of which the microRNAs are best known. Other molecules are found in the cytoplasmic foci such as Argonaut and PIWI of the RNA Interference Silencing Complex (RISC) as well as the expanded GW protein family to which the autoantibody of Chan and Fritzler was derived from the serum of a neurology patient. These co-discoveries were serendipitous as the Chan/Fritzler group came from the field of autoantibodies and autoimmunity that has led many important discoveries in RNP biology, and the Sheth/Parker group was investigating the underlying mechanisms of RNA decay. This book richly explores these original scientific discoveries and many of the subsequent detailed studies of the components and functions of RNA processing that take place in GW/P bodies. The author list is truly impressive and reading the history will pique the interests of students and senior investigators, and hopefully, provide insights into future directions of the field of RNA biology.

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Ten Years of Progress in GW/P Body Research

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2013, XII, 276 p., Hardcover

ISBN: 978-1-4614-5106-8