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Ant mosaics in primary rainforests across four continents

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The existence of ant mosaics, or the mutually exclusive distribution of numerically dominant ants (NDA) in tropical tree canopies, has been demonstrated for plantations but remains contentious concerning primary forests mostly due to the difficulty in collecting and observing ants in trees that grow up to 30m in height. Our goal was to overcome this problem and study the three-dimensional distribution of NDA in primary rainforests across four continents. We developed the baitline method allowing us to collect arboreal ants every 5 meters along tree trunks and to conduct aggressiveness tests between ants collected from neighboring trees. These direct observations allowed us to define ant numerical dominance, species coexistence and to delineate NDA spatio-temporal extension. Ant colonies were mapped in quarter hectare forest plots in French Guiana, Brazil, the Democratic Republic of the Congo (RDC), Mozambique, Laos and Papua New Guinea (PNG). Our results indicate that territorial NDA species are found in every lowland forest site investigated. However, there seems to be a gradation in the ant mosaic structure according to the high (e.g. in PNG, RDC) to low (e.g. in Laos) prevalence of NDA on the trees. In some instances (e.g. in Mozambique or in PNG), *Crematogaster* supercolonies completely dominated the plots. Trees where NDA only forage intermittently can be observed at the border of a large NDA territory (e.g. that of Azteca in French Guiana) and create temporary gaps. Two mutually aggressive NDA are sometimes briefly observed on the same tree (e.g. the vertical segregation of *Crematogaster* and *Oecophylla* foragers along a tree trunk in PNG). These results emphasize the three-dimensional and dynamic structure of ant mosaics. They also stress that, in the absence of behavioral observations, statistical analyses of species co-occurrence on individual trees, often used to detect ant mosaics, must be interpreted with care.