

Preface

In writing this book I gradually realized that I was addressing two very disparate scientific communities: biochemists and astrophysicists, and that these communities are rarely in scientific communication. Furthermore, the astrophysicists were further divided into two additional not-very-interactive communities, nuclear astrophysicists and neutrino astrophysicists. What this forced me to do is try to present what I regard as at least a minimal level of information from each of those communities in the context of the primary subject of this book, the chirality of the amino acids. The biochemists will quickly realize that my allegiances are with the astrophysicists; I hope I have done a reasonably credible job of representing the chemists. Trying to gain a reasonable level of personal credibility in biochemistry has certainly represented a major component of the time I spent in writing this book. In recognition of the wide diversity of topics, and the inevitable nomenclature that goes with each, I've tried to include a pretty complete glossary.

Since this book is about origins, I felt it appropriate to present several types of origins, notably, the Big Bang, the origin of the elements, and finally the origin of the molecules of life in the cosmos and on planet Earth (and quite possibly on other planets). I have tried to present all of these subjects at a level that someone with a minimal background in science, but a strong interest in learning new things, can digest. This might also make the book appropriate for a course for undergraduates who are not science majors: "amino acid chirality for poets" (but with significant additional input from the teacher, probably with the help of the many references to supplement the areas of professorial non-expertise). For those readers who have more of a science background, I hope I've not insulted your intelligence too much; the subjects in this book are sufficiently varied that I can almost guarantee that you will eventually find something discussed in which you're not an expert. In any event, I have tried to describe the subjects of the

book in such a way that a class of undergraduates could use the book to truly get a grounding in astrobiology.

Although I have certainly emphasized the model that I, together with my colleagues Toshitaka Kajino and Takashi Onaka, have built, I have also tried to present enough generality in the subjects relevant to the origin of life that students can gain an overall impression of the basic features of the subject. And, of course, I've included some physics background subjects that are favorites of mine, which are relevant to origins, and which can serve as general knowledge for students and other readers who are generally curious about science.

In writing this book I've violated one of the basic tenets associated with attempts to popularize science: don't include equations. I've included lots of equations. In one instance the equation was unavoidable: that was the discussion of the Drake equation, which is pretty basic to discussions of detecting extraterrestrial life. However, my other equations are not the sort of thing you find in algebra books, rather they are more shorthand ways of stating processes or reactions. These are not equations that could be solved for one of the variables; they don't contain variables! I hope the readers will find them useful.

I am deeply indebted to many people for contributing to my knowledge of this subject, and therefore to the content of this book. First and foremost in this regard are my collaborators on the development of the Supernova Neutrino Amino Acid Processing model, Toshitaka Kajino and Takashi Onaka, for their many contributions to our efforts. This book could not have been written without their inputs to our two papers. I must include in my acknowledgements two other people who gave a boost to the early efforts: Isao Tanihata and Reiko Kuroda.

And, finally, I gratefully acknowledge my wife, Sidnee, who although she is a nonscientist, read through the manuscript, and in many instances pointed out the places where the physicist in me had gotten carried away with physics-speak. The places where the physics-speak still lurks are my fault, but the readers can be sure that there are many less such places than there would have been without Sidnee's efforts.

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