

Biogeographic mechanisms involved in the colonisation of Madagascar by African vertebrates: rafting, rafting and runways

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Madagascar's vertebrate fauna shows a complex biogeographic pattern that confounds generalisations developed from other islands. For 80 years popular opinion has held that most of Madagascar's terrestrial vertebrate fauna arrived via transoceanic dispersal (i.e. by rafting or swimming), chiefly from Africa. The Ali-Huber model proposed a jet-like eastward Palaeogene currents which would allow animals to reach Madagascar in 3 – 4 weeks (through hibernation), whilst others like hippopotamuses are supposed to swim across the Mozambique Channel. We re-investigated the Ali-Huber model by tracking particle trajectories in currents simulated using the Institut Pierre-Simon Laplace Earth System Model, under similar palaeo-geographic constraints and showed that the model considerably underestimated the time required to cross the Mozambique Channel under simulated palaeo-geographic conditions. Moreover, hibernation is probably an adaptation to Madagascar's hypervariable climate, and of doubtful value to waif mammalian colonists. In an other hand, due to their limited aquatic abilities and their physiology, hippopotamuses would not have been capable of crossing the Mozambique Channel by swimming.

Therefore we explored the possibility of geodispersal via short-lived land bridges between Africa and Madagascar. We reviewed recent geological results collected in the Mozambique Channel, and compiled three palaeo-sedimentological maps using PLACA4D. Geological data indicate three short-lived land bridges between Africa and Madagascar at 66-60 Ma, 36-30 Ma, and 12-05 Ma.

Mots-Clés : Madagascar's vertebrate fauna, Rafting, Landbridge, Topodynamic