

8th International Symposium on Neuropterology

26-29 July 2003
College Station, Texas, USA

**8th International Symposium on
Neuropterology**

Contents

Schedule of Activities	4
Post-Symposium Excursions	8
Accompanying Persons Program	9
International Association of Neuropterology General Assembly Agenda	10
Instructions to Authors	11
List of Participants	12
Abstracts of Presentations	16

Schedule of Activities

Saturday, 26 July 2003 (Day 1)

- 3:00-5:30 Registration (Texas A&M University, Heep Center, ground floor atrium)
- 5:30-10:00 Symposium-Opening Social Event (at the home of J. Oswald; meet in the Heep Center atrium at 5:30 for transportation)

Sunday, 27 July 2003 (Day 2)

- 8:00-8:30 Opening Remarks (J. Oswald, Symposium host; H. Aspöck & U. Aspöck, co-presidents, International Association for Neuropterology)
- 8:30-12:00 Session 1 (Heep Center 103)
Systematics and Taxonomy
Moderator: J. Oswald
- 8:30 Contreras-Ramos, A.: Updated phylogeny of *Corydalus* Latreille (Corydalidae: Corydalinae), with a hypothesis of the internal relationships of Megaloptera.
- 9:00 Bowles, D.: Spongillafly (Neuroptera: Sisyridae) of North America with a key to the larvae and adults.
- 9:25 Contreras-Ramos, A.: A new alderfly from Venezuela (Megaloptera: Sialidae).
- 9:50 Break
- 10:05 Johnson, J. B.: Recognition of Cryptic Species in the Genus *Chrysoperla* (Neuroptera: Chrysopidae) or, the holosystematic quest for the true *Chrysoperla carnea* (Stephens).
- 11:05 Winterton, S.: Phylogenetic relationships of Neuropterida.
- 12:00-1:00 Lunch (provided, served in Heep 103)
- 1:00-4:00 Session 2 (Heep Center 103)
Faunistics
Moderator: R. Güsten
- 1:00 Penny, N. D.: The antlions (Myrmeleontidae) of Madagascar.
- 1:50 Sziráki, G.: The Coniopterygidae of Asia.
- 2:15 Oswald, J. D.: The Neuropterida of Texas.
- 2:45 Break
- 3:00 Aspöck, H.; Aspöck, U.; Hölzel, H.: Neuropterida of the islands of the Mediterranean Sea -- biodiversity and biogeography
- 4:00-5:00 Session 3 (Heep Center 123)
Posters
- Carvalho, C.: (1) Influence of the density of *Myzus persicae* (Sulzer, 1776) (Hemiptera: Aphididae) on the predatory capacity and biological aspects of *Chrysoperla externa* (Hagen, 1861) (Neuroptera: Chrysopidae); (2) Biological aspects and predatory capacity of *Chrysoperla externa* (Hagen,

1861) (Neuroptera: Chrysopidae) fed on *Bemisia argentifolii* (Bellows & Perring, 1994) (Hemiptera: Aleyrodidae); (3) Biological aspects and predatory capacity of *Chrysoperla externa* (Hagen, 1861) (Neuroptera: Chrysopidae) larvae fed on *Rhopalosiphum maidis* (Fitch, 1856) (Hemiptera: Aphididae) at different temperatures.

Ren, D.: Jurassic fossil lacewings from northeastern China.

5:00-?:?? Open dinner and evening (see map in registration packet for restaurant locations)

Monday, 28 July 2003 (Day 3)

8:00-11:45 Session 4 (Heep Center 103)

Biology, Ecology, Morphology and Biogeography

Moderator: A. Contreras-Ramos

8:00 Miller, G. L.: Unlocking the mystery to some of those “small soft-bodied insects” (Hemiptera: Sternorrhyncha: Coccoidea).

8:55 Gepp, J.: Long-term studies on populations of *Euroleon nostras* (Fabr.) in southern Austria.

9:20 Xu, Y-y.: Effects of photoperiod and temperature on diapause development of adult *Chrysoperla sinica* (Tjeder).

9:40 Break

9:55 Aspöck, U.: Female genital sclerites of the Neuropterida -- an attempt at homologization.

10:30 Duelli, P.; Güsten, R.: The “glenofinger”, a spectacular prothoracic gland in an Afrotropical green lacewing (Chrysopidae).

10:50 Stange, L.: Biogeography of the Myrmeleontidae of the Western Hemisphere.

11:45-12:30 Group Photo (gather on the back steps of the Heep Center)

12:30-2:00 Lunch (open, see map in registration packet for restaurant locations)

2:00-4:00 Session 5 (Heep Center 103)

History and Bioinformatics

Moderator: N. D. Penny

2:00 Aspöck, H.: Early history of Coniopterygidae research.

2:45 Röhrich, W.: "Neuroptera.com" - a new website for world wide neuropterology.

3:05 Oswald, J. D.: The “Bibliography of the Neuropterida” and “Index to the Neuropterida Species of the World”: demonstration and discussion.

4:00-5:00 Texas A&M University Insect Collection, Open House (Heep Center 216)

5:30-10:00 Texas Barbeque Dinner (at the home of J. Oswald; meet in the Heep Center atrium at 5:30 for transportation)

Tuesday, 29 July 2003 (Day 4)

- 8:00-9:30 Texas A&M University Insect Collection, Open House (Heep Center 216)
- 9:30-12:00 Aspöck, H.; Oswald J.: Round table discussion of current and future neuropterid research projects (Heep Center 103)
- 12:00-1:30 Lunch (open, see map in registration packet for restaurant locations)
- 1:30-5:00 International Association of Neuropterology, General Assembly; Adjournment of Symposium (Heep Center 103)
- 6:30-10:00 Congress dinner (Texas A&M University Faculty Club, 11th Floor Rudder Tower, adjacent to the Memorial Student Center [MSC])

Post-Symposium Excursions

Wednesday, 30 July 2003 (Day 5)

- 8:00AM Depart on Texas Hill Country Excursion (meet under the drive-through portico attached to the Memorial Student Center [MSC] at 8:00AM for transportation and loading)

Thursday, 31 July 2003 (Day 6)

- ca. 10:00PM Return from Texas Hill Country Excursion (we will deliver you to your place of accommodation for the night of 14 August)

Friday, 1 August 2003 (Day 7)

- 8:00AM Depart on Western Collecting Excursion (meet under the drive-through portico attached to the Memorial Student Center [MSC] at 8:00AM for transportation and loading)

Thursday, 14 August 2003 (Day 20)

- ca. 10:00PM Return from Western Collecting Excursion (we will deliver you to your place of accommodation for the night of 31 July)

Accompanying Persons Program

Accompanying persons take part in the symposium-opening social event, the Congress dinner, and a special slate of daytime activities on 27-29 July. The latter activities will be determined by its participants in association with Mrs. Diane Oswald, who will lead the program. Participants in this program should plan to meet Diane at the symposium-opening social event on Saturday evening for further information.

International Association of Neuropterology General Assembly Agenda

1. Opening of the General Assembly, Co-Presidents Prof. Dr. H. Aspöck & Prof. Dr. U. Aspöck
2. Minutes of the meeting in Budapest, 9 August 2000
3. Report on activities since the Budapest meeting
4. Report on the finances of the Association
5. Discussion of the *Journal of Neuropterology*
6. Discussion of the *Proceedings* of the 8th Symposium
7. Election of Board Members (current members listed below)
 - Co-Presidents (2000-2003 Prof. Dr. H. Aspöck & Prof. Dr. U. Aspöck, Austria)
 - Vice President (2000-2003 Dr. J. D. Oswald, USA)
 - Treasurer (2000-2003 Mr. A. E. Whittington, UK)
 - Secretary (2000-2003 Dr. Wieland Röhricht, Germany)
 - Additional Members (2000-2003 Dr. M. Canard, France; Dr. P. Duelli, Switzerland; Dr. M. W. Mansell, South Africa; Dr. M. Meinander, Finland; Dr. T. R. New, Australia; Dr. N. D. Penny, USA; Dr. A. Popov, Bulgaria)
8. Determination of the location and date of the 9th International Symposium on Neuropterology
9. Miscellaneous

Instructions to Authors

The Proceedings of the 8th International Symposium on Neuropterology will be privately published as soon as practicable following the symposium. All research papers will be peer-reviewed. Manuscripts should be a maximum of 10-15 pages in length and are limited to presentations made at the symposium. Multiple research papers with the same primary author will only be accepted if space and finances permit. Manuscripts to be considered for publication in the Proceedings should be submitted to the Chief Editor (John Oswald) during, or as shortly after, the symposium as possible. Further details regarding publication in the Proceedings will be made available during or after the symposium. We hope that it will be possible to distribute one copy of the Proceedings volume gratis to all symposium participants. However, whether or not this will be possible cannot be firmly determined until all production costs are known.

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Abstracts of Presentations

NEUROPTERIDA OF THE ISLANDS OF THE MEDITERRANEAN SEA -- BIODIVERSITY AND BIOGEOGRAPHY

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The high number (ca. 5000) and striking differences in size, structure, altitude, and, particularly, age and history of the islands of the Mediterranean Sea make them an interesting challenge to explore, study, document and analyze from the standpoint of their Neuropterida faunas. One main goal of such studies is to contribute toward a better understanding of the origin of the present composition of their faunas.

The preconditions for this long-term project are very favorable. The Neuropterida of the Western Palaearctic have been investigated for more than 200 years and particularly intensively during the past century. The Raphidioptera, Megaloptera and Neuroptera of the bordering continental areas of Europe, Africa and Asia have been the goals of many studies, and thus altogether an excellent taxonomic basis exists.

The Mediterranean Sea is the remnant of the ancient Tethys Ocean, and is today restricted to an area of about 2.51 million km² between Europe, Asia and Africa. Some of the islands represent fragments broken from the margins of adjacent continents, which have subsequently drifted into the sea (e.g. Corsica, Sardinia and the Balears, broken from Iberia in the Oligocene ca. 35-28 mybp), others represent the exposed elevations of otherwise overflowed parts of adjacent continental margins (e.g. Crete, flooded in the Miocene ca. 15 mybp). At the end of the Miocene and the beginning of the Pliocene, ca. 5.6 to 5.3 mybp, the Mediterranean was cut off from the Atlantic Ocean and largely evaporated (the Messinian crisis). These events led to numerous land bridges, partly, however, of doubtful value due to their lagoon-like character. In the Pliocene (and after the re-opening of the Mediterranean to the Atlantic Ocean) a global rise of sea level together with various tectonic events caused transgressions of the sea which overflowed large parts of many islands (e.g. Crete largely). During the Pleistocene (1.8 mybp to ca. 12,000 ybp) several glacial periods led periodically to a lowering of the global sea level and thus again to many land bridges within the Mediterranean and to the surrounding continents. All of these events have influenced the origin and composition of the faunas of the islands, have led to numerous immigrations, but also to extinctions. It is of particular interest to look for remnants of the original fauna of the islands.

So far about 150 Neuropterida species (ca. 30 Raphidioptera: Raphidiidae: 28, Inocelliidae: 2; no Megaloptera; ca. 120 Neuroptera: Nevrothidae: 3, Osmylidae: 1, Chrysopidae: 42, Hemerobidae: 29, Sisyridae: 3, Coniopterygidae: 25, Dilaridae: 3, Mantispidae: 5, Berothidae: 1, Nemopteridae: 5, Ascalaphidae: 10) are known from the islands of the Mediterranean, compared to ca. 340 species recorded in Europe, ca 300 in Mediterranean Asia, ca 280 in Northern Africa and ca. 650 species recorded from the whole surrounding continental area. It is, however, estimated that the total of Neuropterida species fauna of the islands may be at least 200, possibly 250, thus more than 50 species probably still remain to be recorded.

It is not surprising that the compositions of the Neuropterida fauna of the various islands are very different. Most endemic species are to be found among the Raphidioptera (1 in Corsica + Sardinia + Sicily, 2 in Evvoia, 4 in Crete, 2 in Karpathos, 1 in Chios, 2 in Rhodes). Additional endemic species are found in the families Nevrothidae (1 in Corsica + Sardinia), Chrysopidae (1 in Crete, 1 in Cyprus), Hemerobiidae (1 in Corsica), Dilaridae (1 in Corsica), Ascalaphidae (1 subspecies in Corsica + Sardinia, 1 in Sicily, 1 in Crete).

Very few species represent convincing remnants of the old fauna of the Tertiary (e.g. *Fibla maclachlani* in Corsica, Sardinia and Sicily). Most probably, the vast majority of the Neuropterida of the Mediterranean islands can be traced back to immigrations during the last 1.8 mybp via the land bridges of the glacial periods, but a few species may also have reached the islands during the Messinian crisis. The share of the faunas attributable to drift by wind or water, or to anthropogenic factors, remains to be assessed.

Several peculiarities merit special mention. So far, the family Sialidae (and thus the order Megaloptera) has not been found on any of the islands. *Fibla (Reisserella) pasiphae*, an inocelliid endemic to Crete, possesses congeners only in Sicily, Corsica, Sardinia, the Iberian peninsula, and North Africa, and its sister species is supposed to occur (or to have occurred) in the Cyrenaica in Libya. The distribution of *Nevrorthus iridipennis* comprises only small areas on both sides of the straits of Messina, in Calabria (South Italy) and in Sicily. On the other hand, none of the *Libelloides* species occurring in the south of Italy has succeeded in overcoming the straits of Messina, whereas *Libelloides ictericus* occurs (in two subspecies) in Corsica and Sardinia on one hand, and in Sicily on the other, but not on the Italian mainland. Is this due to ecological competition or other mechanisms preventing expansion of the distribution? Many additional questions of general biogeographical significance also remain to be clarified.

EARLY HISTORY OF CONIOPTERYGID RESEARCH

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It is not surprising that descriptions and, in particular, illustrations of these tiny and inconspicuous insects which we nowadays understand as the Neuroptera family Coniopterygidae (dustywings) are scarce in the early entomological literature. It is, on the contrary, remarkable that the first dustywing mentioned in the literature was described in the genus *Hemerobius*, thus demonstrating the high competence of its author (O. F. MÜLLER, a Danish scientist) for estimating the relationship of this insect. The first illustration of a Coniopterygid was published by the German VON BLOCK in 1799; the species (*Hemerobius pulchellus*), although exhibited on a beautifully hand-coloured engraving, can, however, not be identified.

1834 was an important year in the history of coniopterygid research. J. CURTIS, a famous British entomologist, published descriptions of two species (including the first one of a larva) and a superbly hand-colored lithograph showing the first clearly identifiable species (*Coniopteryx psociformis*) and the first illustration of a larva. CURTIS (who erected the genus *Coniopteryx*) and also some subsequent authors did not really know where to classify *Coniopteryx*. Most of them (e.g. BURMEISTER 1839, RAMBUR 1842) relocated them to Psocidae. Only the prominent British entomologist J. O. WESTWOOD (1840) correctly assigned the taxon. Finally, F. M. BRAUER (1852) treated *Coniopteryx* within his Glaphyropteridae, a collective name for most Neuroptera in the present sense.

BRAUER & LÖW (1857), both Austrians, gave another description of the larva and used larval characters (in particular the special sucking tubes) for characterizing their “Megaloptera” (identical with Neuroptera in its modern sense). Another important early step was the publication by F. LÖW (1885), in which he described and figured the larvae of *Coniopteryx* and of a second genus, *Aleuropteryx*, which would later form the basis for the erection of the subfamily Aleuropteryginae.

As long as descriptions of dustywings were based on eidonomic characters (particularly color, shape of head, antennae, and wing venation), a clear differentiation of species was not possible. The monograph of the Coniopterygidae by the German entomologist G. ENDERLEIN, published in 1906, was a mile-stone. In addition to four magnificent chromolithographs showing wings and antennae of several representatives of all genera, this work contained excellent drawings of genital structures, thus clearly characterizing several species for the first time: a new era had begun in research on the Coniopterygidae!

FEMALE GENITAL SCLERITES OF THE NEUROPTERIDA: AN ATTEMPT AT HOMOLOGIZATION

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Terminalia of female Neuropterida are surprisingly heterogeneous in shape and appearance. All Raphidioptera and, among the Neuroptera, Dilaridae and Symphrasinae (Mantispidae) are equipped with a long, hose-shaped ovipositor. A rather club-shaped small to medium-sized ovipositor is to be found in the order Megaloptera and in Nevrothidae, Osmylidae, and Sisyridae among Neuroptera. Predominantly however, neuropteran female terminalia are inconspicuously “rounded” in appearance. Only certain taxa impress with distinctive terminal processus, complicating, but also confirming, homologization of genital sclerites.

Interpretations and terminologies found in the literature reveal numerous inconsistencies and mistakes. This concerns particularly the ventral regions of segments 8 and 9. It is the intention of the present study to understand genital sclerites as tergites, sternites, gonocoxites, styli and gonapophyses of these segments rather than to perpetuate the use of so called neutral terms which have been introduced to avoid wrong homologization, but which in reality do induce (wrong) homologization.

Corydalidae (Megaloptera) have a broad sternite 8; a structure of similar shape in Neuroptera (e.g. certain Nemopteridae) does not necessarily represent sternite 8 (and thus a primitive character), but rather the fused and modified gonocoxites 8. They are, however, frequently reduced or obliterated. The small transverse sclerite in Sialidae (Megaloptera), or in some Neuroptera, e.g. certain Mantispidae, could, however, actually be the reduced sternites 8. The so-called subgenitale of most taxa appears to be the gonocoxites 8, either still with recognizable or amalgamated gonapophyses 8. In Raphidioptera the fused gonapophyses 8 are extremely elongated and constitute an unpaired ventral element of the ovipositor (which is lacking in the long ovipositors of Dilaridae and Symphrasinae). Spectacular processus-like gonocoxites 8 (with distinct gonapophyses 8) can be identified e.g. in certain Myrmeleontidae; this interpretation is corroborated by the additional existence of typical gonocoxites 9.

Segment 9 is generally characterized by the loss of the sternite, and by modifications of the lateroventrally elongated and/or even divided tergite. The so-called pseudohypocaudae of some Berothidae and Rhachiberothidae are the most spectacular derivatives of tergite 9. The gonocoxites 9 with or without styli, with or without gonapophyses, are omnipresent, either as lateral elements of the above mentioned long- or medium-sized ovipositors, or just as semicircular sclerites. Modifications of the gonocoxites 9 are numerous, e.g. the finger-like hypocaudae, which are most prominent in Berothidae, or the spectacular psammarrotrum of Ithonidae.

SPONGILLAFIES (NEUROPTERA: SISYRIDAE) OF NORTH AMERICA WITH A KEY TO THE LARVAE AND ADULTS

Bowles, D.

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The distributions of the two genera (*Climacia* and *Sisyra*) and six species of spongillafies known to occur in Canada, Mexico, and the United States are reviewed and summarized. Several new and significant distribution records are presented for states or provinces in these countries. A revised, illustrated key to the third instar larvae and adults is presented that is inclusive of all six species.

INFLUENCE OF THE DENSITY OF *MYZUS PERSICAE* (SULZER, 1776) (HEMIPTERA: APHIDIDAE) ON THE PREDATORY CAPACITY AND BIOLOGICAL ASPECTS OF *CHRYSOPERLA EXTERNA* (HAGEN, 1861) (NEUROPTERA: CHRYSOPIDAE)

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The influence of different densities of *M. persicae* reared on sweet pepper leaves, *Capsicum annuum* L., on some biological aspects of the immature and adult stages and the predatory capacity of larvae of *C. externa* was studied. The average number of third and fourth instar *M. persicae* aphids consumed daily by each instar of *C. externa* was estimated in a preliminary trial. In the experimental trials, chrysopid larvae were fed at three aphid densities: 50% below the daily average consumption, the daily average consumption and 50% above that consumption. The experiment was completely randomized utilizing in each density 40 newly emerged first instar larvae of the predator, individualized in Petri dishes of 5 x 1.5 cm and kept at 25 °C, RH of 70 ± 10% of 12-hour photophase. The duration and survival rate of each instar larval, pre-pupa and pupa stages, number of aphids consumed, duration of pre-oviposition period, daily and total oviposition during 50 days and survival rate of eggs were evaluated. It was found that the density of the aphid influenced the consumption of the three larval instars, greater consumption taking place with increasing prey density. There were no significant differences between the duration of the first and second instars of the larval stage when the average density of prey was 50% below the average consumption. The survival rates in the three instars of the larval stage increased with increasing of prey density, showing that survival can be related to the availability of prey. The fecundity of adults originating from larvae fed on that aphid, and the survival rate of their eggs were not influenced by the densities.

BIOLOGICAL ASPECTS AND PREDATORY CAPACITY OF *CHRYSOPERLA EXTERNA* (HAGEN, 1861) (NEUROPTERA: CHRYSOPIDAE) FED ON *BEMISIA ARGENTIFOLII* (BELLOWS & PERRING, 1994) (HEMIPTERA: ALEYRODIDAE)

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The predatory capacity and biological aspects of *C. externa* larvae fed on *B. argentifolii* were evaluated by using nymphs of fourth instar white flies at densities of 100, 160, 220 and 280 reared on tomato plant leaves of the cultivar Santa Clara. The nymphs were obtained by cutting disks 2 cm in diameter from the tomato plant and putting them in Petri dishes of 5 cm containing a 1% agar layer, and by putting one chrysopid larva in each dish. The trials were conducted at 25 °C, RH of 70 ± 10% and 12-hour photophase in a completely randomized design with ten replicates. Duration, survival rate and number of whitefly nymphs preyed upon after 24, 48, 72 and 96 hours were recorded. For the adult stage, the pre-oviposition, oviposition, and effective oviposition periods were determined together with the daily and total fecundity during 60 days, and the embryonic period and survival rate of eggs. The duration of the first, second and third instars of *C. externa* did not differ significantly when they were fed on nymphs of *B. argentifolii* at different densities and the survival rate ranged from 90 to 100%. An increasing trend of the predatory capacity of the larvae of first, second and third instar, as related to the increase of the density of nymphs of *B. argentifolii* was observed. The consumption was of 44.6; 69.9; 68.3 and 107.8 nymphs throughout the first instar; 83.1; 168.4; 203.3 and 288 nymphs for those of second instar and 341.3; 579.3; 697.3 and 1,006.3 nymphs for those of third instar as related with the four densities utilized, respectively. The periods of pre-oviposition, oviposition and effective oviposition were 5.1; 56.8 and 51.4 days, respectively with a daily and total capacity of oviposition of 11.9 and 711.8 eggs per female. The embryonic period was of 4.0 days and the survival rate 90.8%.

BIOLOGICAL ASPECTS AND PREDATORY CAPACITY OF *CHRYSOPERLA EXTERNA* (HAGEN, 1861) (NEUROPTERA: CHRYSOPIDAE) LARVAE FED ON *RHOPALOSIPHUM MAIDIS* (FITCH, 1856) (HEMIPTERA: APHIDIDAE) AT DIFFERENT TEMPERATURES

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Predatory capacity and some biological aspects of immature stages of *Chrysoperla externa* fed on *Rhopalosiphum maidis* nymphs at different temperatures were investigated. The experiments were conducted at 15, 20, 25 and 30 °C, 70 ± 10% RH and 12-hour photophase in a completely randomized design with four treatments and fifteen replicates in the Insect Biology Laboratory of the Entomology Department of the Universidade Federal de Lavras, MG, Brazil. It was found that the length of all the life stages of the lacewing decreased with increasing temperature. At all temperatures, the consumption of aphids by *C. externa* larvae increased as related with the larval development, displaying an increased consumption at the third instar. At 15 °C, the consumption of the larval stage was of 317.4 ± 6.0 aphids of third and fourth instar, increasing at the temperatures of 20 and 25 °C, these being of 351.5 ± 7.1 and 347.5 ± 5.7 aphids, respectively and reducing to 301.3 ± 6.7 aphids at 30 °C. The survival rates for the three larval instars, pre-pupa, and pupa were 100% at the temperatures of 20 and 25 °C, this being, therefore, a suitable range for the development of this predator. The threshold-temperature and thermal constant ranged as related with the insects developmental stage, for the egg to adult, they corresponded to 10.7 °C and 377.8 degree-days, respectively.

A NEW ALDERFLY FROM VENEZUELA (MEGALOPTERA: SIALIDAE).

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During a visit to the Museo del Instituto de Zoología Agrícola 'Francisco Fernández Yépez' of the Universidad Central de Venezuela, Maracay, in 1999, seven new species of Megaloptera from that country were found. Six of them were dobsonflies (Corydalidae: Corydalinae) and their descriptions have been published, but it is not until now that the one alderfly (Sialidae) is being studied. Eight Neotropical alderfly species have been described, all considered within *Protosialis* Weele: *P. bifasciata* (Hagen), Cuba; *P. bimaculata* Banks, Bolivia; *P. brasiliensis* Navás, Brazil; *P. chilensis* (MacLachlan), Chile; *P. flammata* Penny, Brazil; *P. flavicollis* (Enderlein), Colombia; *P. mexicana* (Banks), Mexico and Panama; and *P. nubila* Navás, Brazil. Based on descriptions and the apparent restricted distribution of the species, it is assumed that the Venezuelan specimens (three males and one female, all from Rancho Grande, Aragua) belong to a new species. Diagnostic traits of the Venezuelan species and of the holotype of *P. brasiliensis* Navás (also studied), will be discussed. Because specimens are rare in collections and many available descriptions are the original ones, often inadequate, taxonomic knowledge of Neotropical Sialidae is still insufficient. A revision of the group would be a pertinent future contribution.

**UPDATED PHYLOGENY OF *CORYDALUS* LATREILLE (CORYDALIDAE: CORYDALINAE),
WITH A HYPOTHESIS OF THE INTERNAL RELATIONSHIPS OF MEGALOPTERA**

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Three main lineages are currently recognized within the Megaloptera: Sialidae, alderflies; and Corydalidae, dobsonflies (Corydalinae) and fishflies (Chauliodinae). Generally, it is assumed that these are monophyletic. Within the New World Corydalinae, *Corydalus* Latreille is the most speciose genus, currently with 34 described species. It was revised in 1999, with a phylogeny included. This phylogeny has subsequently been modified, as four species, all from Venezuela, were described after the original study. The new analysis involved 36 taxa (*C. amazonas* was removed because males are unknown; *Chloronia* and *Platyneuromus* as outgroups). Using all characters unordered and with equal weight, through a heuristic search (n = 10 stepwise addition replicates) using PAUP 4.0b8a two equally parsimonious trees were obtained (L = 477, CI = 0.373, RI = 0.662). The resulting phylogeny is in high agreement with the previous phylogeny. Assuming an *a priori* evolutionary polarity for 24 characters (i.e., using a hypothetical ancestor or vector of zeros), which implied that several morphological reductions and fusions were derived conditions, a cladistic analysis of the three major groups within the Megaloptera was performed. The resulting hypothesis supports the idea that fishflies (Chauliodinae) and alderflies (Sialidae) are sister groups, and the dobsonflies are a basal taxon. This result, if correct, would render the family Corydalidae a paraphyletic taxon.

**THE GLENOFINGER, A SPECTACULAR PROTHORACIC GLAND IN AN AFROTROPICAL
GREEN LACEWING (NEUROPTERA: CHRYSOPIDAE)**

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Three types of exocrine glands have hitherto been described in green lacewings (Chrysopidae): 1) Specialized secretory units opening directly onto the cuticular surface which often shows unusual modifications. Such structures have been located on the pronotum in some species, and on abdominal sternites in others. 2) Secretory units connected with the gonosetae in males of some chrysopids. 3) Paired prothoracic glandular reservoirs, opening in the pleural region and identical in both sexes. This anatomical gland appears to be universal in the family and has been shown to produce repellent allomones in at least in some species. A highly peculiar prothoracic gland has been newly detected in males of *Glenochrysa principissa* (Navás, 1915), a species found in coastal forests of South-Eastern Africa. Unlike the prothoracic glands already known, this structure is unpaired and can be extruded dorsally. When the males are undisturbed, it can slowly grow to almost the size of the abdomen. At the slightest perturbation (vibration, noise, shadow) it can be retreated within a second. The procedure is shown in a video sequence, and the presumed function of this previously unknown structure in lacewings is discussed. The fact that only males show the Glenofinger suggests a sexual attraction function for the structure, but females were never seen to react to it.

LONG-TERM STUDIES ON POPULATIONS OF *EUROLEON NOSTRAS* (FABR.) IN SOUTHERN AUSTRIA

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For the last 30 years, a metapopulation of the myrmeleontid species *Euroleon nostras* (Fabr.) has been observed within a small area (1 square kilometer) in south-eastern Austria (south-western Styria). In Austria, the pit-building ant-lion *Euroleon nostras* (Fabr.) lives mainly in dry and sabulous places, e.g. under roofs and large trees or in steep waysides. Populations remain under the same trunk or house wall for up to 12 years. They are displaced by young trees casting shadows and move to areas free of vegetation. Oscillation of total frequency is low (from 100 to 300 pits). Activity rhythms are determined by the annual weather course. Humid soil is a handicap for pit building and is responsible for retardation of development. In years with dry winters and sufficient sunshine, ant-lions are active throughout the year. Total duration of imago development therefore takes between one and two years. Univoltine development reduces the loss of ant-lions in comparison with bivoltine development. Therefore, the number of ant-lions after warm and dry years exceeds the population size after cold and rainy years. In the last 10 years the increasing average temperature has caused a high density of individuals and an extension of the populations.

RECOGNITION OF CRYPTIC SPECIES IN THE *CHRYSOPERLA CARNEA* GROUP (NEUROPTERA: CHRYSOPIDAE) AND THE QUEST FOR THE “TRUE” *C. CARNEA*.

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Chrysoperla carnea (Stephens) was described from London, England in 1836. The specific epithet *carnea* was given because of its reddish brown, “meat-like” diapause coloration. In the last 167 years, the name has appeared in numerous systematic, biological, ecological and agricultural publications from around the Northern Hemisphere. *C. carnea* is the most studied and best-known species of Neuroptera.

On the other hand, more than 80 populations of “*C. carnea*” exhibiting minor anatomical differences have been described as distinct species. Additional avenues of taxonomic exploration fall into three categories: larval anatomy, diapause traits and courtship behavior. Tauber (1974) and Thierry, Cloupeau, Jarry and Canard (1992-present) found that larval head markings varied between species of *Chrysoperla*. Ecophysiological traits associated with the adult diapause of *Chrysoperla* species were examined in two series of studies by Tauber and Tauber (1977-present) and Thierry, Cloupeau and Jarry (1992-present). Henry (1979) reported the third important new approach after recording tremulation signals during the courtship of “*C. carnea*.” Since that time Henry and co-authors (Wells, Pupedis, Brooks, Duelli and Johnson) have published a series of papers (1980-present) on courtship songs in *Chrysoperla* species.

The distinct tremulation patterns in each species provide convincing evidence that these species are valid biologically, although forced hybrids in the laboratory usually produce viable offspring. The current state of knowledge on taxonomy, distribution, ecology and behaviour of the known and described species in the *C. carnea* complex is presented.

Currently, it seems that at least 15 partly cryptic song species exist: 7 in North America, 5 in Europe and at least 3 in Asia. The species are often widely distributed (2500-3000 km east-west), broadly sympatric, and syntopic, with as many as four species at a single site. Songs are nearly uniform over a species’ range, but adult and larval anatomy and coloration vary within and between populations. Only one of them is the

“real” *carnea* of Stephens, and it took a long study and considerable controversy to determine which one.

Cc1 was ruled out as the true *C. carnea* because the adults do not change color in diapause. Cc1 was determined to be *C. lucasina* (Lacroix) based on that species’ unique brown stripe on the pleural membrane of the second abdominal segment. Cc5 was found to have a song identical to that of *C. mediterranea* Hölzel, redefining the geographic range and degree of variation in that species. Cc4, the only other species of *Chrysoperla* known in England, then appeared to be the true *C. carnea*, until Cc2 was found in 2000. Adult Cc2 and Cc4 tend to differ in four anatomical traits, but none is definitive alone or in aggregate due to overlapping ranges of variation. The morphological characteristics of most paralectotypes were unambiguously recognizable as Cc4, but the female lectotype was a pale specimen and had characteristics of both Cc2 and Cc4. In the end we chose a pragmatic approach and allocated Cc4 to *carnea*, considering that Cc4 was the most important and common species in temperate Europe, the arboreal habits of Cc2 make it an unlikely candidate for Stephen’s original series of specimens and diapause coloration supports this decision. Cc2 turns tan to light brown while Cc4 turns a reddish brown. Cc2 could not confidently be associated with any described species, so we described it as *C. pallida* (Henry et al. 2002), due to its pale ventral abdominal setae. Cc3 could not be associated with a published name and is being described as another new species (Henry et al. 2003) due to its broad distribution and great activity during courtship.

**UNLOCKING THE MYSTERY OF SOME OF THOSE “SMALL SOFT-BODIED INSECTS”
(HEMIPTERA: STERNORHYNCHA: COCCOIDEA)**

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Identification of Neuroptera prey is often neglected. This presentation concentrates on those species of scale insects (Coccoidea) that have been recorded as Neuroptera prey. General information on scale biology, hosts, and associated Neuroptera is presented. Information on the various Coccoidea data base initiatives (e.g. ScaleNet, the Coccoidea Web Page, the National Scale Insect Photographic Collection) currently underway within the Systematic Entomology Laboratory will also be discussed.

THE NEUROPTERIDS OF TEXAS

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The Neuroptera of Texas are reviewed. Approximately 180 species are known to occur in the state. Since 1995, new records of ca. 50 species have been documented. Distributions of species occurring within the state are examined in the light of a range of biotic and abiotic factors.

THE ANTLIONS (MYRMELEONTIDAE) OF MADAGASCAR

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The species of Myrmeleontidae known from Madagascar are reviewed and preliminary distributions are discussed. There are currently about 50 known species. Many species appear to either be confined to the dry spiny forest on the western side of the island, or to wet forests of the eastern escarpment.

JURASSIC NEUROPTERAN FAUNAS FROM NORTHEASTERN CHINA

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The Jurassic is a pivotal period in the evolution of lacewings. Many of the modern higher taxa of lacewings originated in the Jurassic period. In 1928, Ping described the first Chinese fossil lacewing: *Mesohemerobius jeholensis*, an Early Cretaceous (Late Jurassic actually) brown lacewing collected from the upper volcanic series of Beipiao, Liaoning province. Here I report on fossiliferous rocks preserving nearly complete lacustrine communities from the Hebei-Inner Mongolia-Liaoning border that shed considerable light on this critical interval. The Jurassic lacewings of China are exquisitely preserved: details of hair fringes, setae, microtrochia on wing membranes, color markings, nygmata, trichosors are present in many specimens. The abundance of complete lacewings and the preservation of mini-features elevates these sites to one of the most significant neuropteran Lagerstätte in the world.

Some species of lacewings have previously been described from these localities, but the full extent and significance of its diversity have only recently been discovered. At least 67 species (28 published and 34 unpublished) of lacewings in 14 families (Osmylidae, Mantispidae, Berothidae, Hemerobiidae, Chrysopidae, Myrmeleontidae, Ascalaphidae, Kalligrammatidae, Grammolingiidae, Polystoechotidae, Rapismatidae, Psychopsidae, Aethegrammatidae, Nymphidae) have been recorded from this area. I report here the oldest definitive records for seven families (Berothidae, Mantispidae, Myrmeleontidae, Ascalaphidae, Kalligrammatidae, Rapismatidae, Psychopsidae).

Non-marine Jurassic deposits in NE China can be divided into seven formations. Two of these (Jiulongshan Formation and Yixian formation) have proved to be particularly productive, and most of the lacewings (including those reported here) have been recovered from a thin band of lacustrine sediments at the base of these two units.

The Jiulongshan Formation is 50-250m thick, and consists of yellowish green sandstones and shales with tuff. The leading form of the insects and conchostracan faunas indicates a Middle Jurassic age (Late Aalenian or Early Bajocian). All fossil lacewings of the Jiulongshan Formation were collected near Daohuguo village, Shantou township, Ningcheng county, Inner Mongolia. The depositional environment has been interpreted as a volcanic region with mountain streams and humid and warm-temperate climate.

The Yixian Formation that can be divided into 6 members and is about 500m in total thickness, and composed of layers of volcanic rocks sandwiched between sedimentary deposits. The lacewings dealt with in this Formation were collected from the second member of the formation, near Huangbanjigou village, Beipiao City, Liaoning Province, from which many insects have been reported. The preliminary investigation of the Yixian lacewing fauna indicates that it closely resembles the Solnhofen and Karatau insect faunas. Some genera are common among these sites (*Kalligramma*, *Aeschnidium* in Liaoning and Solnhofen; *Protonemestrius*, *Kalligramma*, *Karatavoblatta* in Liaoning and Karatau). This implies a Late Jurassic (not Early Cretaceous) age for the Yixian Formation.

In terms of taxonomic diversity and total number of specimens, the Chinese deposits are probably now the largest in the world for Jurassic lacewings.

A complete list of the lacewing groups represented in the two main Jurassic neuropteran faunas is given.

**“NEUROPTERA.COM” – A NEW WEBSITE FOR WORLD WIDE
NEUROPTEROLOGY**

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Neuroptera.com is a new web portal linking and supporting the study of insects in the Neuropterida group (Megaloptera, Raphidioptera & Neuroptera). The official web site of the IAN (International Association for Neuropterology), designed "to provide a forum for communication between persons interested in the study of Neuropterida," Neuroptera.com will be publicly launched during a short demonstration.

Some of the possibilities of this communication medium will be discussed.

**BIOGEOGRAPHY OF THE MYRMELEONTIDAE OF THE
WESTERN HEMISPHERE**

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Present information indicates there are about 262 species of antlions in the Western Hemisphere distributed in 41 genera. The distributional patterns of the taxa are analyzed and 25 zoogeographical provinces are recognized. Most of the antlion provinces correspond to predominant biomes in their area. Deserts are the biomes with most diversity. The most conspicuous barrier to antlion distribution in South America is the Atacama Desert which has no antlions. However, to the south is the Chilean province which is desert in the north, Acacia grassland in the central and Nothofagus forest in the south. Although not uniform in fauna, the tribe Lemolemini is the major group in this area with 12 species in 5 genera, all endemic except for *Elicura* which ranges to southern Brazil. To the north of the Atacama Desert is the Peruvian Coastal Desert with 90% endemism characterized by the endemic genus *Millerleon* Stange and *Eualeon* Stange, with many species of *Abatoleon* Banks plus endemics in the Nemoleontini. To the west of the Atacama Desert is the Subandean Desert which has low endemism with one endemic genus, *Rovira* Navás. This is because many species are shared with the dry Chaco Province which is contiguous. An isolated tropical desert occurs in northeastern Brazil (Caatinga Province) which is poorly collected but with at least one endemic genus. Also, the Colombian Province is poorly known but appears to have a distinctive fauna of about 6 species, 5 genera. The temperate deserts of North America are the Arizona-Sonora Province (50 species, 16 genera, 12% endemic), Mohave-Colorado Desert (41 species in 14 genera, 20% endemic), the Great Basin (21 species in 9 genera, only 9% endemic). The low endemism of the latter region is due to considerable sharing of species among contiguous regions. The Tropical Deciduous forest has unique faunas. There are 4 such areas, two in Mexico (Nayarit Province and Mexican Province with *Dejuna* Navas as characteristic) and two in South America (Venezuelan Province and Chaco Province with *Ameromyia* being characteristic). Grasslands appear to have less diversity, with two temperate provinces in North America (Central California; Prairie Province) and one tropical grassland in South America (Venezuelan Province). The Pampas are mostly grasslands and are temperate in Argentina and subtropical in Uruguay where most of the endemic species occur. Tropical evergreen forests probably have a richer fauna than is known, since species are difficult to find unless larvae are located. There appear to be four separated tropical evergreen forests as defined by endemic species in South America, the Atlantic along the east coast of Brazil, the immense Amazonian Province (*Brasileon* Stange is endemic), the very humid Yungas Province along the lower parts of the Andes and the Pacific Province which extends from Ecuador into eastern Mexico and barely into southeastern Texas. Temperate forests have the least diversity with three provinces in North America and may be characterized in part by *Dendroleon* which is the only shared genus with the Eastern hemisphere except for *Myrmeleon*. The Western Montane, the Eastern Montane and the Austroriparian of southeastern United States which has 16 species and 62% species endemism. The island provinces are very endemic with the complex Caribbean Province with about 5 transcaribbean

species and with endemic species mostly in the highlands of many islands. The Galapagos Islands has one endemic species and genus and a *Myrmeleon* which is widespread from the western United States to northern Chile. *Myrmeleon* is absent from Chile, and with only 1 species in Argentina and Peru.

THE CONIOPTERYGIDAE OF ASIA

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In 1972 the first modern monograph of the neuropterous family Coniopterygidae (dustywings) documented 231 recent species. This number increased to 423 by 1990, and to 550 now. Simultaneously, the number of Asian species increased from 66 to 151 by 1990, and to 224 (representing 17 genera) at present. This dustywing fauna now represents 41 % of the known world fauna. Species of the genera *Paraconis*, *Vartiana* and *Thecosemidalis* live only in Asia. (*Paraconis* in Indonesia, *Vartiana* in Western Asia, *Thecosemidalis* in Central Asia and China.) As regards the genera distributed more widely, *Heteroconis* and *Spiloconis* are known from Eastern and South-Eastern Asia, *Parasemidalis* only from Mongolia, while *Aleuropteryx* is known from Mongolia and from Western Asia. The genera *Coniocompsa* and *Cryptoscenea* are widely distributed in the eastern and southern parts of the examined territory. *Helicoconis*, *Hemisemidalis* and *Nimboa* are absent from South-Eastern Asia, while *Conwentzia* and *Semidalis* are absent from the continental part of this area. The subgenus *Xeroconiopteryx* is absent from a large part of South-Eastern Asia, while two newly recognized species groups of *Coniopteryx* s. str. live here exclusively. In the last several years the known ranges of the genera *Coniocompsa*, *Cryptoscenea* and *Heteroconis* have increased most significantly.

PHYLOGENETIC RELATIONSHIPS OF NEUROPTERIDA

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The Neuropterida, comprising the orders Megaloptera (dobsonflies, alderflies), Raphidioptera (snakeflies) and Neuroptera (=Planipennia) (lacewings), are considered one of the most basal groups of Holometabola. While numerically small, there is considerable morphological diversity across the *ca.* 21 families within the group. This diversity has made estimates of homology difficult to reconcile across families, and while the Neuropterida has undergone numerous taxonomic and morphological studies, little progress has been made towards developing an overarching phylogeny. Indeed, Withycombe's 1925 phylogeny of the Neuroptera has served as the basis for our understanding of the evolution of the Neuroptera until very recently. Recent morphological studies using cladistic methodology have proposed new hypotheses of neuropterid relationships. Unfortunately, these hypotheses are based on relatively few characters and have left many unanswered questions (or poorly supported conclusions) regarding the position of several key families and family-groups. A revised phylogeny of Neuropterida relationships is presented using a greatly expanded set of characters (morphological and molecular) in a total evidence analysis across a more extensive set of exemplars from all families.

**EFFECTS OF PHOTOPERIOD AND TEMPERATURE ON DIAPAUSE DEVELOPMENT OF
ADULT CHRYSOPERLA SINICA (TJEDER)**

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The green lacewing, *Chrysoperla sinica* (Tjeder), is one of the most important natural enemies of aphids, mites and lepidopteran eggs and young larvae in China. It survives the cold winter as a diapausing adult in nature and can be induced to diapause in the laboratory. The initial intensity of adult diapause and adult diapause development were studied at different photoperiods and temperatures in the laboratory. Results indicate that photoperiodic sensitivity persisted throughout the adult stage of *C. sinica*. Different diapause-inducing photoperiods significantly affected both the initial intensity of adult diapause and the average preoviposition periods. Under the temperature of 22°C, the initial intensity of adult diapause decreased as the daylight duration increased from 9 h to 13 h, and the average preoviposition periods gradually decreased from 107.5 to 15.6 d. We found that adults showed a clearly quantitative photoperiodic response. Temperature was not the key factor controlling the adult diapause, but it significantly affected adult diapause development. Under the photoperiod of 9L: 15D, average preoviposition periods gradually decreased from 153.4 d to 52.0 d as temperature increased from 15°C to 27°C. We also found that there was a distinct negative correlation between the rate of diapause development and temperature, the lower development threshold was 12.4°C, and the effective heat unit was 785.4 day-degrees. Diapause development in *C. sinica* proceeded gradually under a diapause-maintaining short-day photoperiod, and diapause could be terminated without exposure to low temperature.