Forests on ultramafic-derived soils in Borneo have very depauperate termite assemblages

Abstract

Previous studies in Sundaland (Borneo, Sumatra, Java and Peninsular Malaysia) have shown that termite assemblages in natural forests have a characteristic structure. These typical forest assemblages contain many soil-feeding species. However, this study investigated four natural forest sites in Borneo with depauperate termite assemblages, and compared their soils with soils from four other sites that have typical termite assemblages. In contrast to the typical assemblages, the four depauperate assemblages all have low species density (<35%), low relative abundance (<30%), a virtual absence of soil-feeders, significantly fewer wood-feeders, and a near-absence of species of Rhinotermitidae, Amitermes-group, Termes-group, Pericapritermes-group and Oriensubulitermes-group. The depauperate sites are on ultramafic-derived soils and have significantly higher concentrations of calcium, magnesium, nickel, chromium, cobalt, copper and zinc compared with the non-ultramafic soils at sites with typical assemblages. In addition, soil pH at the depauperate sites is significantly higher (>pH 5.4) compared with soils at the typical sites (which are all below pH 4.7). Possible mechanisms to explain the depauperate termite assemblages on ultramafic soils include metal toxicity, high pH disrupting gut physiology, and microbial interactions with metals.