

## Foreword by the Supervisor

In the flowering plants, there are currently 3–4 synonyms for every accepted name (<http://www.theplantlist.org>). This fact is not a harmless nuisance. Synonymous names cause at least two kinds of errors: they result in wrong assumptions about species' geographic ranges, and they make it difficult to find information about species because users cannot know which name refers to what. The judgment about what is a good biological species and which names are synonyms is made during monographic research. Such research consists in evaluating the information pertaining to all names published for the species, subspecies, or other forms in a genus or family, along with studying all specimens to which these names have been applied (rightly or wrongly). The very best monographs also include geographic distribution maps and DNA sequences from specimens representing the group's species. Based on these data, a monographer reaches a conclusion about which names refer to true biological species. He or she then constructs a key to identify the accepted species and prepares authoritative species descriptions and maps.

**Fernanda Antunes Carvalho** carried out monographic research on the papaya family, Caricaceae, between April 2010 and December 2013. Her dissertation consisted of several chapters, three of which are included in the present book. A novel aspect of Dr. Carvalho's monograph of the Caricaceae was that she availed herself of the cybertaxonomy platform 'Botanical Research and Herbarium Management System' (BRAHMS) to also develop an online version of her monograph that will be updated at certain intervals. In her work, she allocated the about 200 names relevant to the family Caricaceae to 34 biological species and one hybrid. To arrive at this conclusion Dr. Carvalho studied of about 2000 herbarium collections as well as relevant type specimens (specimens on which particular names are based).

Fernanda Antunes Carvalho also used molecular-phylogenetic methods to infer the phylogenetic relationships in the papaya family. Her

phylogenetic work in 2011/2012 led to the discovery that the closest relatives of papaya (*Carica papaya*) all live in Mexico and Guatemala, not in the Andes as often suggested. This discovery fits with other data that likewise indicate that the papaya was domesticated in Mexico/Guatemala.

The book that Fernanda Antunes Carvalho is presenting here brings together all information that is available today about the evolution, distribution, ecology, morphology, and conservation status of the species in the papaya family. Together with the online data and image database that she maintains about this family, it forms the foundation of all current and future research on this family.

Munich, March 2015

Prof. Dr. Susanne S. Renner

Molecular Phylogeny, Biogeography and an  
e-Monograph of the Papaya Family (Caricaceae) as an  
Example of Taxonomy in the Electronic Age

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