

Preface

Until close to the end of the twentieth century, man had no evidence that living creatures of any kind could exist anywhere else in the universe other than our own planet. Due largely to the advent of computers and rocket science, in the last years of the twentieth century, scientists began making a series of amazing discoveries that have completely revolutionized the biological sciences as well as the geological and space sciences. Many scientists now believe we are only a few years away from confirming the existence of extraterrestrial life not only in our solar system but also possibly on planets circling other stars in our galaxy, and even beyond our galaxy.

Upon retiring in 2008 from a 40-year career as a professor of psychology and the brain sciences, the author immediately elevated what had been his lifelong hobby as an amateur astronomer from a part time to a fulltime passion and is now devoting his retirement years to pursuing a second career (albeit without pay) as an amateur astrobiologist. In 2011, I published my first book on this topic entitled ***From Dying Stars to the Birth of Life: The New Science of Astrobiology and the Search for Life in the Universe*** (Nottingham University Press, United Kingdom) for interested nonscience readers. While writing the book, which was designed to be an overview of the new science of astrobiology, with a particular emphasis on how life and Earth's geology coevolved to produce a life friendly world, I frequently found my "alternate self" (i.e., my brain science/psychology background) tricking me into speculating about how different kinds of intelligent life might have arisen if Earth's earlier environmental conditions had been different in some way. I decided that my next book should take advantage of my knowledge of both the space and brain sciences to see if I could come up with any new ideas about how intelligent life might be able to evolve on other worlds.

In the present book, I have taken the bold step of attempting to merge my knowledge of astronomy and the neurosciences and describe my personal (plus professional) thoughts on how intelligent nervous systems might be able to develop and survive on other planets (or moons) in the universe. For many years, those astronomers who were interested in investigating the possibility of life on alien

worlds (who were first labeled as *exobiologists* but now call themselves *astrobiologists*) were accused of pursuing a science that was totally devoid of any observable or measurable subject matter which they could directly investigate (no extraterrestrial life-forms, no exoplanets, etc.). When I first started writing the present book in January, 2012, I realized that I would be faced with the same predicament that haunted the astrobiologists since I also had no hardcore data to directly support any ideas, theories, or speculations I might want to discuss concerning the possible existence of intelligent extraterrestrials. However, the good news is that our astrobiologists and space scientists now appear to be very close to putting an end to this longstanding dilemma. While we still have no confirmed evidence for the existence of life of any kind, including intelligent life, on any other planet other than Earth, our astrobiologists are now finding solid evidence that potential homes for life (i.e., exoplanets) may be relatively common in the universe, and it now appears likely that it is only a matter of time until we discover Earth-like worlds circling stars in life friendly warm and wet habitable zones that could support carbon-based life similar to that which inhabits our planet.

Therefore, while I have knowledge (and access) to a considerable amount of scientific data related to how life and intelligent nervous systems evolved on Earth, I know nothing about how (or even whether) such systems might evolve on other worlds. This book will, therefore, be mostly filled with my educated guesses, as well as those of other respected Earth-bound scientists, of what may be happening out there beyond our atmosphere. When there is little or no confirmed data to support a field of science, it is disturbingly easy to be wrong in describing how things might happen. Some rare individuals sometimes manage to avoid this pitfall as did Charles Darwin whose ideas on biological evolution were amazingly on-target in spite of the fact that he knew virtually nothing about the underlying chemical, genetic, and biological underpinnings of this field of science. I am hoping that I might be lucky enough to get close to the truth with some of the many speculations that this book will, of necessity, contain.

Another major reason I chose to write this book at this time is that I believe very strongly that, even though we have not yet confirmed the existence of extraterrestrial life, it is not too soon to take the next major step in unraveling the mysteries of this exciting new field of science by inviting our behavioral scientists (neuroscientists, psychologists, and even sociologists) to join ranks with our astrobiologists to begin serious discussions and debate on what kinds of intelligent life-forms may exist out there and how we might go about locating and studying them. The amazing invention of digital computers in the last half of the twentieth century not only opened the door wide open to a bona fide scientific revolution in my childhood hobby of astronomy (and space science), it launched a similar revolution in the waning years of my professional career as a neuroscientist/psychologist. The recent advent of fast and powerful computers is also now triggering an incredible explosion of fascinating new information on how the brain works. As a newly retired professor, I find myself literally caught between the proverbial “rock and a hard place” and have decided to devote my “golden years” to learning as much as I can from my younger and still active older colleagues (plus, hopefully, my readers)

about whether brains on other planets may work the same or entirely differently from those found on Earth.

Once again, as I did in my last book, I cannot take personal credit for any of the data, theories, ideas, etc. that this book contains with respect to astronomy and astrobiology. And, although I was an active brain researcher and published numerous research articles and a few textbooks, the brain science information presented in the present book is also public domain. Finally, I would again like to thank my wife Fran for tolerating the way I have converted what was supposed to be our leisure retirement years into a busy second career.

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