

Preface

Public discussions of evolution versus “intelligent design” or a deity are no more enlightening than public discussions of man-made global warming and ocean acidification with an oil executive. Basically, one is having the wrong conversation with the wrong people. Evolution is no more anti-religion than wristwatches or jet airplanes. As recognized by Arrhenius (late 1800s to early 1900s), carbon dioxide is a greenhouse gas that dissolves in water to produce acid. So, why argue about that? What evolution appears to do is to render a deity unnecessary, at least, for the genesis of life on earth, a story that now can be told with surprising details, confidence, and authority.

I wrote this book to tell a simple, brutal story of genesis that integrates RNA structure/function, protein structure/function, RNA synthesis, protein synthesis, metabolism, and phylogenomics. As living organisms, our story is rich and wonderful, and I hope I tell some of our most ancient stories well. I have certainly learned a lot writing this book. Perhaps regrettably, my best studies in the scientific literature were written based on my ancient evolution studies of transcription systems and cloverleaf tRNA. This book is an attempt to reach a larger, perhaps less-specialized but more enthusiastic audience. I have great passion for this book and subject.

So, why might you be interested in *Evolution Since Coding*?

Although you may not think so, you wish to learn molecular graphics, and I will encourage you to do so. Initially, low-level proficiency with molecular graphics programs takes a few hours. Of course, ultimately, this core life skill will cause you much frustration, anguish, and pain. But, if you do not want a life of thwarted dreams, you should avoid biology.

I tell a very straightforward story of evolution of life on earth. I am amazed at how simple, integrated, and predictive the story of genesis has become.

This is a story of code breaking. The codes are dumb, but not so dumb that scientists could not break them. Genetic codes provide a written and historic record of evolution, and much of the initial print remains legible.

Transcription (RNA synthesis) systems resemble a Rube Goldberg construction with seemingly endless add-ons and compensations. Evolution makes surprising sense out of otherwise incomprehensible transcription systems.

Translation (protein synthesis) systems comprise a Rube Goldberg contraption with a distinct history. Evolution of transfer RNA (tRNA) provides the core narrative and makes conceptual sense out of translation systems.

The evolution of metabolism is conceptualized. A simplified evolutionary description may be a useful complement to the perplexing treatment presented

in biochemistry courses. When you realize that much of metabolism is based on two protein folds of the same basic pattern ($(\beta-\alpha)_8$, TIM barrels, and Rossmann folds), the subject may seem conceptually less daunting.

The evolution of three domains of life on earth (archaea, bacteria and eukaryotes) reduces to an instructive working model. To a remarkable extent, evolution of the three domains tracks evolution and divergence of transcription systems: that is multisubunit RNA polymerases and their general transcription factors.

Eukaryote complexity is the consequence of archaeal and bacterial fusions. The clash of many prokaryotic genomes to form eukaryotes generates organismal complexity in understandable ways.

So, if you care about genesis of life on earth, this book is for you.

If you care about the RNA-protein world, this book is for you.

If you care about transcription and translation systems, this book is for you.

If you care about metabolism, this book is for you.

If you care about eukaryotic complexity, this book explains that.

If you care about cancer, viral infection, and/or animal complexity, I offer simple foundational models.

Despite seemingly endless possibilities (and current politics), evolution is frighteningly conservative. Significantly, evolution appears to lack a strong ethic of innovation and instead builds new functions on existing scaffolds. Very often, generation of biological complexity involves iteration of motifs followed by folding and then coevolution of partners. Repeatedly, evolution appears to be a race to fold, to closure, and to resulting solubility with later emergence of refined biological function and specialization. Intricate folds and much larger biological systems are duplicated and repurposed.

So, this is a conceptual story of genesis supported by many beautiful color pictures and verifiable hypotheses. Molecular graphics is high art, and soon you will make your own. I hope no one is too offended or too upset by the simplicity. Personally, I find the models in my book a little frightening and unsettling.