

determinants of land snail diversity along a tropical elevational gradient: Insularity, geometry and niches

Abstract

Aim: We investigated the patterns of species richness in land snails and slugs along a tropical elevational gradient and whether these patterns correlate with area, elevation, geographic constraints, and productivity. We did so both at the scale at which land snail population processes take place and at the coarser scale of elevational zones. **Location:** Mount Kinabalu (4096 m) and the adjacent Mount Tambuyukon (2588 m) in Kinabalu Park, Sabah, Malaysian Borneo. **Methods:** We used an effort-controlled sampling protocol to determine land snail and slug species richness in 142 plots of 0.04 ha at elevations ranging from 570 to 4096 m. Extents of elevational ranges were determined by interpolation, extended where appropriate at the lower end with data from lowlands outside the study area. We used regression analysis to study the relationships between species density and richness on the one hand and elevation and area on the other. This was done for point data as well as for data combined into 300-m elevational intervals. **Results:** Species density (based on the individual samples) showed a decline with elevation. Elevational range length profiles revealed that range lengths are reduced at greater elevations and that a Rapoport effect is absent. Diversity showed a mild mid-domain effect on Kinabalu, but not on Tambuyukon. When the data were combined into 300-m elevational intervals, richness correlated more strongly with elevation than with area. Ecomorphospace was seen to shrink with increasing elevation. **Main conclusions:** The elevational species richness patterns show the combined effects of (1) reduced niche diversity at elevations with lower productivity and (2) historical events in which the upward migration of lowland species as well as the speciation of highland endemics took place. © 2009 Blackwell Publishing Ltd.