

BOOK REVIEWS

Frozen Evolution: Or that's not the way it is, Mr. Darwin

By **Jaroslav Flegr**

Charles University in Prague Press, 2008, \$20.99,
224 pp. ISBN 978-80-200-1526-6
[\[http://www.frozevolution.com/frozen-evolution-book\]](http://www.frozevolution.com/frozen-evolution-book)

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Jaroslav Flegr's *Frozen Evolution, or that's not the way it is, Mr. Darwin* (with a further subtitle of *Farewell to the selfish gene*), is his second book on the topic of evolution. The book begins with a short introduction of Darwinian evolution and the historical context in which it was derived. Flegr wastes no time presenting his opinion on Darwinism, boldly stating "the manner of formation and development of species through the action of natural selection is different than that described by Darwin and that modern textbooks attempt to show us" (p. 10). As opposed to classic Darwinian evolution, the argument put forth by Flegr is that species can only vary from their original state to a limited extent and therefore can adapt to environmental changes only until sufficient resistance forces them to break and fall into extinction. He posits that there are two life stages: [1] evolutionary plasticity, where the species under consideration can change its properties in response to environmental selection pressures and [2] a period of frozen plasticity. During this latter period, the species responds to environmental pressures only temporarily. Therefore, once the species has

reached this stage, any large environmental changes would lead to the species' extinction (pp. 141-142).

While this theory, which he calls "Frozen Plasticity" sounds plausible and is the primary topic of the book, the argument is not as strong as it could be due to the inclusion of numerous asides that might confuse the reader. Many of these asides are worthy of mention, but are completely unnecessary in this book, especially since the book might be read by those new to the field. In fact, the concluding chapter of the book states that the intended audience is young people, particularly high school and university students (p. 217). I am in good position to assess the success of meeting this aim, having only recently completed an undergraduate degree in psychology. In general, I believe that this book presents an intriguing idea (i.e., Frozen Plasticity), but that students without a considerable background in the fields of evolution, ecology, and genetics may feel overwhelmed by the material.

After opening with a short introduction, Flegr spends the next two chapters providing a background in Darwinian evolution and genetics rather than launching into the details of his argument for Frozen Plasticity. In Chapter 2, Flegr begins with a lesson on how to write a scientific paper, using his own study on Rh positive and Rh negative individuals and their resistance or susceptibility to toxoplasmosis as the example. Although the fundamentals of the paper writing process are necessary for beginning students, using an example of toxoplasmosis resistance is likely to perplex many students. Although the intention is admirable, this section does not allow the rest of the chapter to follow logically, as the remainder of the content is a condensed background on Darwinian evolution. That being said, Flegr does well to emphasize the importance of Darwin's discovery in the given historical context. He makes it known that theories proposing the formation of adaptive

traits in living organisms had been put forth before Darwin's time, but it was Darwin who presented a mechanism to explain what drove these adaptations: natural selection. While this knowledge is important in the study of evolution, students might have difficulty in focusing on the main tenets of Darwinian evolution itself, due to unnecessary, distracting asides.

Chapter 3 consists of an explanation of Darwinian evolution's synthesis with modern genetics. A densely detailed explanation of basic genetics is provided, followed by superfluous information on scientific paradigms, and even mention of how "Occam's broom" is used to sweep those theories that do not fit current scientific understanding into the unknown. Darwinian evolution and modern genetics are both topics that are extremely important to understanding the basis of Flegr's argument, it would have been good to have more extensive coverage of these areas, particularly since the readership is intended to be students. On the positive side, the book has highly focused chapter summaries, which recap the main points for the reader and help to elucidate the overall building of the central argument.

The next four chapters are far easier to understand, as they are extremely well organized and elaborate on several issues in a focused manner using relevant examples. Chapter 4 does a fantastic job of outlining the basic agents of evolution (e.g., types of selection, micro and macro evolution, genetic drift, etc.) as well as population ecology. Chapter 5 could be the highlight of the book and presents the complexity and organization of organisms. It is very well laid out and interesting to read, outlining several of the processes that account for complexity and organization. For example, using the structure of a crystal, Flegr examines how such an improbable structure is actually the most probable one, given the physical and chemical

processes to which it is exposed. This concept is extended to explain the structure and organization of populations. After a well-described interpretation of the hawk-dove model of competitive strategies and evolutionary stable strategies, Flegr points out that the stable strategy in no way needs to be the one that ensures maximum fitness. Thus, he proposes that the Darwinian idea of individuals with the highest biological fitness predominating in evolution is false and misleading. He then devotes an entire chapter to describing Dawkin's well-known Selfish Gene theory, only to dismiss it on the same grounds: only sometimes is competition between genes accompanied by competition for greatest biological fitness.

It is very clear that Flegr has a firm grasp on genetic modeling, as Chapters 5 and 9 are packed with models. Although these models are likely of interest to some readers, and arguably necessary for comprehending the idea of frozen plasticity, I found these parts to be highly laborious to read and am not certain that they actually helped rather than hindered his thesis.

The final ten chapters are not as strong, and the content is again interspersed with confusing asides. The chapter summaries remain useful, though, and may help students obtain at least a rudimentary understanding of what is presented. The crux of the book is Flegr's theory of frozen plasticity as presented in detail in Chapter 11. As opposed to the earlier descriptions, this section incorporates the genetic basis for the evolutionary stable strategy that frozen plasticity affords. In subsequent chapters, Flegr offers paleontological, genetic, and naturally occurring data that support his theory.

Aside from the concerns with the presentation of the material, the key idea of frozen plasticity is very intriguing. As described above, the evolutionary plasticity of a species is limited to

the short period of time immediately subsequent to the initial speciation event. This period is when the most significant changes occur. After this stage, the species only deviates slightly in response to environmental pressures; that is, it enters a period of frozen plasticity. If true, paleontological data from the evolutionary plastic phase should be quite limited. Fossils that indicate transitional forms, derived from a speciation event, are very rarely found, so the current fossil record supports this aspect of his theory. Stating that, "macroevolutionary processes can hardly be studied using laboratory experiments" (p. 174), Flegr uses natural incidences, such as island species, to find supportive data for his theory. The limited genetic material (due to few immigrants to the island), along with a variety of unoccupied ecological niches should result in organisms with greatly derived evolutionary features. That is, new features should develop faster in island species than mainland species. Again, this aspect of his theory is supported in nature.

The remaining chapters discuss the ecological consequences of the theory of frozen plasticity and how it relates to evolutionary trends. There are a few rather confusing paragraphs preceding Flegr's argument that the evolutionary plasticity of sexually reproducing species increases biodiversity. He then uses his theory to explain why evolutionary trends are slow, the main idea being that since the period of evolutionary plasticity is so short as compared to the evolutionary frozen phase, species must wait for a new speciation event before evolving any further. After a chapter discussing his theory in relation to domesticated animals, Flegr presents a very in-depth, genetic theory of altruism according to frozen plasticity. Taking into account the controversial nature of altruism in evolutionary biology (Hoffman, 1981), this chapter is promising and concise but perhaps a more thorough explanation would be more helpful to new students of this topic.

Flegr's theory of Frozen Plasticity, while obviously very well thought out and thoroughly researched, is not entirely convincing. Although Flegr presents ample evidence and genetic models to suggest its superiority over Darwinian evolution, the argument as a whole is somewhat lost in the presentation. A more focused presentation of the evidence directed towards geneticists and evolutionary biologists might earn him positive recognition, and help place Flegr's theory in current textbooks. As Flegr points out himself, recognition for a theory can take 10 to 15 years. It is necessary to point out however, that the original Czech version of this book has already earned him great recognition, and the quality of his English adaptation is highly admirable. If he is willing to present his theory to the necessary audience in a more concise and straightforward format, further recognition may await him.

In summary, Flegr's argument for frozen plasticity is comprehensible, but it seems unlikely that students will understand the intricacies of his theory without prior solid understanding of genetics and Darwinian evolution. Students new to the field will probably need firm guidance if this book was adopted in a course, whereas it might be suitable for graduate students. Rather than writing an introduction to evolutionary thought or processes, Flegr has presented an alternative perspective of one important aspect to the evolutionary process, and this book is centered on his argument. As a result, this book would be best suited for individuals with a strong background in evolution and who have an interest in new, developing theories.

References

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The Evolution of Childhood: Relationships, Emotion, Mind

By **Melvin Konner**

Harvard University Press, 2010, 943 pp; ISBN-13: 978-0674045668 [Hdbk, US\$60]

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Mel Konner has been a contributor to human ethology since the inception of the field. My own introduction to his work stems from his developmental ethology of the !Kung San of the Kalahari desert, which was published in a 1972 classic edited by Nick Blurton Jones entitled, *Ethological Studies of Child Behavior*. In the 38 years since then, Konner has become well known for his multifaceted analysis of the hunter-gather way of life, especially childhood and adolescence. He is the author of a number of books including an earlier synthesis entitled, *The Tangled Wing: Biological Constraints on the Human Spirit* (1982) that foreshadowed this 943-page magnum opus.

Konner presents a vision of childhood that is sweeping in scope, encompassing the evolution of human behavior and culture. He explores issues such as the early development of the brain, and the biological bases for diverse human behaviors, including attachment, play, emotion, gender differences, language, cooperative breeding, and male parental care, to name but a few. This vision is multi-disciplinary, drawing primarily on his broad training in anthropology, ethology and neuroscience, as well as the other disciplines he has folded into this core. Such an extensive multi-layered database demands careful organization. Rather than attempting to review so many topics in depth, I will instead provide an overview of the organizational framework of the book and then highlight a few of the topics