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MERIAN AWARDS 2014

In 2001 the gtoe established the Merian Awards for the best contributions given by young scientists during the annual meeting. There are six Merian Awards annually, three for the best oral contributions and three for the best posters. ECOTROPICA highlights these contributions by publishing the abstracts.

The gtoe has selected Maria Sibylla Merian as the patron of the Merian Prize to commemorate her unique work as an outstanding artist and as the first female tropical naturalist who actually traveled to the tropics in order to study their fascinating diversity, in particular insects. Maria Sibylla Merian was born in 1647 in Frankfurt/Main as the daughter of the engraver, etcher and book dealer Matthäus Merian. She died in 1717 in Amsterdam, Netherlands. Sibylla Merian's most remarkable contributions included a book on the fauna and flora of Surinam: "Metamorphosis insectorum Surinamensium", which brought her international fame even during her lifetime. She was the first scientist who recognized, and documented in her artistic work, that insects go through various developmental stages. This is particularly remarkable as the general public in her time still believed that, for instance, mosquitoes and caterpillars were generated in mud by the devil.

The awards of 2014 for the best talks were given to:

1. Sarah Luke, *University of Cambridge, Great Britain*
2. James Smith, *ETH Zürich, Switzerland*
3. Witold Lapinski, *University of Ulm, Germany*

The awards of 2014 for the best posters were given to:

1. Patrick Cvecko, *University of Ulm, Germany*
2. Roman Link, *University of Göttingen, Germany*
3. Brenner Silva, *University of Marburg, Germany*

Abstracts

The impacts of logging and oil palm agriculture on stream invertebrates in Malaysian Borneo: can riparian margins mitigate the loss of biodiversity?

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Freshwaters provide essential ecosystem services, and comprise highly biodiverse habitats, but are heavily threatened by land use change. In Southeast Asia, tropical rainforest stream ecosystems are being impacted by rapid expansion of logging activities and growth of oil palm agriculture causing changes in inputs of sediment, nutrients and flow. These changes may substantially impact biodiversity, ecosystem function and consequent provision of services, but research has been limited, and there has been little testing of strategies for mitigating logging and oil palm agriculture effects. Our work at the Stability of Altered Forest Ecosystems (SAFE) Project, in Sabah Malaysia, tests the effects of catchment logging and oil palm plantations on stream macroinvertebrate assemblages, and the value of riparian forest margins for protecting stream ecosystems from disturbance. Macroinvertebrates form a major part of the freshwater biota and changes in their assemblages are likely to have significant impacts on ecosystem func-

tion. We surveyed benthic insect larvae, surface skater bugs, large shredders/ grazers (crabs, shrimps, snails), and adult dragonflies across streams with a range of catchment forest quality and oil palm. We found that diversity and abundance of many macroinvertebrate groups was reduced in low quality forest and oil palm catchments, however dragonflies remained abundant and species rich. However, this richness was maintained through a shift in community composition, rather than all species surviving the disturbance – many forest specialists and locally restricted species were lost from disturbed streams. This shows that recent logging and oil palm land use change in Malaysian Borneo, and likely wider Southeast Asian tropical forests, has significant impacts on macroinvertebrate communities, and particularly on specialists. Strategies such as riparian forest margins must be developed to maintain freshwater ecosystems and unique biodiversity, in the face of expanding agriculture.

Winging it: using tower experiments and seed morphology to predict dispersal in tropical trees. James Smith[1], Judith Ellens[1], Chris Kettle[1], Robert Bagchi1, Colin Maycock[3], Eyen Khoo[2], David Burslem[4], Jaboury Ghazoul[1]

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In view of the widespread loss and degradation of Southeast Asian tropical forests there is much interest in ecological processes that facilitate forest recovery and regeneration. Of central interest is the seed production and dispersal of trees belonging to the Dipterocarpaceae family, which may constitute over 40% of lowland forest biomass. Dipterocarps mostly have winged fruits that gyrate to the ground following irregular inter-annual masting events. Dispersal is generally poor, but there is wide variability in fruit size and wing morphology which might reflect species specific differences in dispersal capacities. Such variation has implications for dispersal to, and colonization of, degraded forest microsites with further implications for future forest compositional trajectories. We explored experimentally how inverse wing loading (IWL) affects the shape of seed dispersal kernels among 13 dipterocarp species using fruit releases from a canopy tower. Dispersal increased with IWL, and especially so at high wind speeds. Dispersal distances were low (90% within 10 m), confirming that the majority of seed dispersal is local, but there are substantial dispersal differences among species that can be related to IWL. We hypothesis that such poor seed dispersal leads to clumped spatial aggregations and strong fine-scale genetic structuring within dipterocarp populations. This may leave this family vulnerable to inbreeding and genetic drift in degraded or fragmented forests. We further present a database of expected dispersal kernels for a range of IWL values from 1 to 50 (encompassing 75% of Bornean dipterocarps). This database will facilitate trait based analyses of dipterocarp ecology and an assessment of dipterocarp species vulnerabilities.

Habitat use and ecomorphology in Central American wandering spiders. Witold Lapinski[1], Marco Tschapka[1,2]

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Sympatric occurrence of species is thought to be mainly based on the differences in their habitat use and the use of limiting resources. Segregating parameters may be of spatial or temporal character and may include behavioral differences. We hypothesized that large hunting spider species living sympatrically in a Costa Rican lowland rain forest should differ in their habitat and / or hunting microhabitat preferences, and, as an adaptation to the preferred hunting microhabitat, in their specific ability to adhere to smooth surfaces. We found an assemblage of eight large species of the families Ctenidae and Trechaleidae, consisting of three subguilds: (1) two semi-aquatic species with low adhesion ability, (2) three forest ground dwelling species with good adhesion ability, and (3) three vegetation dwelling species, showing very good adhesion ability. The species were partially segregated by habitat type, with two of the vegetation dwelling species preferring the treeless area of a temporary swamp. Differences in the sets of adhesive hairs on the tarsi of the legs reflected the microhabitat preferences of the spider species. The similarity in community structure between this

Costa Rican and a central Amazonian assemblage suggests the existence of similar structuring mechanisms in wandering spider assemblages in climatically similar biomes.

Activity pattern and foraging behavior of the tent - making bat (*Uroderma bilobatum*) in Panama. Patrick Cvecko[1], Andreas Rose[1], Stefan Brändel[1], Thomas Hiller[1], Marco Tschapka[1,2]

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We investigated foraging behavior and activity patterns of Peter's tent-making bat (*Uroderma bilobatum*) using radio telemetry in a tropical lowland forest in Panama. Three adult males, roosting under modified pinnate leafs of American oil palm trees (*Elaeis oleifera*) at the shorelines of Lake Gatún, were equipped with radio transmitters and tracked for four consecutive nights between July and September 2013. These fruit-eating bats are fig specialists, foraging in the canopy where they pick figs in flight and carry them to a feeding site. Fruiting fig trees of various species (*Ficus insipida, F. obtusifolia, F. dugandii*), all of them known to be part of U. bilobatum`s diet, were identified within the foraging range of the tracked animals. We recorded flight and resting phases, as well as flight distance. Activity patterns monitored throughout the nights were dominated by extensive resting phases, interspersed by flying bouts to fruiting trees. Two reproductive males mainly concentrated their foraging activity to fruiting trees near their day roost. This behavior is also known from other frugivores bats such as *Artibeus watsoni, Carollia perspicillata* or *Artibeus jamaicensis*, where reproductive males form harems of females in their day roosts, which they defend against competing males. Another individual found roosting on a small island, traversed frequently open water patches to get to fruiting trees and even set off quite far into the mainland. We conclude that spatial distribution of food sources is a strong factor shaping foraging strategies for male *U. bilobatum*, but also roost site defense may influence their range use pattern during the night

Small – scale spatial distribution of Piperaceae and Rubiaceae in a tropical mountain ecosystem in southern Ecuador. Roman Link[1], Jürgen Homeier[1]

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The objective of this study was to investigate the role of small-scale topographic heterogeneity for the distribution patterns of plant species in tropical mountain ecosystems, with special emphesis on the question whether the general pattern of the elevational gradient of species richness (SR) is mirrored by topographic gradients at a local scale. The study is based on presence/absence data of the species of two model taxa (Rubiaceae and Piperaceae) from sample plots located in a forest reserve (ca. 11 km²) in the Andes of southern Ecuador (1800 - 3200 m asl). Both species distribution models (SDM) and macro-ecological models of SR (MEM) were set up using an ensemble modeling approach and predictor variables derived from a digital elevation model - elevation, topographic position index (TPI), slope, aspect and topographic wetness index. The ensembles comprised models of five model classes (GLM, GAM, MARS, RF and GBM) that were fitted over a large set of initial conditions created by repeated random divisions of the data into training and testing datasets (100 repetitions for each model class). Prediction accuracy was evaluated by the biserial correlation coefficient in case of SDM and the root mean squared error in case of MEM. Consensus predictions were computed as the weighted average of the predictions of the 50 best performing models (weighted by their evaluation scores). SR of both taxa could be well predicted by the available topographic predictors. Elevation and TPI were by far the most important predictor variables for SR, with TPI explaining a similar proportion of the variability in SR as elevation. In both families, SR decreased substantially from valleys to ridges. Piperaceae SR was found to decline continuously with elevation, while Rubiaceae SR peaked at 2300 - 2500 m asl. The distributions of individual species varied considerably between species even at the small scale of the research area, reflecting their distinct ecological requirements.

RendezWUE: Canopy evapotranspiration meets water use efficiency of leaves. Brenner Silva[1], Simone Strobl[2], Jörg Bendix[1], Erwin Beck[2]

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Evapotranspiration and water use efficiency (WUE) are useful indicators to monitor the impact of environmental changes on ecosystem functioning. For area-wide monitoring there is a need to upscale water and carbon flux measurements from leaf to the landscape. In this work we combine two techniques to assess evapotranspiration and photosynthesis in two scales: leaf and canopy. A gas porometer was used to measure transpiration and photosynthesis of green leaves and calculate water use efficiency. A dual-beam small aperture scintillometer, extended with a weather station, was used to measure evapotranspiration above the canopy. The name RendezWUE refers to the simultaneous use of these instruments (porometer and scintillometer) for measurements on green leaves (leaf level) and above canopy (canopy level). The approach was tested on a pasture area located in the valley of the San Francisco River, South Ecuador. The site is covered by the grass *Setaria sphacelata*, planted in rows, around three years old, and not intensively grazed. For the scintillometer the measurement height was 2 meters and the path length (between transmitter and receiver) was 89 meters. Measurements with the porometer were carried out along the scintillometer path. Five daily courses are available covering different weather conditions. For instance, on a sunny day, canopy evapotranspiration reached peaks of 1 mm/hour while the highest leaf transpiration was 0.4 mm/hour. The correlation coefficient between canopy evapotranspiration and leaf transpiration was higher than 0.9 and their ratio corresponds to that of the leaf area to the ground area. The RendezWUE approach allows the direct up-scaling of evapotranspiration from leaf to canopy and will be next used to calculate water use efficiency on both scales. In the future this technique will be deployed in a forest site, in which evapotranspiration and water use efficiency will be available from tower observations.