New book: *How and Why Species Multiply: The Radiation of Darwin's Finches* by Peter R. Grant and Rosemary Grant, 2007, 218 pages, ISBN 978-0-691-13360-7, Princeton University Press, hardcover, US$35.00.

An adaptive radiation is defined as the rapid evolution of several species from a common ancestor to occupy different ecological niches (Givnish & Sytsma, 1997; Schluter, 2000). Therefore, not all speciation occurs through adaptive radiation. What makes adaptive radiation a unique focus of evolutionary biology research is that descendent species are numerous enough for quantitative comparisons and similar enough to one another, enabling the reconstruction of the routes of diversification and that they live in environments where those routes can be interpreted adaptively. Among the best known evolutionary diversification cases (e.g., cichlid fishes of East African Great Lakes, *Drosophila* and the silversword plant alliance of the Hawaiian archipelago, *Partula* snails in Polynesia, and *Heliconius* butterflies in Central and South America, to mention a few), the adaptive radiation of Darwin's finches represents a special and unique opportunity to understanding the mechanisms of adaptation and speciation. Darwin's finches are special because they were made famous by the revolutionary thinker Charles Darwin based on his experiences in the Galapagos Islands in 1835. They are unique because they are manageable in numbers (there are 14 or 15 species depending on classification scheme), similar to each other so that evolutionary changes can be reconstructed easily, they are accessible and no species has become extinct through adverse human activities. Except for the Cocos finch, they are also confined to a small archipelago of Galapagos situated 900 km from the South American continent.

This book is an accessible and authoritative summary of the life's work by two of the leading evolutionary biologists of our time. Distilled into less than 200 pages, it provides a concise synthesis of what we currently know about the adaptive radiation of Darwin's finches, thanks mostly to a 34-year research by the authors and to works of many other contributors. The authors expertly balance the informing biologists and explaining to general readers: the highly technical and complex research topic was presented with such clarity and accessibility suited for general audience, but without losing interest of biologists who needs the sufficient depth and technical details.

In this book, 2-3 million years of evolutionary history of Darwin's finches was traced with insights from geography, behavior, ecology, and genetics, involving natural and sexual selection, genetic drift, introgression, and genetic and cultural evolution. One message is abundantly clear when reading this book: 'speciation is a process and not an event,' as the authors asserted, and environmental change is a major driving force in the origin of new species. This confirms Hutchinson's poetic remark that evolutionary process is a play in the ecological theater (Hutchinson, 1965).

In a sense, speciation is evolution of reproductive barriers leading to genetic incompatibility of incipient species and such barriers may arise by many different means. If reproductive isolation is breached, as in case of some of the closely related Darwin's finch species, and the fitness of hybrids is not less than the parents, then speciation can be considered incomplete. In other words, fusion of incipient species would have to be less than fission caused by different selective regimes for speciation to be reinforced on secondary contact. However, the authors show that such an interpretation is too simplistic. The authors convincingly demonstrated that characteristics conferring to a greater fitness of hybrids in one environment may well be disadvantageous in other environmental conditions (Grant & Grant, 1996b; Keller *et al.*, 2002). Again, it reconfirms that environmental dynamics is an overarching determinant of evolutionary process.

Another intriguing finding described in the book is the role of cultural evolution in the radiation of some Darwin's finches. Of course, the focus of research on Darwin's finches has always been divergence of beak size and shape under natural selection (Lack, 1947; Grant, 1999; Podos & Nowicki, 2004). However, songs or acoustic signals plays an important role in the divergence of the finches (Grant & Grant, 1996a; Grant & Grant, 1997) and it has been reviewed in the book. One can imagine that songs have two components: heritable part in association with beak size and shape