

## Navigating the Molecular Maze: A Chemist's Quest to Grasp RNA Biology

Anavadya M K

Department of Chemistry, IISER Tirupati, Andhra Pradesh, India

**Abstract:** A change in research focus can be challenging, especially when transitioning between entirely different fields. This article explores my journey from a background in pure chemistry to the fascinating realm of RNA biology within chemical biology. It details my experience of acquiring new knowledge, adapting to unique terminology, mastering data analysis, and specialized experimental techniques in RNA research. Despite these hurdles, the article emphasizes the valuable foundation provided by a chemistry background while highlighting the importance of determination, adaptability, and a willingness to learn new things that facilitated my successful transition into this exciting field.

**My** transition from being a person with interest in pure chemistry to pursuing a discipline like chemical biology was a compelling journey that involved acquiring new knowledge, skills, and a shift in research focus. I should say that my fascination with pure chemistry was the foundation for everything. Being a BS-MS student, my journey towards becoming an enthusiast involved embracing the interdisciplinary nature of the field which includes taking courses that bridge the gap between chemistry and biology. This helped me gaining a solid foundation in both subjects, and develop a knack for integrating concepts from both disciplines.

Moving from a chemistry-focused mindset to a biological perspective was not an easy transition for me. As chemists, we need to adapt to understanding how RNA molecules function within the complex environment of a living cell. This means learning about the various biological processes that RNA is involved in, such as gene expression (how genes are turned into proteins), translation (how proteins are synthesized), splicing (how RNA is edited), and post-transcriptional modifications (chemical changes to RNA after it is made). Not only do we need to grasp the roles of RNA in these processes, but we also have to consider that these processes are constantly changing and interacting with each other, adding an extra layer of complexity.

The study of RNA biology is inherently interdisciplinary, requiring collaboration and communication between experts from different scientific fields. There are many other sub-disciplines in biology and chemistry including biochemistry, genetics, structural biology, and other domains that contribute to our understanding of RNA. Breaking down the barriers between these disciplines and integrating knowledge from each area was a significant hurdle for me initially. I struggled to bridge the gaps in terminology, experimental approaches, and ways of thinking between these fields. Additionally, the techniques used in RNA biology labs, such as working with sensitive RNA samples, specialized equipment, and large datasets, were new and challenging for me to master as someone with a chemistry background.

This field comes with its own unique language and terminology which was new for me at the beginning. Chemists accustomed to chemical nomenclature and equations may struggle to grasp the specialized terminology used by biologists. When I started in the field of RNA biology, I had to learn a completely new set of words and terminology that I wasn't familiar with before. It was difficult for me to understand the specialized language that biologists use. The way data is analyzed in this field is also very different, as this field is very data intensive. So, I had to change my way of thinking about data analysis. RNA biology involves working with large amounts of data, and to make sense of all this data, I needed help from experts who knew how to properly handle and interpret it. In spite of all these hurdles, I found the experimental techniques used in RNA biology to be very interesting to

learn. Methods like extracting and purifying RNA, performing transcription and PCR amplification, and doing fluorescence-based experiments require extreme precision and care. Even the slightest contamination from touching the samples with bare hands can ruin the experiment. So, mastering these delicate and sensitive techniques took a lot of time and effort, and I had to be extremely dedicated and persistent to get them right.

Even though the journey into the field of RNA biology was laden with challenges, it's also a path of immense potential and knowledge. If you are a person with determination, adaptability, and a willingness to learn, it is easy to overcome these difficulties. Chemistry has provided me with the foundation for understanding the chemical interactions, structural characteristics, and kinetic properties of RNA molecules and also equipped me with the skills to investigate the RNA world at the atomic and molecular levels, making it a vital tool in the quest to decipher and learn RNA biology.

## Summary

This article recounts my journey from pure chemistry background into the interdisciplinary realm of chemical biology, specifically RNA biology. While a deep fascination with chemistry laid the groundwork, engaging with courses that bridged the gap between chemistry and biology enabled the integration of concepts across these disciplines. This shift, however, was accompanied by numerous challenges. Adapting to understand RNA's role in cellular processes like gene expression, dealing with the unique terminology and data analysis approaches of biology, and mastering the sensitive experimental methods such as RNA synthesis and purification techniques proved to be significant hurdles. Overcoming these obstacles demanded a combination of unwavering determination, adaptability, and a willingness to continually learn. Ultimately, my strong foundation in chemistry provided invaluable skills for understanding RNA at the molecular level, thereby serving as an important tool in learning the intricate complexities of RNA biology, despite the inherent difficulties of bridging the gap between the fields.

## Acknowledgements

I would like to thank IISER Tirupati for providing a stimulating environment filled with resources and opportunities for interdisciplinary exploration. I am particularly grateful to my supervisor, Dr. Ashwani Sharma who not only imparted his knowledge in RNA biology but also encouraged me to bridge the gap between chemistry and biology and motivated me throughout the journey. I would like to thank my parents for their unwavering support and would also like to extend my thanks to my fellow students and friends, whose discussions and collaborative spirit enriched the learning experience.

**Do you want to share your research story or opinion? Send it to us at [editorialoffice@advancesin.org](mailto:editorialoffice@advancesin.org)**