

Microsnails at microscales in Borneo: Distributions of prosobranchia versus pulmonata

Abstract

We surveyed the population structures of microsnails (shell size <5 mm) in two 20 x 200-m plots of pristine primary forest in Danum Valley Conservation Area, Malaysian Borneo. The plots were 400 m apart and each was divided into ten 20 x 20-m subplots, from which separate soil samples were taken. Micro-shells were extracted by flotation. A total of 407 shells were found, belonging to at least 29 species. After exclusion of very rare species and the juveniles of large-bodied species, micro-scale distributions were mapped and analysed for the remaining six prosobranchs and eight pulmonates. In general, the pulmonates were dispersed more evenly along the two plots: all pulmonate species were found across both plots, whereas three of the six prosobranchs were present in only one plot, with one species occupying only five adjacent subplots within one of the transects. Correspondingly, the index of dispersion, I-D, indicated significant departure from random distribution for all prosobranchs, but only for four out of the eight pulmonates. Whittaker's I, which indicates the spatial partitioning of diversity, was twice as high for prosobranchs as for pulmonates ($I = 3.8$ and $I = 1.9$, respectively, $P < 0.001$). These results suggest that Bornean prosobranchs have more highly fragmented population structures. This, in turn, would mean that gene flow is reduced, which might help to explain the higher degree of endemism in prosobranchs compared with pulmonates in the region. Alternatively, it could mean that ecological tolerances are generally lower in prosobranchs, which would also promote speciation.