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XXI SIMPÓSIO DE MIRMECOLOGIA

01-02 de dezembro de 2013

Fortaleza, Ceará, Brasil

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INTENSIVE ANT BIOTIC SURVEYS: LESSONS FROM IBISCA-PANAMA AND NEW PERSPECTIVES

M. LEPONCE[1], J.H.C. DELABIE[2], W.D. DA ROCHA[2], I.C. DO NASCIMENTO[2], A.F.R. CARMO[2], J. ORIVEL[3], B. CORBARA[4,5], S. RIBEIRO[6], R. CAMPOS[6], R. DIDHAM[7], J. SCHMIDL[8], Y. BASSET[9] & A. DEJEAN[3]

[1]Biological Evaluation Section, Royal Belgian Institute of Natural Sciences, 29 rue Vautier, 1000 Brussels, Belgium, Maurice.Leponce@naturalsciences.be ; [2]Laboratório de Mirmecologia, Convênio UESC/CEPLAC, Centro de Pesquisas do Cacau – CEPEC, CEPLAC, Caixa Postal 7, 45600-970 Itabuna, Bahia, Brasil ; [3]Écologie des Forêts de Guyane (UMR-CNRS 8172), Campus Agronomique, 97379 Kourou cedex, France ; [4]CNRS - UMR 6023, Laboratoire Microorganismes, Génome et Environnement, Université Blaise Pascal, Complexe Scientifique des Cézeaux, Aubière, France, [5]Clermont Université , Université Blaise Pascal, LMGE, BP 10448 F-63000, Clermont-Ferrand, France ; [6]Laboratory of Evolutionary Ecology of Canopy Insects and Natural Succession, Department of Biodiversity, Evolution and Environment/ICEB, Universidade Federal de Ouro Preto, Campus Morro do Cruzeiro, Ouro Preto, MG 30400-000, Brazil; [7]School of Animal Biology, The University of Western Australia (M092), 35 Stirling Highway, Crawley Wa 6009, Australia; [8]Universität Erlangen-Nürnberg, staudtstr. 5, D-91058 Erlangen; [9]Smithsonian Tropical Research Institute, Apartado 0843-03092, Balboa, Ancon, Panama City, Republic of Panama.

We will present results from the IBISCA-Panama project on the ant distribution among forest strata (i.e., the ground, understorey and canopy) and the efficacy of a wide array of entomological methods to collect ants. The survey was conducted during one year in the San Lorenzo Protected Area, Panama, between October 2003 and 2004. The global aim of the survey was to assess the spatio-temporal distribution of a wide range of arthropod taxa and to estimate their total local species richness. We used 11 methods to sample ants from 11 sites separated from each other by less than 2 km. Some methods were focused on a single forest strata or microhabitat (*ground*: Winkler extracts of leaf-litter, pitfall traps; *understorey*: Malaise traps, palm tree inspection, ground Flight Intercept Traps; *canopy*: tree climbers, insecticidal fogging). Three methods were used at both the ground and canopy level (i.e., Berlese extracts of soil, beating the vegetation, light traps). Finally, aerial Flight Intercept Traps (aFITs) were installed at 7 different heights from the ground (0m) to the canopy level (35m). Altogether 410 species were collected. Around ¼ of the species were found foraging in all forest strata. Approximately 2/3 of the species were found either at the ground or canopy level but only 1/5 of the species were only found at one of these levels. Half of the species were found at the understorey level and 10% of the species only in this strata. The 90 aFITs used during a year (16,244 trapping days) captured more than half the local species richness. Without taking into account the sampling and processing effort, the three most efficient methods to collect ants were aFITs, Winkler and fogging. While the Winkler extraction of leaf-litter ants has long been recognized as an efficient method in the standardized A.L.L. protocol for collecting ground-dwelling ants, the efficacy of aerial Flight Intercept traps was unexpected. This method may offer a promising avenue for developing a much needed standardized protocol for collecting arboreal ants. This standardization of methods for collecting both ground and arboreal-dwelling ants would facilitate between site comparisons of species diversity. Beside traps, other approaches to collecting arboreal ants will be presented including the use of baits, canopy cranes or balloons. Finally methods that increase our knowledge of arboreal species biology will be discussed (e.g. aggressivity tests or tree felling experiments).

RAINFOREST ANTS REVEALED: A PROJECT ALAS RETROSPECTIVE

J.T. LONGINO

Department of Biology, University of Utah, Salt Lake City, UT 84112, USA, e-mail: jacklongino@gmail.com

The Arthropods of La Selva (ALAS) project was among the first large-scale inventories of insects, mites and spiders in the tropics, and ants were a major focus. The project ran from 1991–2006, at La Selva Biological Station of the Organization for Tropical Studies (OTS), funded by a series of U.S. National Science Foundation grants. Project ALAS drew together the expertise of systematists and ecologists to uniquely combine taxonomic expertise and structured sampling. ALAS carried out an intensive regimen of quantitative sampling, structured to allow species richness estimation and statistical assessment of inventory efficiency and completeness. In the process it developed novel analytical and statistical techniques and publicly available software for quantitative inventory and biodiversity statistics. The project culminated in the sampling of the Barva Transect, a continuously forested elevational gradient from La Selva to the peak of Volcan Barva at 2900m elevation. The results from the ALAS survey have made major contributions to global change biology and continue to be a long-term resource.

ANT COMMUNITIES LONG TERM MONITORING: LTER, TEAM OR SELF INITIATIVES?

S.P. RIBEIRO[1] & R. FAGUNDES[1,2]

[1]Laboratory of Evolutionary Ecology of Canopy Insects and Natural Succession, Department of Biodiversity, Evolution and Environment/ICEB, Universidade Federal de Ouro Preto, Campus Morro do Cruzeiro, CEP 30400-000, Ouro Preto, MG, Brazil,. [2] Post-Graduate Program in Ecology and Conservation of Natural Resources, Laboratory of Behavioral Ecology and Interactions, Universidade Federal de Uberlândia, CEP 38400-902, Uberlândia, MG, Brazil

We present preliminary results related to long term data collecting protocols, taken from two State Parks of Minas Gerais, Brazil, within the same macro river basin, at distinct altitudes: Rio Doce (200 m a.s.l., lowland semidecidual forest) and Itacolomi (1200 m a.s.l. montane forest) Parks. Data were taken with canopy beating, baits, pit-fall or winkler sampling. Protocols were part of a Long Term Ecological Research (LTER) plus a Tropical Ecological Assessment and Monitoring Initiative (TEAM) in Rio Doce, and of an independent sampling protocol in Itacolomi. From Rio Doce, data was taken from 2000-2007 and then again from 2010-2013. From Itacolomi, data collecting started in 2006 and last until the present. Except from TEAM´s winkler´s protocol, all sampling points were the same (same canopy and understorey trees and surrounding grounds) and samples were repeated twice a year. As expected, soil fauna was significantly richer than canopy fauna regardless altitude. However, high altitude montane forest was poorer in species in all habitats compared to lowland forest, and thus required fewer samples to get the species richness estimator stabilized. When samples were joined by years, we found an increase from 11.93 mean species per sample in one year to 52.64 in five years sampling. From the first to the second year the number of species more than doubled, and kept increasing steadily until the fourth year, which was not statistically different from the fifth year. Our data suggest that species shift is an intense process along time at a very local scale. However, data refining and interaction experiments are required to elucidate the mechanisms behind the found patterns. Other long term examples from Brazil are also acknowledged.

LEAF-LITTER ANT GUILD STRUCTURE AND MORPHOLOGICAL DIVERSITY IN A WESTERN AMAZONIAN FOREST SITE: FOUR YEARS OF SAMPLING.

R.R. SILVA[1] & C.R.F. BRANDÃO[2]

[1]Museu Paraense Emílio Goeldi, Coordenação de Ciências da Terra e Ecologia, Av. Perimetral 1901, CEP 66077-530, Belém, PA, Brasil, e-mail: rogeriorosas@gmail.com; [2]Museu de Zoologia da Universidade de São Paulo, Laboratório de Hymenoptera.

Biological inventory is a crucial activity in life sciences research. Long-term ecological studies are important to enable insights in ecology, environmental change and biodiversity. It is, however, time-consuming and laborious to amass representative samplings of communities, especially in the case of invertebrates. Among ants, the leaf-litter fauna is considered a hyperdiverse segment with comparatively high levels of taxonomic and morphological diversity at local and regional scales. Here we describe a regional leaf-litter ant fauna biodiversity using a morphological approach and guild classification. As a study system, we used data on the ant fauna along four years of leaf-litter surveys in sites located in the Western Amazonia. We sampled eight regularly distributed 250 m-long transects over 5 km^2 plots, spaced 1 km between them, and six 5 km^2 plots along 70 km of the Rio Madeira River, distributed at the left and right margins of the River (three paired plots). Sixteen sampling events were performed along four years (four samplings/year; two in the rainy season and two in dry period). In each sampling period, five random transects were surveyed in each plot and five 1 m^2 leaf-litter samples collected at 50-m intervals along each transect. In total, 48 250 m-long transects were sampled. After four years of plot monitoring, we accumulated 2,305 1m^2 leaf-litter samples. Each leaf-litter ant species was described in terms of morphological traits recognized as important in ant ecology. We used these two data sets (community and morphology) in a long term sampling monitoring to describe biodiversity, community structure, guild composition and sampling completeness of the leaf-litter ant fauna. We registered 23,973 occurrences of individuals belonging to 283 species. Further, each transect was characterized in terms of soil structure (relative proportion of silt, clay and sand), density of vegetation at five height classes (0-1m, 5-10m, 10-15m, 15-20m, > 20m) and topography. We discuss the importance of an objective guild determination to describe the structure of ant communities in a hyperdiverse ant fauna - the leaf-litter in an Amazonian forest. We discuss also the dynamics of guild composition along time and the importance of long term studies to describe the leaf-litter ant fauna structure. (FAPESP)