

## EDITORIAL

## An Integrative Look at Frugivory and Seed Dispersal Studies

The declaration of 2010 as the International Year of Biodiversity by the United Nations' General Assembly was a recognition of the reality and gravity of the current biodiversity crisis, an episode in earth's history that many now consider the 6<sup>th</sup> Mass Extinction (Wake & Vredenburg 2008). Human-driven loss of biodiversity refers not only to the loss of species, populations, and genetic diversity, but also to the loss of ecological interactions that are central to ecosystem function (Tylianakis *et al.* 2008). One of these key interactions is the process of seed dispersal — the movement of seeds away from their parent plants — often mediated by frugivorous or granivorous animals engaged in a tight plant-animal mutualism bearing profound implications for the regeneration, maintenance, and conservation of terrestrial ecosystems (Wang & Smith 2002).

2010 was also the year of the 5<sup>th</sup> International Symposium on Frugivores and Seed Dispersal (FSD 2010), held in Montpellier, France, with a focus on 'Mechanisms and Consequences of a Key Interaction for Biodiversity'. This seminal international gathering takes place every 5 years and serves as a nucleus for a rapidly growing, integrative field of inquiry. The study of Frugivory and Seed Dispersal serves as a meeting point for scientists with a broad range of expertise studying natural systems from different perspectives and at different levels of ecological organization (Jordano *et al.* 2010). Frugivory and Seed Dispersal is by definition a melting pot of integrative research where the animal ecologist meets the botanist, the physiologist, the landscape ecologist, the geneticist, the modeler, and increasingly, the conservation biologist.

At FSD 2010, we met a rich combination of the most prominent people in the field, young emerging researchers, and "hungry" graduate students. It was precisely among

the *café au lait* and *croissants* of FSD 2010 coffee breaks that this special issue was forged and its contents initially outlined. The momentum generated at the meeting was a motivation to capitalize on the diversity of expertise, study systems, levels of organization, and experience at FSD 2010. The result is this special section of *Integrative Zo-*



**Figure 1** A large ground finch (*Geospiza magnirostris* Gould, 1837) cracking open a hard Muyuyo seed (*Cordia lutea*) on the Island of Santa Cruz. Photograph by Ruben Heleno.

ology on Frugivory and Seed Dispersal. The pieces published herein contain a high content of research on plants, and animal-plant interactions that may seem unusual for a more traditional zoological journal. In fact, the intersection of such cross-disciplinary boundaries captures the very essence of frugivory and seed dispersal; ecologically and evolutionarily speaking, the lives of frugivorous animals and fruiting plants are so intimately intertwined they cannot be understood in isolation of one another. Thus, we believe that *Integrative Zoology* is the most appropriate journal for this topic. Initially, we envisioned a special issue containing up to 8 contributions. However, the response to the call for papers was so successful that, to accommodate the high number of papers, we required two special sections in respective issues of the journal.

### Contents of the Special Section

This first special section dedicated to frugivory and seed dispersal includes 4 articles: 2 original articles and 2 reviews. In the first paper of this Special Section, Gutiérrez-Granados (2011) shows the negative effects that logging has on the scatter-hoarding behavior of rodents in a tropical moist forest of Mexico's Yucatán Peninsula. Logging is a common and severe form of habitat degradation in the tropics that results in a dramatic loss of functional diversity (e.g. Ernst *et al.* 2006). Gutiérrez-Granados found that the number of scatter-hoarded seeds and the hoarding distance are lower in logged than in unlogged forests.

Secondary dispersal can modify, in important ways, the final spatial arrangement of dispersed seeds and their survival, yet it remains an under-appreciated process. Kunz & Krell (2011) highlight the importance of dung beetles as secondary dispersers in African savanna ecosystems, in the second paper of this special section. This study shows interesting differences in the dung beetle community among African savanna and forest environments as well as among Africa and the Neotropics.

The third and fourth papers are reviews. The first of these two looks at the past, present, and potential futures of seed dispersal mutualisms in the extremely degraded but well-known tropical landscapes of Hong Kong (Corlett 2011). As human population growth and habitat degradation continue in the tropics, we must learn from the errors of the past and the opportunities for the future, in order to make human-dominated landscapes more accommodating to frugivory and seed dispersal interactions. Corlett's

(2011) analysis of Hong Kong's seed dispersal mutualisms identified scatter-hoarding rodents as the most important missing guild of dispersers in the island.

The second of the two review papers takes us to the Galápagos, an oceanic archipelago with a special place in the history of natural science. Although the Galapagos is an intensively researched system — a field laboratory for evolutionary and ecological research — the work of Heleno *et al.* (2011) is the first comprehensive study on the seed dispersal mutualisms between its unique flora and fauna. Their paper highlights the importance of cooperation between scientists and managers, and how research on plant-frugivore interactions has relevant applications for ecological restoration in landscapes with disrupted mutualisms and a high prevalence of invasive species.

### Final Remarks

Following the spirit of FSD 2010, the papers in this special section emphasize the mechanisms and consequences of seed dispersal as a key ecological interaction for the conservation of Earth's biodiversity. The second special section, to be published in December, 2011 (Volume 6, Issue 4), will include another set of articles that, together with the 4 papers published here, will form an integrative snapshot of the state of the science of frugivory and seed dispersal. We end by thanking all contributors and the Editorial Office of *Integrative Zoology* for making this project a successful one.

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