Supplementary file to:

Evolutionary implications of new Postopsyllidiidae from mid-Cretaceous amber from Myanmar and sternorrhynchan nymphal conservatism

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1. Geological setting

As the southward extension of the Tibetan orogeny, Myanmar lies south to the eastern Himalayan syntaxis, and is suggested to be subdivided into three major tectonic zones: the Indo-Burma range, the West Burma and Sibumasu Terranes[56-57]. The amber locality in this study lies in northern part of the West Burma Terrane[58], which was suggested to collide with the Sibumasu Terrane in early Cretaceous[59-60]. In mid to late Cretaceous, the West Burma Terrane was situated in the southern edge of the southeastern Asia, and the frontal area of the subduction of the Neo-Tethyan ocean to the Eurasian plate[56,57,59]. Humid tropical climate with volcanic activities thought to be dominated in this area, which can also be indicated from fossil records[45,46,61].

Burmese amber, the fossil resin referred as burmite[62,63], has become the most important source of amber inclusion in Cretaceous. There are more than 2000 species varying from invertebrates, vertebrates, protists, plants, and fungi have been reported from Burmese amber by now, indicating the enormous biodiversity and biotic importance of the Burmese amber biota[64]. The amber deposits are mainly outcrops as clastic sedimentary rocks, with thin limestone beds and abundant coaly and carbonaceous material. An estimated age of earliest Cenomanian (98.8 ± 0.6 Ma) for the amber deposit was proposed by[49] from radiometric U-Pb dating of zircons from the volcanoclastic matrix. This age is younger than the age based on fossil ammonite[65], pholadid bivalves inclusion and palynological study[61,66-68]. Xing & Qiu[69] also proposed an older zircon U-Pb dating age (ca. 110 Ma) from the newly discovered Hkamti mine south to the Hukawng basin, and indicated the importance of distinguishing amber sources from different mining regions. Detailed geological surveys are still needed to constrain various amber bearing layers in the Cretaceous strata in the northern Myanmar.

The Burma Terrane was part of a Trans-Tethyan island arc and stood at a near-equatorial southern latitude at about 100 Ma. The area of Kachin amber formation and deposition in the mid-Cretaceous times is considered to be an island or archipelago[70-74,] suggesting island endemism for the Kachin amber biota. A warm, humid, nearshore marine setting with high species diversity has been proposed for the amber locality[65,46]. The origin of the resin remains unclear, but Cupressaceae gymnosperms, very likely *Metasequoia* Hu & W.C. Cheng, 1948 or related taxa, were the trees exuding the resin at the time of burmite formation[75] as well as trees of the families Araucariaceae and Taxodiaceae[61,68,76]. The Cretaceous has often been described as a period of "warm and equable" climate[77], with the average global temperature near to 18°C. However, more recent refined work shows that climates during the 79 Myr of the Cretaceous were not quite so unvarying as originally thought[78-80]. Larger meridional heat transport by atmospheric and/or oceanic circulation, shaping the mid-Cretaceous "supergreenhouse" period[81] inferred the area of Kachin amber formation and deposition in the mid-Cretaceous times. Combination of topography and climatic challenges could be responsible for magnification of evolutionary rate of insects in this area, resulting in their adaptation and fast diversification.

2. Taxonomic treatments

To avoid a lengthy list of references dealing with scientific names and being in concordance with ICZN[50] Article 51.1 and Recommendations 22A.1 and 51A, and following Consortium of European Taxonomic Facilities (CETAF) best practices in electronic publishing in taxonomy[82] here we are listing all taxonomic names with their authors and references to the papers in which the taxa mentioned in the main text have been established. We are following the convention that taxon authority is treated as part of the name, not a citation, but relevant paper introducing the name of a taxon must be listed. The names of taxa are presented here in alphabetical order.

Aleuronympha bibulla Riek, 1974[83]
Aphalaridae Löw, 1879[84]
Archescytinidae Tillyard, 1926[85]
Cicadomorpha Evans, 1946[86]
Coleorrhyncha Myers et China, 1929[87]
Eogyropsylla Klimaszewski, 1993[88]
Fulgoromorpha Evans, 1946[86]
Hemiptera Linnaeus, 1758[89]
Knezouria unicus Jell, 1993[90]
Paraprotopsyllidiidae Hakim, Azar, Szwedo, Drohojowska et Huang, 2021[7]
Permopsyllidiidae Becker-Migdisova, 1985[18]
Permaleurodes rotundatus Becker-Migdisova, 1959[24]
Poljanka Klimaszewski, 1995[17]
Postopsyllidiidae Hakim, Azar et Huang, 2019[6]
Postopsyllidium Grimaldi, 2003[16]
Postopsyllidium burmaticum Hakim, Azar et Huang, 2019 in Hakim *et al*. 2019[6]
Postopsyllidium emilyae Grimaldi, 2003[16]

Postopsyllidium grimaldii Hakim, Azar et Huang, 2019 in Hakim *et al*. 2019[6]
Postopsyllidium rebeccae Grimaldi, 2003[16]
Protopsyllidiidae Carpenter, 1931[91]
Protopsyllidioidea Carpenter, 1931[91]
Sternorrhyncha Amyot et Audinet-Serville, 1843[92]
Talaya batraba Drohojowska, Szwedo et Azar, 2013[21]

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