



Towards a global historical biogeography of Palms

Thomas Couvreur (1), William J. Baker (2), Jean-Marc Frigerio (3), Pierre Sepulchre (4), and Alain Franc (3)

(1) UMR Diade, IRD, Montpellier, France, (2) Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AB, UK, (3) UMR BioGeCo, INRA & Université de Bordeaux, and INRIA, Pleiade team, Bordeaux, France, (4) Laboratoire des Sciences du Climat et de l'Environnement, LSCE/IPSL, CEA-CNRS-UVSQ, Université Paris-Saclay, F-91198 Gif-sur-Yvette, France

Four mechanisms are at work for deciphering historical biogeography of plants : speciation, extinction, migration, and drift (a sort of neutral speciation). The first three mechanisms are under selection pressure of the environment, mainly the climate and connectivity of land masses. Hence, an accurate history of climate and connectivity or non connectivity between landmasses, as well as orogenesis processes, can shed new light on the most likely speciation events and migration routes driven by paleogeography and paleoclimatology. Currently, some models exist (like DIVA) to infer the most parsimonious history (in the number of migration events) knowing the speciation history given by phylogenies (extinction are mostly unknown), in a given setting of climate and landmass connectivity. In a previous project, we have built in collaboration with LSCE a series of paleogeographic and paleoclimatic maps since the Early Cretaceous. We have developed a program, called Aran, which enables to extend DIVA to a time series of varying paleoclimatic and paleogeographic conditions. We apply these new methods and data to unravel the biogeographic history of palms (Arecaceae), a pantropical family of 182 genera and >2600 species whose divergence is dated in Late Cretaceous (100 My). Based on a robust dated molecular phylogeny, novel paleoclimatic and paleogeographic maps, we will generate an updated biogeographic history of Arecaceae inferred from the most parsimonious history using Aran. We will discuss the results, and put them in context with what is known and needed to provide a global biogeographic history of tropical palms.