Dear Neuropterologists,

As the president of the *International Association of Neuropterology*, I welcome you all in Mexico City for the 12th *International Symposium on Neuropterology*. In the past four years since the previous symposium in Ponta Delgarda, Azores, research projects in neuropterology have developed, new species have been discovered and described, many scientifc questions have been answered, whereas many new questions have emerged. It is high time to come together again and to demonstrate the current status-quo in international neuropterology.

Alae IV nudae, venis reticulatae, or, in English, four wings bare, veins reticulate. This is how Carl Linnaeus introduced Neuroptera to the scientific world in 1758 in a brief and hardly inspiring phrase. Since then neuropterologists from all over the world have revealed a remarkable and intriguing diversity of forms, behaviors and adaptations within this relatively small insect group both in the recent and the past biodiversity. The *International Symposium on Neuropterology* in Mexico City is a window to this fascinating diversity, explored by different methods and with different perspectives by enthusiastic researchers. Atilano Contreras-Ramos and his team have provided an excellent environment for scientific and personal exchange among neuropterologists.

I wish us all a fruitful and pleasant symposium!

Michael Ohl
Museum für Naturkunde Berlin, Germany

Dear Neuropterologists, Friends,

Writing these notes nearly at the onset of this, the XII International Symposium of Neuropterology, the first thing that comes to my mind is that we have a diverse group, mostly members of a young new generations of lacewing lovers; within this feeling of excitement, I feel confident that this will be a dynamic and appealing symposium, under a relaxed atmosphere, with a strong exchange of information. Although some areas and disciplines are more widely covered than others, we have certainly a good representation of faunas and approaches. I hope everyone enjoys the meetings, as well as the field excursion to Los Tuxtlas.

¡Bienvenidos!

Atilano Contreras-Ramos
Host and Organizer
ISN 2015, UNAM, Mexico City

Keynote address

Bugs, barcodes, and big data: today's systematics

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"Big data"; the collection of genomes or transcriptomes with high-throughput sequencing, has revolutionized today's phylogenetics. One might also consider international efforts to sequence a single (barcode) locus from every species on earth another kind of big data. Kjer addresses the philosophical and analytical challenges of big data, and describes some of the solutions used in the 1KITE project to produce a well-supported insect phylogeny from transcriptomes. There are many other sources of data as well, from genomes to single-locus "barcode" data. Some of these data sources such as barcodes combined with targeted PCR, are well suited to undergraduate teaching, or alpha taxonomy. Others, such as exome capture using degraded DNA from museum specimens, fill gaps in taxon sampling where transcriptomes are impossible to collect. Little attention has been directed toward coordinating diverse datasets into a unified picture of insect evolution, from the root to the tips of the tree. Kjer proposes a strategy to do that, using Trichoptera as an example. The strengths and weaknesses of each technology are discussed.

Systematics, Biodiversity, Paleobiology

Toward a global monograph of the Neuropterida

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The Internet provides nearly limitless potential for the distribution of information as texts, images, and sounds. Since 2007 the web-based Lacewing Digital Library (LDL) project has provided a portal for the delivery of information on the global neuropterid fauna. Over the past 30 years a major focus of my research program has been the development of global-scale data resources that summarize and synthesize available knowledge in selected information domains for the Neuropterida, and the delivery of those data to the neuropterology community to address targeted information and research needs. One primary long-term goal of these efforts continues to be the development and organization of data in support of a grand synthesis of existing knowledge about the lacewings and their relatives – a global monograph of the Neuropterida. Progress toward that goal will be reviewed, including an assessment of available and needed datasets and presentation of a preliminary design draft of a new Monograph Record page for the LDL's Neuropterida Species of the World resource.

Phylogeny and biogeography of Megaloptera

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Megaloptera is a basal holometabolous insect order as a group of “living fossils” whose evolutionary history attracts great interest because of its antiquity and important systematic status in Holometabola. However, due to the difficulties identifying morphological apomorphies for the group, controversial hypotheses on the monophyly and higher phylogeny of Megaloptera have been proposed. The present work is aiming to reconstruct the phylogeny of Megaloptera at the family, genus, and species level based on morphological and molecular data combining comprehensive sampling from extant and fossil material. First, our results corroborated a monophyletic Megaloptera and its sister relationship with Neuroptera based on morphological and mitochondrial genomic data. Within Megaloptera, Corydalinae (dobsonflies) and Chauliodinae (fishflies) form the monophyletic Corydalidae, which is the sister group of Sialidae (alderflies). Second, the intergeneric phylogeny of Corydalinae, Chauliodinae, and Sialidae was largely resolved. Third, the interspecific relationships of several genera were also recovered. Based on the presently reconstructed framework of the megalopteran phylogeny, some significant events on the evolution of Megaloptera were revealed. The divergence time estimation suggests that Megaloptera arose no later than the Late Permian, while the divergence among the three major groups of Megaloptera was during the period no later than the Middle Jurassic. Furthermore, the generic divergence of Chauliodinae and Sialidae might have taken place before or during the breakup of Pangaea. Subsequently, some regional speciation might

have happened since the beginning of Cenozoic. The present study provides new evidence for the historical evolution and diversification of Megaloptera.

Outstanding diversity of the *Coniopteryx lobifrons* group in Madagascar

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An interesting new coniopterygid species, *Coniopteryx (Coniopteryx) lobifrons* Muphy & Lee 1971, was described from Singapore at the beginning of the seventies of the last century. The structure of the male genitalia was similar to species of the *Coniopteryx tineiformis* group, but there were two peculiar features on the male head: a flattened process of the vertex between the antennae, and a setose outgrowth on the first flagellar segment. About 30 years later, four very similar species were discovered, also in Southeast Asia. These five species were regarded by the present author as *Coniopteryx lobifrons* species group. Meantime, Martin Meinander reported *Coniopteryx* specimens with similar features from Madagascar, but he regarded those as variations of *C. madagascariensis* Meinander 1974. As a result of the examination of an extraordinarily large dusty lacewing material, which was collected in the framework of the Madagascar Project of the California Academy of Sciences, it cleared out that the insects, which were handled as *C. madagascariensis* variations, represent in truth three undescribed species belonging to the *C. lobifrons* species group. This result was supported also by the investigation of the holotype of *C. madagascariensis*. Moreover, 11 other unknown species of the originally Oriental *C. lobifrons* species group were recognized in the examined Madagascan material.

Phylogeny of *Ceraeochrysa* Adams, 1982 (Neuroptera, Chrysopidae)

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The chrysopid genus *Ceraeochrysa* Adams, 1982 includes species widely distributed in the Americas, Caribbean and West Indies. Adults are mostly green, often with red or brown marks on the sides of the pronotum and scape. Males are recognized by the elongated gonapsis between sternites VIII and IX, and females by their elongated "U"-shaped spermatheca. There are some studies using species of *Ceraeochrysa* for biological control, but the biology of the species of the genus, and especially the phylogenetic relationships within the genus, are poorly known. This study performs a cladistics analysis of the genus using morphological features, extending previous studies in the genus by Freitas, Penny and Adams. A total of 50 morphological characters were obtained for 66 terminal taxa (62 *Ceraeochrysa* species, and *Joguina constellata* (Navás, 1913), *Chrysoperla genanigra* Freitas, 2003, *Chrysopodes* (*Chrysopodes*) *polygonica* Adams & Penny, 1987, and *Criptochrysa chloros* Freitas & Penny, 2001). A heuristic search using TNT resulted in a single most parsimonious tree with 187 steps, consistency index of 0.27 and retention index of 0.77. Major species groups (groups *everes*, *cincta* and *lineaticornis*) were recovered as monophyletic. *C. intacta* (Navas, 1912) and *C. placita* (Banks, 1908) form together the sister clade of all remaining *Ceraeochrysa* species.

First large scale phylogeny of Myrmeleontiformia, with a focus on Ascalaphidae

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The first large-scale phylogeny of the Ascalaphidae is presented. A combined morphological (25 characters) and molecular (16S, 18S, and COI genes) dataset was analyzed under several analytical regimes (maximum likelihood, Bayesian, and parsimony) for 76 exemplars of Myrmeleontiformia (Ascalaphidae, Myrmeleontidae, Nemopteridae, Nymphidae, Psychopsidae), including 57 of Ascalaphidae. At the infraordinal level, the families were recovered in all analyses in the form Psychopsidae + (Nymphidae + (Nemopteridae + (Myrmeleontidae + Ascalaphidae))). Ascalaphidae was recovered as monophyletic in the Bayesian and parsimony analyses, and paraphyletic with respect to Ululodini and Myrmeleontidae in the maximum likelihood analysis. The subfamilies Haplogleniinae and Ascalaphinae were not recovered as monophyletic in any analysis. Ululodini was monophyletic and well-supported in all analyses, as were the New World Haplogleniinae and the African/Malagasy Haplogleniinae. The remaining Ascalaphidae, collectively, were also consistently monophyletic, and include a genus traditionally placed in Haplogleniinae, *Protidricerus* van der Weele. None of the included tribes of non-ululodine Ascalaphinae were monophyletic in any analysis. *Protidricerus* was discovered to express a well-developed pleurostoma, a feature previously only encountered in divided-eye owlflies, and this feature may be important in future classifications. The feature traditionally used to differentiate the Haplogleniinae and Ascalaphinae, the entire vs. divided eye, can no longer be regarded as a reliable spot diagnosis character to separate monophyletic groups within the family, and should be re-evaluated.

The wing-base structure of Neuropterida: comparative morphology and phylogenetic implications

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Despite considerable progress in systematics, the phylogenetic status and the monophyly of the holometabolous insect order Megaloptera has been an often disputed and long unresolved problem. In addition, there are two viewpoints about its sister group, that is Megaloptera + Raphidioptera or Megaloptera + Neuroptera. The present study attempts to infer phylogenetic relationships among three orders, Megaloptera, Neuroptera, and Raphidioptera, within the superorder Neuropterida (14 species in total), based on wing base structure because of its conserved nature. Cladistic analyses were carried out based on morphological data from both the fore and hindwing base (23 characters in total). Our matrix analysis yielded 41 equally most parsimonious trees (MPT). Topologies of the 41 MPTs are different only in the relationships within the Neuroptera. Four apomorphies support the monophyly of Neuropterida. One synapomorphy supports Megalotera + Neuroptera, and three synapomorphies support the monophyly of Megaloptera. Therefore, a sister relationship between Megaloptera and Neuroptera was recovered, and the monophyly of Megaloptera was corroborated. The division of the order Megaloptera, the traditional higher classification, into Corydalidae (Corydalinae + Chauliodinae) and Sialidae, was also supported by our wing base data analyses.

The phylogeny of the Nemopterinae (Neuroptera, Nemopteridae) based on morphological characters

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The Nemopterinae are a small group of lacewings comprising 98 species distributed among 19 genera. They are grouped together with the Crocinae within the Nemopteridae, which belongs to the Myrmeleontiformia. The Nemopterinae are distributed in Australia, South America, southern Palearctic and Afrotropics with almost half of the Nemopterinae species (45%) found in the southern parts of Africa. A unique character of the Nemopterinae is their highly modified, ribbon-like hindwing, by inter-specific variation in the number of apical or pre-apical dilation. Here, we performed a phylogenetic analysis of lacewings using 35 morphological characters and employing a parsimony-based approach. To this end, we treated 19 species of the Nemopterinae as ingroups and one species each of the Psychopsidae and Crocinae as outgroups. We performed parsimony analyses using NONA and TNT. The resulting cladogram is partially consistent with a cladistics hypothesis previously published by Sole et al. (2013, Mol. Phyl. Evol. 66: 360-368). We found further evidence supporting the conclusion of Sole et al. that the last common ancestor of the Nemopterinae probably possessed a ribbon-like hindwing having an abrupt double dilation. Within the Nemopterinae the hindwing shape has undergone further modifications.

Advances in the higher phylogeny of Neuropterida based on the mitochondrial genomes

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Mitochondrial (mt) genomes have been proven to be informative and insightful for phylogenetic studies. The mt genome sequences can be more phylogenetically informative than shorter sequences of individual genes, and provide multiple genome-level characteristics, such as relative position of different genes, RNA secondary structures, and modes of control of replication and transcription. Besides, the mt genes are almost unambiguously orthologous, having historical and methodological advantages, such as the availability of primers for amplifying specific genes from many lineages and the relative ease of generating new data. The mt genomes of insects typically contain 13 protein-coding genes (PCGs), 22 transfer RNA (tRNA) genes, two ribosomal RNA (rRNA) genes, and a large non-coding region (also referred to as the control region, CR). Recent studies on the higher phylogeny of Neuropterida based on mt genomes have rapidly developed. As to April 17th 2015, 22 complete Neuropteridan mt genomes have been sequenced and deposited in GenBank (www.ncbi.nlm.nih.gov), including 13 species of Neuroptera, eight species of Megaloptera and one species of Raphidioptera. There are still nine families of Neuroptera (i.e., Berothidae, Coniopterygidae, Dilaridae, Hemerobiidae, Nemopteridae, Nevrorthidae, Psychopsidae, Rhachiberothidae, and Sisyridae) and one family of Raphidioptera (i.e., Inocelliidae) with their mt genomes not yet reported. All publications of Neuropterida phylogeny based on complete mt genomes got the same conclusion, that Neuroptera is the sister-group of Megaloptera, and together are the sister-group of Raphidioptera. A phylogenomic analysis was carried out based on the mt genomic sequences of 13 mt PCGs and two rRNA genes of nine Neuropterida species, comprising all three orders of Neuropterida and all three main groups of Megaloptera. Both maximum likelihood and Bayesian inference analyses highly support the monophyly of Megaloptera, which was assigned to be the sister of Neuroptera. Within Megaloptera, the sister relationship between Corydalinae and Chauliodinae was corroborated. The divergence time estimation suggests that Neuropterida separated from Coleoptera in the Early Permian. The interordinal divergence within Neuropterida might have happened in the Late Permian, when Megaloptera and Neuroptera also arose. A phylogenetic analysis based on the mt genomic data for 10 species from seven families of Neuroptera, three species from two families of Megaloptera and one species of Raphidioptera, supported the monophyly of Myrmeleontiformia and the sister relationship between Ascalaphidae and Myrmeleontidae. The undoubted sister relationships between Ascalaphidae and Myrmeleontidae, and together be the sister-group to Nymphidae were corroborated. Besides, the mt genome analysis also sheds new light on the identification of rare species with sexual dimorphism

and the biology of Neuroptera. The comparative mitogenomic analysis of *Rapisma xizangense* and *Rapisma zayuanum* showed that they share a similar mitogenomic structure. The genetic distance between them based on two rRNAs and 13 protein coding genes (PCGs) as well as the genetic distance between each of these two Tibetan *Rapisma* species and a Thai *Rapisma* species (*Rapisma cryptunum*) based on partial *rrnL* showed that *R. xizangense* and *R. zayuanum* were most likely conspecific. Thus, *R. zayuanum* should be treated as a junior synonym of *R. xizangense*. In the phylogenomic analysis on the higher relationships within Neuroptera, the interfamilial relationships are consistent with the previous result from Wang et al. In addition, Osmylidae is assigned to be the sister to all other neuropteran taxa. *Rapisma* is the sister of *Polystoechotes*, supporting the monophyly of Ithonidae. The phylogeny of Neuropterida is significant with respect to our understanding of the reconstruction of character evolution and the evolution of life styles of the larvae. However, despite the numerous studies dedicated to the phylogeny of Neuropterida and their position within Endopterygota, many questions still are far from being resolved. In the future, the determination of the mt genomes of all Neuropterida families is necessary, and hopefully will draw a better-resolved higher phylogeny and time-scale for this ancient but fascinating group.

Color morphs in the wasp-mimicking mantispid *Climaciella brunnea* – Geographic patterns and genetic diversification

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The mantispid *Climaciella brunnea* occurs widespread in North and Central America between Canada and Costa Rica. Specimens are known for their distinct color varieties, which today are considered as representatives of one single species. Color forms of *C. brunnea* build complexes of Batesian mimicry with harmfully stinging wasps. Here, the occurrences of appropriate model species and according color mimics are compared. Results suggest a strong link between the appearance of both model species and color mimic. A phylogenetic analysis of the mitochondrial COI fragment of four different color morphs was further conducted. Results show no direct correlation between genetic diversification and color forms of *C. brunnea.* Phylogenetic clusters seem to be linked to their geographic origins. From this, two species are inferred within *C. brunnea*: one occurring in North America and one in Central America. Within the North American group, a distinct split between two populations can be observed, resulting in a western and an eastern group.

Revision of the family Dilaridae (Insecta, Neuroptera) from China and adjacent regions

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Dilaridae (pleasing lacewing) is one of the smallest families in the holometabolous order Neuroptera and also one of the few neuropteran families absent from the Australian region. It can be readily recognized by the pectinate male antennae, the strongly elongate ovipositor, and the presence of three prominent tubercles on the vertex. Hitherto, there are 76 valid species of Dilaridae in the world, sorted in five genera of two subfamilies: Dilarinae (only occur in the Old World) and Nallachiinae (mainly occur in the New World, with two species recorded from Vietnam and South Africa). The fauna of Dilaridae is diverse in China with 21 described species, which were previously described mainly based on external morphological characteristics. Moreover, the fauna of Dilaridae from the adjacent regions of China is poorly known. In this study, we made a comprehensive taxonomic revision of all the species of Dilaridae from China. New information on Dilaridae from South Asia, Southeast Asia, and other parts of East Asia is also provided. Sixteen undescribed species were found in China, while eight undescribed species were from Southeast Asia, including a Vietnamese species that belongs to the subfamily Nallachiinae. Based on our revision, there are two genera and 33 valid species recorded from China and four genera and 27 species from adjacent areas of China. China and its adjacent regions are undoubtedly a significant diversification centre of the pleasing lacewings.

The taxonomy of the genus *Plega* Navás (Mantispidae, Symphrasinae)

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An overview of the taxonomic status of the genus *Plega* Navás is presented. The genus *Plega* was erected in 1927 by Navás for the Mexican species *Plega variegata*. This genus currently contains 14 nominal species occurring from southern United States to the central part of South America. Information about diagnostic features and distribution for each of the species is provided, including the type specimen, sex, and repository collection. General comments on a potentially undescribed species from Central Mexico are provided.

Morphological phylogeny of the subtribe Periclystina (Myrmeleontidae, Dendrolentini)

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The subtribe Periclystina was erected by Stange in 1976 as one of five subtribes in the Dendroleontini. The group is restricted to Australia, except by one species known from New Guinea. Currently, the subtribe is composed of 63 described species that are divided into 10 genera. The defining characteristics of the subtribe and its genera are confusing and variable, making the species hard to classify. During the international meeting I will be presenting the preliminary results of an ongoing study of morphological phylogeny for the Periclystina species. The data matrix of this study will include the defining characters for each genus and other more from all the adult body parts, specially wings and terminalia. This study will be the first phylogeny approach for the subtribe, which is a very important step to test the monophyly of each one of genera and aims to help the understanding of the classification of this group of antlions.

Coniopterygidae from Rancho Santa Elena, Hidalgo, Mexico

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The family Coniopterygidae or dusty lacewings is one of the four largest groups of Neuroptera. They occur throughout the world. Their distinguishing features include their very small size, with a wingspan of no more than 6 mm, with usually their whole body covered with white or greyish wax. The family currently contains nearly 560 described species worldwide. Mexico has 45 species recorded, yet the total number of Mexican species will very likely be more than 50. Five species are known from state of Hidalgo: *Coniopteryx palpalis* Meinander, *Conwentzia barretti* (Banks), *Semidalis byersi* Meinander, *S. mexicana* Meinander and *S. hidalgoana* Meinander. In the current study, we are attempting to contribute new data on the phenology and records; the data corresponds to three events of samplings carried out during the years 2003, 2005 and 2010. The material was collected with Malaise traps and, occasionally, some specimens were collected at light during the night. *Coniopteryx californica* sensu Meinander and *C. diversicornis* Meinander are recorded as new for the state of Hidalgo.

DNA identification of the larvae of *Nohoveus zigan* (Neuroptera, Myrmeleontidae)

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To identify undescribed larvae of Myrmeleontidae may require to rear them to adults and obtain the identity on the basis of adult characters. This might be very time consuming, because the larval phase of an antlion lasts usually several months or longer. In order to facilitate larval identification, we attempt to identify the larvae of antlions using a molecular method. At the same time and the same site we collected antlion adults of three species and several antlion larvae which were divided into four morphological types. DNA was extracted, respectively, from these three species of adult specimens and the larval specimens of the four phenotypes. Based on their DNA sequences of mitochondrial genes: cytochrome oxidase I (a modified DNA barcoding approach) and 16S, we constructed a phylogenetic tree with other four species of Myrmeleontidae. The results show that the two larval types in these four larval phenotypes grouped into one branch with the adults of *Nohoveus zigan* and their genetic distance is less than 0.01. So we confirm these two phenotypes are *Nohoveus zigan*. The obtained results of these two phenotypes are consistent with the DNA identifying result.

Current knowledge of Myrmeleontidae (Neuroptera) in Mexico

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Myrmeleontidae, or antlions, is the biggest family in the order Neuroptera with a global distribution, mostly in hot dry areas. It is estimated that they were originated in the late Triassic and the monophyly of the group is not questioned, yet until recently the inner classification was without consensus. There are nearly 2,000 species described in various hundred genera. Mexico has a little over 100 species registered, most of them from the northeast and east coast. Six tribes are present in the country: Acanthaclisini with four species; the biggest is Brachynemurini with 49; the smallest is Dendroleontini with only two; Gnopholeontini has 15; Myrmeleontini has 11; and Nemoleontini has 28. The aim of this work is to present what is known of these species, including descriptions, immature stages, biology, life cycles, and keys, in order to present the opportunities to increase the knowledge of the family and promote interest in this group.

Jurassic lacewing faunas of Asia

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The Jurassic period is especially interesting with regards to Neuroptera, because during that time some of the first Recent lacewing families appeared, e.g. Osmylidae, Nymphidae, Chrysopidae, Berothidae and Mantispidae, as well as several bizarre extinct groups, for example, "Mesozoic butterflies" Kalligrammatidae. Lacewings from the Upper Lias of Western and Central Europe and from the Upper Jurassic of Solnhofen, Germany (marine deposits in both cases) have drawn attention of entomologists since the Mid 19th century. The finds of Asian Jurassic lacewings, which all come from continental deposits, are about ten times more abundant than European ones and still insufficiently studied. Jurassic lacewings are known from at least 15 Asian localities: Douhugou (J2-3) and Yujiagou (J2-3) [China]; Iya (J2), Novospasskoye (J1-2), Kubekovo (J2) and Uda (J3) [Russia]; Sogyuty (J1), Sai-Sagul (J1-2) and Sauk-Tanga (J1-2) [Kyrgyzstan]; Karatau (J2-3) [Kazakhstan]; Khoutiyn-Khotgor (J3), Bakhar (J2-3), Shat-Teg(J3), Oshin-Boro-Udzur-Ula (J1-2) and Bayan-Teg (J2)[Mongolia]. The most abundant faunas of Jurassic Neuroptera have been collected in China (Daohugou, more than 2000 specimens) and Central Asia (Karatau, 550 specimens, and Sai-Sagul, 240 specimens). The other localities are much less rich in fossil lacewings. The most characteristic feature of Jurassic lacewing faunas of Asia is the presence of extinct families Grammolingiidae and Saucrosmylidae, which could be treated (together with rather rare Panfiloviidae) as putative relatives of Osmylidae. Grammolingiidae are common in Douhugou (20,2% of all Neuroptera), Sai-Sagul (12,3%) and in the Middle-Upper Jurassic of Mongolia. Saucrosmylidae are quite usual in Daohugou (6,3%), Bakhar and Khoutiyn-Khotgor. Both of these families along with a few other Jurassic taxa (e.g. Parakseneuridae) had become extinct by the Cretaceous period. Three faunas of Asian Jurassic lacewings (from Daohugou, Sogyuty and Kubekovo) are dominated by Osmylidae (about half of all Neuroptera), so this group played a more important role in the Jurassic than nowadays. The first representatives of Recent osmylid subfamilies (Kempyninae, Gumillinae) came to be in the Middle Jurassic. That was the time when a number of other lacewing taxa first appeared (green lacewing Mesypochrysa Martynov, 1927, kalligrammatids, nymphids) which would be widely distributed throughout the Early Cretaceous. Hence the Middle Jurassic seems to be one of the turning points in evolution of Neuroptera. Lacewing faunas of Daohugou, Karatau and three Mongolian localities, Khoutiyn-Khotgor, Bakhar and Shat-Teg, could be considered as quite similar to each other due to the presence of genera *Leptolingia* Ren, 2002 (Grammolingiidae), *Sinosmylites* Hong, 1983 (Berothidae), *Jurakempynus* Wang et al., 2011 and *Arbusella* Khramov, 2014 (Osmylidae). Fauna of Karatau, the second largest

locality of Jurassic lacewings, are distinguished by the abundance of Berothidae (13,8%), which is more usual for ambers, than for rocks, and by plenty of green lacewings (11,4%), which makes Karatau similar to the Early Cretaceous localities. This research was supported by the Russian Foundation for Basic Research (Grant No. 13-04-01839-a).

Mesozoic butterfly-like Lacewings

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The Kalligrammatidae are occasionally referred to as “butterflies of the Jurassic” because of their large size and wingspan, presence of wings with patterned surfaces, including conspicuous eyespots, and long maxillary palps. These features provide an appearance similar to large, modern moths and butterflies. Recently, a large number of well-preserved kalligrammatid specimens have been described from the Mesozoic of China, augmenting our knowledge of the family. We described sixteen additional species, including three unassigned to a species and one unassigned to a genus from northeastern China ranging in age from late Middle Jurassic (Jiulongshan Formation, 165 Ma) to the mid Early Cretaceous (Yixian Formation, 125 Ma). We redefine the family based on synapomorphic characters. We also conducted a phylogenetic analysis, and the results partitioned the Kalligrammatidae into five subfamilies: Kalligrammatinae Handlirsch, 1906, Kallihemerobiinae Ren and Engel, 2008, Meioneurinae subfam. nov., Oregrammatinae subfam. nov. and Sophogrammatinae subfam. nov. The Kalligrammatidae exhibit an elevated species richness and broad morphological diversity during the mid Mesozoic, suggesting Kalligrammatids were perhaps the most successful Mesozoic neuropteran lineage, exhibiting an extraordinary breadth of form, taxonomic diversity and ecological dominance that included a variety of plant-insect associations and deterrence from predators. These features indicate that the evolutionary biology of mid Mesozoic kalligrammatid lacewings was more complex than previously realized.

Fossil Mantispidae: Current knowledge, new specimens, and future research

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Over 30 recorded specimens of Mantispidae are known from the fossil record. The oldest record of the family is from the Jurassic, with the others being found throughout the fossil record. The fossils have been placed within the extinct Mesomantispinae, and the extant Drepanicinae, Symphrasinae and Mantispinae subfamilies. No fossils from the other extant subfamily Calomantispinae have been discovered. Mantispidae is thought to have originated in the early Jurassic (or latest Triassic), in Europe or Asia, and diversified in the Jurassic. The mantispid fossil record, however, has some problems. The taxonomy of some of the taxa is in need of revision, with the validity of a few genera being doubted, and it is possible that some of the specimens assigned to Mantispidae may not be mantispids. The relationship of the fossil taxa to each other, and to the extant mantispids, is also in need of further study. New material is also being discovered, often very well preserved fossils, from amber (including larvae), beautifully preserved specimens from China, and the first records from Copal. These new specimens give further details on diversity, distribution and taxonomy of fossil Mantispidae, giving extra information, which will help solve some of the current problems.

Ecology and Applied

Sublethal effects of the ingestion of Imidacloprid and Detlamethrin by *Chrysoperla agilis* (Neuroptera: Chrysopidae)

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The sublethal effects of two pesticides, Deltamethrin (Pyrethroid) and Imidacloprid (Chloronicotinyl) on *Chrysoperla agilis* (Neuroptera: Chrysopidae), were assessed by studying the development and survival of immature stages and the survival and reproductive performance of adults. Insecticides were sprayed on prey (*Ephestia kuehniella* eggs) at doses recommended by the manufacturers for the control of aphids and whiteflies for ingestion essays, both using third instar larvae of *C. agilis* as predator. Deltamethrin treatment resulted in a high mortality rate amongst female individuals, leading to a significant male biased sex-ratio when compared to imidacloprid (Chi^2 = 9.174, p = 0.02) and control treatments (Chi^2 = 4.748, p = 0.029) with 82.1% of male when adult stages were sexed. The weight gain of L3 was significantly lower after treatment with Deltamethrin compared to control and Imidacloprid treatments (all $P < 0.05$, Tukey HSD tests). Contrarily, pupae weight gain was lower in Deltamethrin treated group, the only one differing significantly from the control (P = 0.045, Tukey HSD test). This shift in the weight gain (larvae vs. pupae) indicates a recovery trend in the Deltamethrin treated group that results in the absence of significant differences in the weight of the adults.

Functional geometry of the antlion's capture pits (Neuroptera: Myrmeleontidae)

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Antlions dig pitfall traps in the sandy ground to get their food. Through the three larval instars, characters like abdomen, mandible, and head increase in size. Although body size has a positive relation with the increase of pitfall trap size, other factors could be influencing in the expected size of traps. These capture tools define the size of prey that falls inside and is later manipulated by the antlion in order to feed itself. Referring to the pit construction, there is much support and research that describe some aspects about cone geometry of antlions. With this study, we contribute to functional geometry knowledge from pitfall traps made by *Myrmeleon*. We report the pit volume as a response to larval size and the opening angles of the traps of each instar. Results were obtained from 248 antlions collected in the Reserva de la Biósfera Tehuacán-Cuicatlán: 71 larvae from first instar, 102 belonging to second instar, and 75 to third instar. Larvae may show any opening angle between 80.5° and 90.9° without a determined difference by the larval stage.

Mark-recapture studies involving some common Texas antlions (Insecta, Myrmeleontidae)

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Field data are presented for adults of several genera of antlions (*Brachynemurus* Hagen 1888, *Euptilon* Westwood 1837, *Peruveleon* Miller & Stange 2011, and *Myrmeleon* Linnaeus 1767) collected during a three-year mark-recapture study in Lick Creek Park located in College Station, Texas. Results and discussion cover adult longevity, seasonality, local movement, and population size estimates. This study provides useful information which increases our knowledge of the ecology and biology of adult antlions.

Posters

New data of the family Hemerobiidae from China (Insecta, Neuropterida)

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The insect family Hemerobiidae (brown lacewings) belongs to the Neuropterida, and within this in Planipennia and Hemerobioidea. It is one of the largest families in Neuroptera, which contains about 1200 species in the world and is widely distributed, except in Antarctica. Presently, about one hundred and twenty species are recorded in China, including seven subfamilies and eleven genera. In this study, we have redescribed the species from China, based mainly on the external morphological characteristics. Moreover, in order to contribute about the neuropteran mitochondrial genome and related phylogenetic research in Hemerobiidae, the mitochondrial genome of *Neuronema laminatum* Tjeder, 1936 was sequenced using the strategy of PCR direct sequencing and clone sequencing methods. Detailed comparative analyses about genome organization and structure, protein-coding genes, tRNA genes, rRNA genes and non-coding regions are also given.

Current knowledge and distribution of Hemerobiidae (Neuroptera) in Mexico with notes on a possible undescribed species of *Notiobiella*

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Individuals of the family Hemerobiidae possess a forewing length of 4 to 12 mm, with a mostly brownish coloration, which occasionally may be yellow, black, or green. This family might be considered one of the most common families of Neuroptera by its abundance of individuals and the number of species; only Chrysopidae and Myrmeleontidae surpass them in terms of described species. The current knowledge of this family from Mexico was recorded in this study; which was achieved by reviewing literature about distribution, biology, and taxonomy. The southern portion of the country is better represented in number of species, mainly in the states of Chiapas, Oaxaca, and Veracruz, while states like Aguascalientes and the peninsula of Yucatan, essentially lack records of this family. Regarding life cycle, at present there is quite limited data for most of the 50 species recorded. The female genitalia are not described in most of the publications. Comments are made about a possible new species of *Notiobiella*, close to *N. rubrostigma* and *N. brasilensis*, yet with marked differences in male genitalia.

Developmental changes in the morphology of the stemmata in larvae of the dobsonfly *Cordydalus armatus* Hagen, 1861 (Megaloptera, Corydalidae)

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The genus *Corydalus* (Megaloptera, Corydalidae) is a distinctive group of dobsonflies endemic to the New World. Their larvae feed actively from a wide variety of prey in lotic ecosystems, therefore it is essential to study the morphology of their stemmata in order to understand how the larvae exert effectiveness in feeding. The morphology of the lateral ocelli or stemmata was studied in larvae of *Corydalus armatus* at different stages by using histological techniques. The larvae used in this study were collected from a swift stream located in Velez Municipality (Santander Department, Colombia). Twenty light adapted larvae ranging in body lengths between 25 to 74 mm were fixed with 10% buffered formalin. After fixation, each head was removed and their stemmata embedded in paraffin to obtain histological slices of 4 µm and stained with Hematoxylin-Eosin. Photographs of the histological slices were taken with a camera connected to a light microscope for analysis. Ontogenetic allometry of the body length and the distribution of the stemmata on the head was studied with geometric morphometric methods. Measurements of the thickness and diameter of the corneal lens and the size of the conical crystalline body were measured with the software Image-J. All above mentioned measurements were later correlated with body length of the larvae. The diameter of the corneal lenses and the interocellar distance increases with successive molts.

Current knowledge of the Ascalaphidae (Neuroptera) of Mexico

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Knowledge of the Ascalaphidae, or owlflies, of Mexico is reviewed. This family has ca. 450 species described worldwide, whereas for Mexico, 21 known species in eight genera have been recorded, one of which appears to be endemic, based on available data. Existing bibliographic information on the Mexican fauna was collected, and the current state of knowledge about the immature stages is described, as little is known about the biology of the species; also, geographical distribution data are summarized, complemented with information from specimens deposited in the National Collection of Insects of the Instituto de Biología, UNAM. Faunistic, descriptive, and revisionary work is still needed, in order to have an updated view of the biodiversity of Mexican owlflies.

First record of the family Sialidae (Megaloptera) from Thailand and description of the female and larva of *Indosialis bannaensis*

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The female and larva of *Indosialis bannenaenisis* Liu, Yang, and Hayashi are described for the first time from specimens collected in Thailand. The species previously was known from China and Vietnam, thus making this the first report of the family and genus from Thailand. A preliminary assessment of characters for separating the genera of larval sialids of the World also is presented.

Description of the larvae of *Protosialis flammata* Penny (Insecta, Megaloptera) with notes on bionomics

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Of Sialidae, in Latin America only the genus *Protosialis* is reported with nine species, four of which are present in Brazil: *Protosialis nubila*, *Protosialis brasiliensis*, *Protosialis flammata*, and *Protosialis hauseri*. The only known species in the Amazonia region is *P. flammata*, which was described on two males collected in light trap, near the Barro Branco stream, in the Adolpho Ducke Reserve, Manaus County, Amazonas State. The objective of this study is to describe the larval last instar and provide notes on bionomics of *P. flammata*, improving in this way, the knowledge on this family in the Neotropical region. Observations were made between September 2000 and January 2001 and 2003 and 2006, at the Reserva Florestal Adolpho Ducke, Manaus County, Amazonas, type locality of *P. flammata*. Larvae were collected with aquatic net or directly searching in the available substrates in the streams. Large larvae were collected and maintained alive in a plastic container with substrate from the habitat. Larvae were fed with earth worm and other invertebrates until pupation; observation on larvae were made dayly. All the specimens were preserved in 80% ethanol and deposited at the Invertebrate Collection of Instituto Nacional de Pesquisas da Amazônia (INPA), in Manaus, Amazonas, Brasil. Diagnosis of larva: Head with the dorsal region clear brown to dark, mandible pale brown, wide and long; lateral areas of the head darkened; the first apical tooth long and tapering; the second median tooth 2 times the length of the first tooth. Ventral region with mentum partially quadrangular; gular plate partially elongated. Prothorax sclerotized; metathorax pale brown, surrounded by dark color; small areas with microsetae. Legs well-developed, slender, region median and posterior with rows of comb-shaped sensilla. Abdomen with dorsal region pale brown to dark, covered by microsetae; lateral abdominal filaments tapering apically; with small constriction, filaments covered with fine filamentous setae. Ab_{10} long, apically tapered, flexible, and covered by long filaments. Postures of *P. flammata* (n = 10) were collected in leaves in the vegetation of the creeks. The postures were not solid, without defined form, occurring small gaps between the eggs. The postures vary between 5 to 12 mm in length (mean = 7.7 mm; DP = 2.45) and between 4 to 8 mm (mean = 5.00 mm; DP = 1.63) wide. Postures eggs containing between 200 to 500 (mean = 267; DP = 122.98); pale brown to dark coloration near the outbreak. The egg measuring between 0.49 to 0.51 mm (mean = 0.49; DP = 0.02) in length and width between 0.20 to 0.35 (average = 0.23; DP = 0.05); with micropilar opening long. Adults obtained in the laboratory from larvae reached an average life span of 17 days, periods of prepupae and pupae of 5 days and adults between 1 to 2 days. Taxonomic studies on immature species of Sialidae in the Neotropical

region are important to know the relationship between species of this family and to provide evidence to clarify the validity of the genus *Protosialis*.

SEM study of the larvae of *Tricholeon relictus* Hölzel & Monserrat, 2002 (Neuroptera, Myrmeleontidae)

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The external morphological characteristics of 3rd instar larvae of the Spanish endemic antlion species *Tricholeon relictus* Hölzel & Monserrat, 2002 using scanning electron microscope (SEM) are described and illustrated. The larvae are sit-and-wait predators and do not construct pitfall traps. This species has been found only in a small area in the coast of Granada. The genus *Tricholeon* Esben-Petersen, 1925 is particularly interesting because of its distribution: two species in southern Africa and this one in the south of the Iberian Peninsula. Setae and sensilla are described and illustrated for the first time in this genus and in the tribe Dendroleontini Banks, 1899 using SEM. Setae of these larvae show differences from the setae of the other studied antlion larvae with this technique, especially in the length of those situated on the thoracic setiferous processes. Also, the sensilla trichodea found in the second pair of legs are bigger than any sensilla trichodea found in antlion larvae until present.

Setae and sensilla of the *Myrmeleon* Linnaeus, 1767 larvae present in the Iberian Peninsula

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The genus *Myrmeleon* Linnaeus, 1767 is represented in the Iberian Peninsula at least by four species: *Myrmeleon formicarius* Linnaeus, 1767, *M. gerlindae* Hölzel, 1974, *M. hyalinus* Olivier, 1811, and *M. inconspicuus* Rambur, 1842; the presence of *Myrmeleon bore* (Tjeder, 1941) is still doubtful. This genus belongs to the tribe Myrmeleontini Latreille, 1802, characterized in their larval stages by the construction of pitfall traps. All the species of this genus in the Iberian Peninsula have been described in their larval stages, but *M. gerlindae* and *M. hyalinus* have not been described using scanning electron microscope (SEM) until now. The different kinds of setae and sensilla present in the Iberian species larvae of this genus are described and illustrated, as well as their location on the larval body surface. The larval characters have been used in the systematics of the family Myrmeleontidae, and a comparative SEM study of the larval morphology could be very important for this subject.

Chrysopidae from the state of Colima, Mexico

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Neuroptera are one of the smallest and more primitive orders of holometabolous insects, with approximately 6000 described species. Adults and larvae of most families are predatory; some lacewings can be of considerable value as manipulable predators for use in biological control programs. There are 10 families of Neuroptera currently known from Mexico and Chrysopidae, or green lacewings, is one of the most studied families, because of their role as biocontrol agents on agricultural crops, and they are often found in tropical and temperate zones. About 1200 species are known, of which 100 species are found in Mexico; it appears to contain approximately 8.3% of the world's known Chrysopidae fauna. Results of this contribution are part of a study to determine the species of Chrysopidae from the state of Colima. Previous studies reported six species from state of Colima: *Ceraeochrysa cincta* (Schneider), *C. valida* (Banks), *Chrysopa externa* (Hagen), *C. rufilabris* (Burmeister), *Chrysopodes collaris* (Schneider) and *Gonzaga torquatus* (Navás); we report herein two more species, *Chrysoperla carnea* (Stephens) and *Ceraeochrysa claveri* (Navás).

Sexual dimorphism and allometric growth of the postocular flange in *Platyneuromus* (Megaloptera, Corydalidae)

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Adults of the genus *Platyneuromus* (Megaloptera, Corydalidae, Corydalinae) are easily recognized by the notable postocular flange (PF) on the head, which can grow disproportionately in larger males. It possibly depicts a sexual dimorphic component, potentially analogous to the allometric pattern of the mandibles in other genera of Corydalinae (e.g., *Corydalus*). To test matematically the allometry of the PF, the head of 200 specimens of the three species of the genus *Platyneuromus* were used in a morphometric study of head variation to analyse sexual dimorphism (SD) and allometric growth (AG). Results of principal component, logarithmic regression, and discriminant analyses reveal different interespecific patterns of morphological variation by distinct morphospace occupation, patterns of SD, and AG rates. This study favors a biological interpretation of the PF growth in *Platyneuromus* in the sense of sexual selection.

Homology and nomenclature of Chrysopidae (Neuroptera) wing venation

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Patterns of insect wing venation have provided the basis for many classifications and are widely used as distinguishing characters. Some obstacles, however, have hampered systematic studies based on insect wings: nomenclatural inconsistency and insufficient detailed study of small veins hinder the establishment of a complete system of homology. Neuropterida has an amazing variety of wing venation patterns, what has attracted the attention of many researches. Nevertheless, the variety of wing venation patterns generated many conflicting systems and questions regarding nomenclature. The pattern of wing veins in “S” in Chrysopidae (Neuroptera) generates an even more complex problem to establish homology between all wing veins. This contribution tries to understand in great detail the homology of the Chrysopidae complete wing venation and to standardize the nomenclature of the wing veins. Wings of pupae of *Chrysoperla externa* (Hagen, 1861) at different days of development were studied, as well as adult wings of species of Leucochrysini, Belonopterygini, Ankylopterygini, Apochrysinae and Notochrysinae. Wing vein nomenclature was standardized and the wing vein patterns were discussed for all Chrysopinae tribes and for Notochrysinae and Apochrysinae. The general patterns observed are consistent with those observed by Adams in 1996.

Osmylidae (Neuroptera) of South America

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Osmylidae is a small and primitive group of Neuroptera with about 200 species distributed among eight subfamilies with a worldwide distribution. This family is more diverse in the Oriental and Australian regions, but they are also found in Neotropics (South America), Afrotropics and Palaeartic region (lower diversity found). Although adults of Osmylidae reach wingspans up to 30 mm they are weak-flying insects. They are usually active during daytime or in the twilight hours and are mainly predators, but it has been reported the presence of pollen, fungal spores, algae and other kind of material in the gut contents. Osmylids can be found along the margins of water bodies, wetlands, dry open forests and cold mountain areas. Only 15 Osmylidae species distributed among five genera are found in South America; they have been reported from Brazil, Argentina, Chile, Ecuador, Colombia, Bolivia and Peru. South American osmylids are poorly studied, then this work made a review of 15 species and a morphotype of *Isostenosmylus* Krüger, 1913 previously described for South America, plus one undescribed species of *Isostenosmylus*; the majority of holotypes were photographed, a key to South American Osmylidae species was made, as well as new illustrations.

New distributional records of Sisyridae (Neuroptera) in Brazil with bionomic notes on *Climacia townesi* Parfin & Gurney

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The objectives of this study are to increase knowledge of Sisyridae species distribution in Brazil and to provide bionomic information on *Climacia townesi* Parfin & Gurney. Two species are recorded for the first time in Brazil: *Climacia doradensis* Flint, 2006 (Pará state) and *Climacia aff. californica* (Santa Catarina, Rio Grande do Sul and Goiás states). We report Sisyridae species for the first time in the following Brazilian states: Roraima (*C. townesi*, *Sisyra apicalis* Banks, *Climacia bimaculata* Banks), Goiás (*Climacia carpenteri* Parfin & Gurney) and Rio Grande do Sul (*C. aff. californica*, *C. carpenteri*). *Climacia townesi* is one of the most abundant Sisyridae species in Amazonas state; it can be found in open canopy habitat, around large rivers. This species pupates on exposed roots of trees located on the banks of the rivers; adults were collected near rivers containing species of the following sponge genera: *Corvospongilla*, *Metania*, *Pottsiela* and *Trochospongilla*, which constitute the potential habitat and food for the larvae.

Species of Megaloptera in Mexico: bioclimatic profiles and potential distribution richness

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The order Megaloptera is generally considered to be among the most primitive of the holometabolous insect orders. Thirteen species are distributed in Mexico, included in five genera in the families Corydalidae and Sialidae. Little accurate geographic information on distribution of species richness and the species' bioclimatic profile are available. The aims of the present work were (i) to evaluate potential distributions of the species; (ii) to identify the major climatic descriptors upon which they depend; and (iii) to identify areas of potential high richness. We modeled the ecological niches (ENM) of three species of the genus *Chloronia*, five of *Corydalus*, three of *Platyneuromus* and one of *Neohermes*. Species distributions models (SDMs) were generated using Maxent, a maximum entropy algorithm (Maxent v. 3.3.3e); this analysis was performed on a record set of 1,355 localities, including collection and literature records and the values of 21 environmental variables across the record set. All species models were overlapped in a single map in order to obtain a potential richness map and to identify patterns of richness. A jackknife analysis of the variables in the MaxEnt environment was used to determine which variable contributes the most information to the ENM of each species. Boxplots were used to visualize the distribution of bioclimatic variables across taxa. The bioclimatic profile of each species was characterized through extreme, median and dispersion features of the values of the variables.

Distribution of New World Megaloptera holdings of the National Museum of Natural History (Smithsonian Institution)

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Megaloptera is an order of insects within the Neuropterida, which contains two extant families: Corydalidae, fishflies and dobsonflies, and Sialidae, alderflies. The National Museum of Natural History in Washington D.C. contains over 3,000 specimens of Megaloptera spanning over half of the world's species of Sialidae in five of the seven genera and 106 species in 20 genera of Corydalidae. In this work, these specimens are used to create distribution maps of the species collected in the New World. These data will contribute to future efforts to determine patterns of biogeography and diversification within this archaic order while further providing a framework for the documentation of Megaloptera from other museum holdings and biogeographic regions.

First records of adult feeding in Megaloptera (Corydalidae, Corydalinae) from Mexico, with comments on food preference

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Adult males and females of *Platyneuromus soror* (Hagen, 1861) and *Corydalus magnus* Contreras-Ramos, 1998 were collected using light traps in cloud forest in Hidalgo, Mexico. They were transferred to a terrarium in the laboratory where food preference observations were performed upon offering of various potential food items. All data observed were video recorded. Males and females of both species were isolated and various types of fruit were placed before them as potential food, subsequently it was offered food to only females and then males and females together in order to see if there was any interaction for the resource. No male *Corydalus* was able to eat solid food, because of clear hindrance by mandibular size. However, in *Platyneuromus*, both male and female individuals were capable of food uptake. Food preference of both species was evaluated by offering a variety of fresh fruits and vegetables in different stages of decomposition. These observations are discussed and future directions for research are given.

Residual effects of the ingestion of Imidacloprid by *Chrysoperla agilis* (Neuroptera: Chrysopidae)

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Chrysoperla agilis is a native species to the Azores, with potential to be used in biocontrol and IPM programs. We tested the residual effects of the recommended field concentration of Imidacloprid® used against aphids and white flies, added to the lacewing imago's food. Recently emerged adults (< 24h) were coupled and monitored for 15 days. On the first day, couples were fed pollen pulverized with the pesticide, with different time intervals between pesticide application and feeding (A-0h; B-24h; C-48h; D-72h and E-96 hours). Pollen without pesticide was used as control. During the rest of the experiment adults were fed a mix of honey, commercial pollen, yeast and water (1:1:1:1). In the first 24h, control had no mortality while on treatments ranged from 33.3% to 85.7%. The average number of eggs laid / female / day was also affected: control – 17.67±0.90; treatments ranging from 0±0 to 6±2. Fertility rate was also affected: control- 69%; treatments A, B and C- 0%; D- 11%; E-67%. Preoviposition period seems to increase under the influence of Imidacloprid: control - 3.93±0.31 days; treatments' ranged from 5.5±0.35 to 9±0 days. According to the IOBC classification, Imidacloprid is considered moderately harmful when ingested by *Ch. agilis*, with a decreased impact on fertility and mortality after 96 hours.

The lacewing *Ceraeochrysa cincta* (Schneider) is the predominant species in citriculture in the southerm São Paulo state

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This study aimed to determine the species richness of lacewings in two orchards of citrus in the municipality of Anhembi, São Paulo, Brazil. One orchard is under a strict pest management and another one under a less intensive management system. The sampling of adults were made monthly, in the morning, for one year, in 2011-2012. Capture effort of lacewings was for 30 minutes, and to facilitate, we used a stick (five feet long) to shake branches of the plants, chosen at random, to cause the displacement of adult lacewings and when the adults left the plants, they were captured with an insect net of 30 cm of diameter. We collected a total of 259 adult lacewings in both orchards, more than 71% of the individuals were collected from the orchard under a less intensive management system and approximately 29% were collected from the orchard under a strict management system. In both orchards, more than 90% of the specimens were *Ceraeochrysa cincta*. In addition, we also collected *Chrysopodes* sp. and *Chrysoperla externa* in both orchards and only in the orchard under less intensive management system, it was possible to collect other species, such as *Ceraeochrysa everes*, *Plesiochrysa brasiliensis*, *Leucochrysa cruentata* and *Ceraeochrysa cubana*.