Russian Academy of Science
Siberian Branch
Trofimuk Institute of Petroleum Geology and Geophysics

Cretaceous Ecosystems and Their Responses to Paleoenvironmental Changes in Asia and the Western Pacific

Short papers for the Fourth International Symposium of International Geoscience Programme IGCP Project 608

August 15–20, 2016
Novosibirsk, Russia

Edited by O.S. Dzyuba, E.B. Pestchevitskaya and B.N. Shurygin

Novosibirsk
IPGG SB RAS
2016

УДК 551.763+551.863
ББК 26.323
М47

Cretaceous Ecosystems and Their Responses to Paleoenvironmental Changes in Asia and the Western Pacific: Short papers for the Fourth International Symposium of IGCP Project 608, Novosibirsk, August 15–20, 2016 / Dzyuba, O.S., Pestchevitskaya, E.B., and Shurygin, B.N., Eds. – Novosibirsk, IPGG SB RAS, 2016. – 134 p.

The book contains materials of the reports submitted to the Fourth International Symposium of International Geoscience Programme (IGCP) Project 608. Theoretical, methodical and practical questions of Cretaceous paleogeography, paleontological characteristics and stratigraphy of different regions of Asia and the Western Pacific are discussed. The significant attention is given to the Cretaceous climate and environmental changes, biogeography, biodiversity of terrestrial and marine ecosystems, and vertebrates of Asia and Western Pacific.

This book will be of interest to a wide range of geoscientists who study the Cretaceous Period.

The organization and carrying out of the Symposium are supported by the UNESCO-IUGS-IGCP Committee (IGCP Project 608) and the Russian Foundation for Basic Researches (RFBR Project 16-05-20508).

Cover illustration: *Psittacosaurus sibiricus*. Painting by Andrey A. Atuchin

ISBN 978-5-4262-0073-9

The neuropteran assemblage (Insecta) of the mid-Cretaceous Burmese amber confirms transitional character of its biota

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The biological inclusions of Burmese amber represent a sample of a tropical forest community in equatorial southeastern Asia at ~12°N paleolatitude (Grimaldi et al., 2002; Poinar et al., 2008). The volcaniclastic matrix of the amber is estimated as ~98.79±0.62 million years old, i.e., near the Albian–Cenomanian (Early–Late Cretaceous) boundary (Shi et al., 2012), but the amber is considered to be slightly older, Late Albian.

Fossils of the order Neuroptera have been found as old as the early Permian. Today, this order is comprised of 16 families. A preliminary analysis of published and unpublished materials reveals the presence of 18 neuropteran families in Burmese amber, 13 of which are extant and 5 extinct. To date, 25 neuropteran species have been described from Burmese amber, and more specimens in existing collections remain undescribed.

The vast majority of extant families are found in Burmese amber. Polystoechotidae is the only extant family known from the Cretaceous that is still not recorded from it. It is noteworthy, however, that only a few representatives of some Coniopterygidae, Nevrorthidae, Osmylidae and Dilaridae are similar to extant taxa, certainly or probably (Nevrorthidae, Osmylidae) belonging to their crown groups. All other extant families are represented in Burmese amber by unusual and/or distantly related supergeneric taxa (extinct subfamilies and tribes) that belong to their stem groups.

Burmese amber has the oldest fossil records for the extant families Sisyridae, Dilaridae and Nevrorthidae, but they are undoubtedly older, originating at least as far back as the Jurassic. All other extant families in Burmese amber except Nemopteridae are recorded from the Jurassic (its oldest known record is in the Late Aptian Crato Formation of Brazil). Unusual larvae similar to those of Crocinae (Nemopteridae) are rather common in Burmese amber, represented by at least two species (e.g., Xia et al., 2015, see figs. on pp. 99, 100).

The Nevrorthidae is recorded from Burmese amber (and the Mesozoic) for the first time, based on the photograph of Xia et al. (2015, right upper fig. on p. 101). Judging from this, this undescribed species does not strongly differ from Baltic amber and extant taxa.

The Coniopterygidae are relatively rare in Burmese amber. Two species assigned to two extinct genera have been described (Engel, 2004a), and there is at least one undescribed genus and species. One genus belongs to extant tribe Fontenelleini.

All known adult specimens of Burmese amber Osmylidae belong to the extant relict subfamily Gumillinae (Myskowiak et al., 2016; pers. obs.), whose single extant species is distributed in Brazil. Two possible larvae of Osmylidae would be very unusual for that group (Engel and Grimaldi, 2008, figs. 9–11; Xia et al., 2015, upper fig. on p. 95).

The Berothidae are the most abundant and diverse neuropterans in Burmese amber, with more than 100 known specimens and thirteen species and one unnamed larva described (Engel, 2004b; Engel and Grimaldi, 2008; Makarkin, 2015; Shi et al., 2015). The subfamily affinities of most of these are unclear (expect the Cretaceous subfamily Paraberothinae), but they probably do not belong to extant subfamilies.

One Burmese amber species assigned to the Mantispidae (Poinar and Buckley, 2011) is, however, not conclusively a member of this family; in any case, its subfamily affinity is entirely unclear.

Some larvae of Chrysopidae from Burmese amber are in general similar to those of some extant taxa, in particular in bearing short lateral tubercles (processes) (e.g., Xia et al., 2015, figs. on p. 96). They are extremely elongated on a few undescribed chrysopoid trash/debris-carrying larvae that are similar to *Hallucinochrysa* Pérez-de la Fuente from the Albian of Spain. No adult chrysopids are known from Burmese amber.

Stem group Hemerobiidae and Ithonidae are present in private collections, with at least one undescribed species each.

Larval Nymphidae are common in Burmese amber, implying that they were probably arboreal. They represent several species, all of which are generally similar to those of Nymphinae. Adults of the family are scarce; one species has been described based on an incomplete specimen (Engel and Grimaldi, 2008).

The larvae of a few species of Psychopsidae are quite common in Burmese amber, consistent with the arboreal habit of their modern species. At least three adults are known, one of which has been described (Engel and Grimaldi, 2008).

All known specimens of Burmese amber Sisyridae belong to the extinct subfamily Paradoxosisyrinae (Makarkin, 2016; pers. obs.). They are remarkable in possessing extremely long, siphonate mouthparts.

The Dilaridae are rather common, and very diverse in Burmese amber, with three species described to date (Huang et al., 2015; Lu et al., 2016). The majority of the species have long siphonate mouthparts, but some are similar to the extant *Dilar* Rambur and have the mandibute mouthparts that are usual for the family.

Of its five extinct families, Burmese amber has the youngest record for four, the Kalligrammatidae, Araripeneuridae, Babinskaiidae, and Mesochrysopidae; the Dipteromantispidae are known in younger (Turonian) New Jersey amber. Undescribed Kalligrammatidae and one species of Araripeneuridae were reported from Burmese amber by Huang et al. (2016), and Dipteromantispidae by Liu et al. (2016a). The Babinskaiidae are reported here for the first time based on photographs provided by Xia et al. (2015, fig. on p. 94). The Mesochrysopidae are represented in Burmese amber by one species similar to the Barremian genus *Allopterus* Zhang (Liu et al., 2016b).

The middle Cretaceous was a time of most intensive transformation of terrestrial ecosystems, shifting from those dominated by ancient gymnosperm groups to those dominated by angiosperms, Pinaceae and polypod ferns ('the mid-Cretaceous biocenotic crisis' of Zherikhin, 1978). In the Burmese amber forest, confident records of extinct gymnosperm groups (e.g., Bennettitales) are so far unknown (except for possible pollen of Bennettitales: Peñalver et al., 2015), but angiosperms were already diverse, and all known ferns are polypods (Schneider et al., 2016). At the same time, extant families dominate the neuropteran assemblage, and extinct families are rare.

The transitional character of the Burmese amber neuropteran assemblage is most clearly seen in the coexistence of three neuropteran groups with siphonate mouthparts, i.e., large Kalligrammatidae, moderately-sized Dilaridae, and small Sisyridae. Most of the Mesozoic kalligrammatid species had a long proboscis. They are assumed to have fed on pollination drops and pollen of extinct gymnosperms, mainly Bennettitales and Caytoniales (Labandeira et al., 2016), and became extinct along with most of their presumptive host plants in early Late Cretaceous. On the other hand, species of Dilaridae and Sisyridae with siphonate mouthparts probably fed on nectar and pollen of flowers, as their proboscis was short, suitable to the shallow calyx (often less than 1 mm) of known Burmese amber flowers. It may be assumed that these Burmese amber sisyrids and dilarids were among the first specialized groups of insect pollinators, which occupied the newly formed niche provided by flowers as a source of food. However, these groups may have also become extinct through an inability to compete as other more active and successful flower visitors appeared, mainly bees.

The study is supported by the grant from the Russian Foundation for Basic Researches no. 16-04-00053.

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