Programme and Abstracts

3RD INTERNATIONAL CONGRESS OF PALAEOENTOMOLOGY

with

2ND INTERNATIONAL MEETING ON PALAEOARTHROPODOLOGY

and

2ND WORLD CONGRESS ON AMBER AND ITS INCLUSIONS

7th to 11th February 2005

Pretoria
SOUTH AFRICA

Fossils X 3

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inclusions found in Dominican and Mexican amber; because the proto-Antilles lay close to Central America during the Paleocene, similarities between the fauna from both amber deposits are to be expected.

What is the relationship between the species from the Mexican amber, extant species, and species found in Dominican amber? How stable has the ecosystem been since the formation of the amber, and what has happened to the fauna of the Mexican amber? These questions have been insufficiently investigated in the past. *Polyderis* (Erwin, 1971), *Procolobostema* (Amorim, 1998), *Trigona* and *Proplebeia* (Grimaldi, 2000), *Cephalotes* (Andrade & Urbani 1999), *Aphaenogaster* (Andrade 1995) and the plant of the fossil resin, *Hymenaea*, together with other new information, suggest a close relationship between Dominican and Mexican amber.

Palaeoentomological associations in Lower Cretaceous lacustrine deposits from Spain: Las Hoyas and El Montsec fossil sites

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Las Hoyas and El Montsec are composed of lithographic limestones, formed by lacustrine deposits from the Barremian. In both sites fossil remains are very abundant, especially insects (more than 30% of total fossil specimens).

From El Montsec, 900 insect specimens belonging to 13 orders, 35 families, 68 genera and approximately 79 species, have been recorded. From Las Hoyas, 1000 insect specimens from 14 orders, 35 families, 51 genera and at least 53 species, have been sampled.

Despite some similarities between the insect composition of these two fossil sites (high diversity, majority of aquatic forms, some species in common), there are remarkable differences, mostly concerning diversity and abundance of taxa, and proportions of different ecological behaviours.

The El Montsec insect association is characterized by high diversity of hymenopterans, blattids and terrestrial coleopterans, while Las Hoyas is characterized by high diversity of neuropterans, odonatans and aquatic coleopterans.

In terms of abundance, El Montsec's most represented groups are ephemeropterans and odonatans (mostly larval remains), while in Las Hoyas the majority of insect remains belong to adults of aquatic heteropterans and coleopterans. These differences yield a contrast between the most represented breathing mechanisms among the insects of these two sites: at El Montsec more than 80% are aquatic-breathing insects, while at Las Hoyas more than 90% are air-breathing.

Even if some of these differences may be caused by interferences in sample method, they have to be related also to differences in the original characteristics of both palaeolakes (geographical or environmental) and to distinct taphonomical processes.

Fossil Achilidae and their significance for the phylogeny and classification of the group (Hemiptera: Fulgoromorpha)

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The earliest Achilidae are known from the Lower Cretaceous (Aptian). Representatives of the family were found in Santana Formation deposits, Burmese amber and Lebanese amber. Few specimens are recorded from Palaeocene deposits of Europe. The richest record of the family is to be found in Eocene Baltic amber, and the Oligocene record is scarce.

Lower Cretaceous representatives are quite distinct from later and extant forms, and none of them can be placed in recently recognized tribes. The most important differences are in venational pattern, but also in other morphological characters. In Palaeocene deposits, Achilidae are reported as abundant, but without formal descriptions or more detailed data available. The richest record of this group is in Eocene Baltic amber. Representatives of some extant tribes have been identified, as well as forms with particular characters, representing separate units. The most numerous are taxa to be placed in Achilini, but with sets of characters calling for further study. It is interesting that extant Achilini are not highly diversified in numbers of taxa, so the fossils seem to be more diversified. The placement of highly derivative Ptychoptilini is still controversial and not resolved. The most numerous tribe in the recent fauna, Plectoderini, is seldom found in Eocene but more commonly in Oligocene/Miocene Dominican amber.

The Achilidae is a group of Fulgoroidea placed close to the basal stock of the superfamily. The most recently proposed scheme of relationships is based on the extant fauna only. Fossils have characters different from extant forms, and could strongly influence the proposed evolutionary scenario of the Achilidae.

Lower Cretaceous Fulgoromorpha (Hemiptera): their diversity and disparity

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The order Hemiptera Linnaeus, 1758, is divided into 6 suborders: Sternorrhyncha, Fulgoromorpha, Cicadomorpha, Coleorrhyncha, Heteroptera and Palaeorrhyncha. Fulgoromorpha comprises one of the most ancient lineages of the Hemiptera, with a fossil record extending from the Lower Permian. The earliest Fulgoromorpha were represented by Permian Coleoscytoidea and Permian-Triassic Surijokocixioidea; the Fulgoroidea are known since the Jurassic.

Lower Cretaceous Fulgoroidea are represented by Achilidae, Cixiidae and Lalacidae. Achilidae are not numerous, but differ from extant taxa in some morphological characters. This is true for fossils from the Santana Formation as well as for taxa found in Burmese amber. Cixiidae are also not common, but very similar in general characters to extant forms. Lalacidae is an extinct family, characteristically of quite distinct disparity (morphological diversity). Some new fossils of this group were recently found. The present state of knowledge suggests that this family was highly differentiated in the Lower Cretaceous.

Recently, new data about representatives of Fulgoromorpha from the Lower Cretaceous have become available. A planthopper with a very particular set of characters was found in Jordanian amber. It seems that this fossil represents a new family of Fulgoroidea. Other planthoppers were found among inclusions in Lebanese amber. These insects are characterised by nymphal characters retained in the adults, particularly venation, hind-leg chaetotaxy pattern, and structure of female external genitalia. These fossils, highly derivative, without doubt represent another extinct family of Fulgoroidea. Representatives of other families, previously not recorded were also identified among Lower Cretaceous fossils.

It seems that the Lower Cretaceous was an age of Fulgoroidea differentiation.

Rooting the insect phylogenetic tree: independent adaptations to terrestrial life

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Ideas about the origin and evolution of insects can be traced back to Aristotle. One of the greatest controversies in entomology concerns the root of the phylogenetic tree for winged insects. Most hypotheses concerning the origin of insects can be accommodated in one of two models, an aquatic model or a terrestrial model. Although the terrestrial model received most support in the last century, recent evidence strongly supports an