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CHAPTER ONE

# Introduction—Panspermia, 2020

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## Abstract

This current volume is, in many ways, a 2020 update to the important 1999–2000 compendium by Sir Fred Hoyle and Professor N. Chandra Wickramasinghe's "Astronomical Origins of life: Steps towards Panspermia." The emerging new paradigm of biology that connects life on Earth with the wider cosmos is covered in considerable depth showing that terrestrial biological evolution is best understood as a cosmically derived habitat and an interconnected genetic system. The various chapters here discuss all aspects of this interconnectedness, particularly relevant now in this time of the coronavirus pandemic (COVID-19) as the human race reacts to the many microbes and viral pathogens that arrive regularly from space.

It is now 50 years since the modern revival of scientific investigations into astrobiology began with the work of the late Sir Fred Hoyle and Professor N. Chandra Wickramasinghe on defining astrobiology as a universe-wide phenomenon (Panspermia). The work of Hoyle-Wickramasinghe and their numerous colleagues marshaled the first key evidences and supplied the critical scientific analyses and arguments to allow the interpretation of the emerging new data. These new data relate directly and indirectly (via "biosignatures" and the like) to extra-terrestrial biological seedings events which then influenced the ongoing terrestrial evolution of life on Earth (Steele et al., 2018). Indeed the current volume can be considered an update to their important compendium "Astronomical Origins of life: Steps towards Panspermia" (Hoyle & Wickramasinghe, 2000). In that compendium the Preface was entitled "Panspermia 2000" and we use this same updated title to flag the appropriate contents of the present book.

This volume therefore brings together various aspects of an emerging new paradigm of biology that connects life on Earth with the wider cosmos. The available facts of terrestrial biological evolution we believe can

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only be understood properly on the basis of a cosmically derived and interconnected genetic system. Indeed as various chapters here discuss our very well being appears overtly dependent on how human beings react biologically to the numerous microorganisms that arrive regularly from space (Steele et al., "Origin of new emergent Coronavirus and Candida fungal diseases—Terrestrial or cosmic?," this volume).

The picture that now emerges is that life on Earth was been seeded from space and began to flourish here at, or shortly after, the *Hadean* epoch about 4.1 billion years ago (Wickramasinghe et al., "Cometary panspermia and origin of life?," this volume). The ongoing and varied tempo and type of these continuing "in-falls" of cosmic genetic material contributed to the emergence and continued evolution of diverse living systems here on Earth. Without such a connection with the wider cosmos we argue that no significant evolution of life would have been possible. It is thus now apparent that the traditional slow, blind and random evolutionary mechanisms, assumed by the traditional neo-Darwinian theory of evolution, are inadequate to explain a wide range of new astrophysical and biological data. Neo-Darwinism as the *dominant* evolutionary process is now contradicted on multiple fronts by the sheer weight and variety of the emerging new evidence. A switch to a Lamarckian-Panspermic view of life, is, in our view, long overdue. Some of these rapid genetic adaptation mechanisms are discussed in various Chapters (Steele et al., "The efficient Lamarckian spread of life in the cosmos," this volume; Lindley, "The mutagenic source and power of our own evolution," this volume; Steele et al., "Origin of new emergent Coronavirus and Candida fungal diseases—Terrestrial or cosmic?," this volume).

Since the 1970s a range of cross-disciplinary evidence has emerged for Lamarckian genetic processes of acquired inheritance—rapid, fast and directional changes that are environmentally responsive. That is, the genetic changes we attribute to evolution of organisms are sensitive to *genetic feedback mechanisms* that guide their future evolutionary development. In lower organisms this is manifest as 'adaptive evolution' where single cells (prokaryote, archaea, more complex eukaryotes) employ rapid SOS or hypermutation and rapid selection proliferation strategies—to ensure survival in new environments. In higher multicellular animals adaptive somatic selection strategies involving acquisition of new genes both by horizontal gene transfers HGT), coupled with somatic hypermutation,

reverse transcription and rapid somatic selection allow "adapted" progeny somatic cells and new vertically transmitted germline genes to emerge (viz. the penetration of the Soma-Germline *Weismann Barrier*). Plants do not possess a *Weismann Barrier* but use a similar set of Lamarckian strategies to pass on their acquired adaptive somatic genetic solutions to progeny organisms, in a process aptly identified as a Pangenesis process, exactly in principle as envisaged by Charles Darwin himself 150 years ago (Liu, 2018).

So these diverse new emerging observations and data on "acquired inheritance" across the kingdoms of life now make rational sense in terms of Lamarckian modes of inheritance (Steele et al., "The efficient Lamarckian spread of life in the cosmos," this volume). We thus draw out the scientific links between rapid Lamarckian inheritance and the efficient Panspermic spread of pre-existing living systems throughout the Cosmos (Steele et al., 2019). This can be summed up as follows: A population of living cellular systems—spores, seeds, even cryopreserved fertilized eggs encased within protective matrices (e.g. interiors of wandering comets, small moons, planetoids, or fragments thereof)—may be dispersed throughout the Cosmos via long space-time journeys (hundreds of millions to billions of years). On landing in a new Cosmic niche a portion or subset of the cells surviving impact adapt rapidly to their new environment primarily via Lamarckian rapid adaptation genetic mechanisms (which may often cause overt disease, Hoyle & Wickramasinghe, 1979, Steele et al., "Origin of new emergent Coronavirus and Candida fungal diseases—Terrestrial or cosmic?," this volume). Thus a Panspermic universe provides the scientific rationale for the actual widespread existence of Lamarckian modes of genetic evolution both on Earth and throughout the Cosmos.

What then for the actual origin of life itself? Our pragmatic position is summed up recently (Steele et al., 2019) but done succinctly here in the Foreword by Brig Klyce who has spent more than 25 years curating the relevant information and the key discoveries at the Cosmic Ancestry website (www.panspermia.org).

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