Palms reveal the significance of climate change for tropical biodiversity

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Scientists at Aarhus University have spearheaded research results that shed new light on the processes forming the composition of species assemblages in the tropics.

"It comes as a surprise to us that climate change over millions of years still leaves a signature in the composition of species assemblages we see today. If species are severely affected by current and future climate change, it'll mean that there are long-lasting consequences for biodiversity, maybe over many millions of years to come – at least much longer than we've ever dreamt of before," says Daniel Kissling, who initiated the ground-breaking research results shortly to be published in the prestigious journal *Proceedings of the National Academy of Sciences* (*PNAS*).

Tropical areas provide similar conditions with high temperatures and humidity regardless of whether you are in Asia, Africa or South America. And you can find lush rainforests in all these places. However, tropical rainforests are not the same. There are fundamental differences in the species composition in the rainforests on the different continents.

Palms are much more than just the coconut palms we see on beaches of pure white sand. There are actually more than 2400 species of palms and, by studying them, the researchers have shown that the palm assemblages we find in the tropics today are to a large extent formed by climatic changes of the past, taking place over millions of years.

South America has had a relatively stable humid and warm climate over the last 50 million years, and rainforests have been widespread throughout this entire period. This is where species diversity is highest. There have been good living conditions and plenty of space for many new species to arise. As species formation has been concentrated in particular groups, the species-rich South American palm communities are now dominated by closely related species.

Africa, on the other hand, has been hit by severe drying during the last 10 to 30 million years. The area of rainforest has thus diminished dramatically, until it reached a minimum during the cold, dry ice ages that have repeatedly affected the world over and over again during the last 3 million years. As a result of past climatic changes, many species have simply disappeared entirely from the continent. There are therefore far fewer palm species in Africa than in South America. The poor palm flora of Africa thus has a relict character, and consists of species that are often not closely related to each other.

Provided by Aarhus University

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