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Biogeographical patterns of molluscs on tropical limestone karst islands9

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also found to be non-randomly distributed on islands, suggesting that smaller islands were sustained in a subset of a more complete one found on larger islands. CCA results showed that spiders were associated with specific environmental variables. A majority of them apparently preferred sites with bigger trees with more canopy cover. Furthermore, the body size of *N. pilipes* females was significantly correlated to island area and distance from Malaysia, the assumed source island for web-building spiders. A larger island and sites found closer to Malaysia harboured greater species richness. Finally, the *K* model provided an improved goodness-of-fit to account for the spider data.

We concluded that many factors could account for the distribution of web-building spiders on these small tropical islands but island area *per se* is the most important factor. Habitat diversity was not shown to play a major role until the usage of choros (*K*) which superceded island area as the best predictor of species distribution. Moreover, conservational strategies should accorded highest protection priority to the bigger islands, i.e. Pulau Ubin as it not only has the highest species richness but also contains many other species not recorded on other islands, and the responses of individual species must also be studied before embarking on a conservation project.

Poster -10

Resolving species limits within *Dicranosepsis*

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Dicranosepsis is the most speciose genus of black scavenger fly (Sepsidae) in South-east Asia. Species limits are problematic for species with few morphologically diagnostic features and cases of cryptic species are suspected to exist within the species currently listed as 'widespread'. Here the use of morphology, DNA and reproductive isolation tests is adopted to help resolve species limits and to test recently proposed methods in DNA taxonomy. The overall level of congruence between morphological and molecular data is low due to greatly differing rates of speciation in different *Dicranosepsis* species. The different rates are not well reflected in COI sequences. DNA taxonomy methods are thus not satisfactory in delimiting species. In contrast, consistent results between morphology and reproductive isolation support the relevance of foreleg morphology for species delimitation within *Dicranosepsis*. Cases of peripatric speciation and rapid speciation are discussed and widespread species are documented that have few morphological modifications but large COI divergences. Cryptic species are not described here because of a lack of reproductive isolation evidence.

Poster -11

Biogeographical patterns of molluscs on tropical limestone karst 'islands'

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Limestone karst outcrops are *de facto* terrestrial islands because they are isolated from one other by non-calcareous substrates. This spatial structure restricts gene flow between isolated karsts, with the result that certain taxonomic groups exhibit high endemism via allopatric and/or parapatric modes of speciation. For terrestrial molluscs, tropical karsts are generally considered evolutionary hotspots for speciation. However, there is a paucity of biogeographical studies on karst malacofaunas in general. Using molluscan species data we: (1) identified correlates of endemism from a set of important biogeographical factors (i.e., karst area, isolation, surrounding soil type and geological age); and (2) investigated how species compositions varied among different karsts in two biogeographical regions (Peninsular Malaysia and Sabah, Malaysian Borneo). Generalized linear mixed-effect models (GLMM)

were used to determine correlates of endemism, while non-metric multi-dimensional scaling (NMDS) was used to investigate species compositional variations. Sampling yielded a total of 198 terrestrial mollusc species. GLMMs revealed an important contribution of karst area and surrounding soil type on mollusc endemic richness, while NMDS showed that karsts separated by vicariant barriers in different parts of Peninsular Malaysia and Sabah had distinct malacofaunas. These results have important conservation implications: planners should take karst area and surrounding soil type into account, together with the effects of vicariant barriers such as mountains, when designing karst reserves in order to maximize the protection of invertebrate diversity.

Poster -12

First inventory of the aquatic and semi-aquatic bugs (Heteroptera: Nepomorpha & Gerromorpha) of Langkawi Island, West Malaysia

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Langkawi Island (Pulau Langkawi) is situated off the northwest coast of Peninsular Malaysia, in the southern Andaman Sea. Although the water bug fauna of the Malay Peninsula is relatively well known, knowledge on the fauna of Langkawi is almost none, except for three reliable species records from Langkawi in the literature: *Halobates hayanus* White, 1883, *Haloveloides sundaensis* Andersen, 1992 and *Xenobates murphyi* Andersen, 2000. In 2006, we and Dr Tohru Naruse visited Langkawi for three days to explore the diversity of water bugs. The intensive collections primarily focused on habitat diversity (freshwater habitats, mangroves, and rocky shores) to record as many species as possible. Additional specimens collected from the island by Dr Damir Kovac in 1993 (deposited in Raffles Museum of Biodiversity Research, Singapore) are also included in this study. This survey unveils 52 species (47 species identified) belonging to 31 genera and 11 families from the island. Most of the species belong to two families, the Gerridae (19 species) and the Veliidae (12 species), while the remaining nine families together contain only 21 species. This agrees proportionally with the species numbers known from the Malay Peninsula. Three species are new to science, they are of the genera *Hydrotrepes* (Helotrephidae), *Strongylovelia* and *Microvelia* (both Veliidae). Another nine species are recorded from Malaysia for the first time. The fauna of Langkawi Island is compared with those of Tioman Island, where intensive surveys were carried out in the past, and of the Malay Peninsula.

Poster -13

Comparative studies on woody species diversity and structure in subtropical evergreen broadleaf forests along a latitudinal thermal gradient of the Ryukyu Archipelago

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In order to compare woody species diversity and stand structure on the basis of the architectural stratification of subtropical evergreen broadleaf forests along a latitudinal thermal gradient of the Ryukyu Archipelago, tree censuses in a 750 m² plot in Okinawa Island and a 400 m² plot in Ishigaki Island were performed. The number of layers increased along a latitudinal thermal gradient from four in the forest of Okinawa Island to five in the forest of Ishigaki Island. The values of Shannon's index H' and Pielou's index J' tended to increase from the top layer downward in the forest of Okinawa Island. However, in the forest of Ishigaki Island, these values tended to increase from the bottom layer upward. High woody