J. Insect Biodiversity 77 (1): 005–008
https://www.mapress.com/jib

Editorial

ISSN 2538-1318 (print edition)
J. Insect Biodiversity
ISSN 2147-7612 (online edition)

https://doi.org/10.12976/jib/2025.77.1.3
http://zoobank.org/urn:lsid:zoobank.org:pub:C1D209A7-E100-4FDB-8275-9BE5E6A0C985

Preface: Early Cretaceous insects from East Asia: Palaeodiversity, palaeobiogeography and palaeoecology

CHEN-YANG CAI[1,2]
[1]*State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, China*
[2] *cycai@nigpas.ac.cn; https://orcid.org/0000-0002-9283-8323*

The Early Cretaceous, encompassing the Berriasian to Albian stages (approximately 143–100 Ma), was a time of critical geological and biological change. Global sea levels fluctuated, continents continued their reconfiguration following the breakup of Pangaea, and volcanic activity intensified in various regions, including East Asia. This period witnessed the origin and diversification of crown-group angiosperms, the radiation of feathered dinosaurs and early birds, and the emergence of complex terrestrial ecosystems. Within this context, fossil insects from eastern Asia provide invaluable windows into the evolution of arthropod-dominated communities. The special issue "*Fossil Insects from the Cretaceous of East Asia*" compiles nine research papers that collectively explore the palaeontological treasures from five key Lower Cretaceous formations: the Dabeigou, Yixian, and Jiufotang formations in northeastern China (the Jehol Biota; Pan *et al*. 2013; Zhou & Wang 2010; Xu *et al*. 2020; Zhou 2014; Zhou *et al*. 2003); the Shouchang Formation in eastern China; and the Jinju Formation in South Korea. These deposits, part of the broader Jehol Biota and its analogs, are renowned for their Konservat-Lagerstätten, exceptionally preserved fossil assemblages that include soft tissues, colour patterns, and behavioural traces. The Early Cretaceous Jehol Biota, spanning 135–120 Ma (Zhou *et al*. 2021), has been well known for producing thousands of exceptionally preserved fossils, including feathered dinosaurs, birds, mammals, pterosaurs, lizards, turtles, amphibians, fishes, as well as abundant insects and flowering plants (Zhou & Wang 2025).

The significance of these formations lies in their stratigraphic and palaeoenvironmental contexts. The Dabeigou Formation, dating to the Valanginian–Hauterivian (*ca*. 135–127 Ma, Zhou *et al*. 2021), consists of lacustrine sediments interspersed with volcanic rocks, representing the earliest phase of the Jehol Biota (Qin 2024). The overlying Yixian Formation (*ca*. 126–124 Ma; Yin *et al*. 2024; Zhong *et al*. 2021) is perhaps the most prolific, featuring laminated shales and volcanic ashes that preserved a diverse entomofauna of over 440 species across 16 orders. The Jiufotang Formation (*ca*. 124–120 Ma; He *et al*. 2004) extends this record into the Aptian, with fewer but significant insect finds, including those from lacustrine ecosystems. In eastern China, the Shouchang Formation belongs to the southeastern extension of Jehol-like biotas. The Jinju Formation in South Korea (Albian, *ca*. 113 Ma; Lee *et al*. 2010) mirrors these with abundant beetles, wasps, true flies and other insects, highlighting trans-regional patterns.

This preface focuses on two themes distilled from the nine research articles: 1) the palaeodiversity of insect lineages from the Early Cretaceous of East Asia, and 2) biogeographic distributions, particularly shared elements between the Yixian and Jinju formations, and palaeoecological inferences, such as carrion-feeding and the evolution of parental care in Early Cretaceous Silphinae. These themes not only synthesize the contributions but also situate them within broader evolutionary narratives.

Insect diversity in Early Cretaceous eastern Asia

The papers reveal a tapestry of insect diversity, documenting new taxa that underscore the adaptive versatility of Mesozoic arthropods. Several new hemipteran fossils from the Jehol Biota of northeastern China are described. Fu *et al*. (2025) describe new cicadomorphan specimens from the Lower Cretaceous Yixian Formation. They include *Stellularis longirostris* and *Sinocercopis* sp. (Procercopidae), a new species, *Cretohylicella lambkini*, tentatively assigned to Hylicellidae, and a new specimen tentatively assigned to Cicadelloidea. Boderau *et al*. (2025) describe *Lapicixius yixianensis* from the Yixian Formation, increasing Lalacidae diversity. Fabrikant and Davranoglou (2025) report *Ilerdocossus cf. fengningensis*, the first Palaeontinidae from the slightly younger Jiufotang Formation, extending the time range to Aptian, indicating that Palaeontinidae were widespread in Jurassic-Cretaceous from Asian and

Received: 29 Dec. 2025; Accepted by Yan-Zhe Fu: 29 Dec. 2025; published: 31 Dec. 2025

European sites, as in other insect lineage (Bashkuev & Jarzembowski 2023). These studies enrich the hemipteran diversity of the Jehol biota and provides new insights into the phytophagous insect assemblage of the Jehol Biota.

The study of the invertebrate fauna of the lower Albian Jinju Formation (South Korea) has experienced renewed interest over the past decade, with numerous new extinct species described each year (Rosse-Guillevic *et al.* 2023). Hymenoptera are notably common, with Symphyta especially well represented and often showing close affinities to taxa from contemporaneous deposits in China, Mongolia, and Russia, indicating a broadly homogeneous Early Cretaceous Asian entomofauna. This pattern is reinforced by two newly described sawflies: *Ghilarella jinjuensis*, a new Ghilarellinae species of the Asian genus *Ghilarella*, and *Meiaghilarella stanislawlemi*, the second species of a genus previously known only from Spain, which markedly expands its Albian distribution across Laurasia (Jouault *et al*. 2025). Lian (2025) introduces *Sinorthophlebia weichangensis* from the Dabeigou Formation, the first Orthophlebiidae sensu stricto from the Lower Cretaceous. Orthophlebiidae, dominant Jurassic mecopterans, are characterized by scorpion-tail-like male genitalia, with fossils spanning Middle Jurassic to Early Cretaceous. This discovery extends the range of Orthophlebiidae and informs wing venation evolution in Panorpoidea.

Beetles are diverse in the Early Cretaceous. Gui *et al*. (2025) describe *Apriacma acoronata*, a cupedid beetle from the Jiufotang Formation, the first Archostemata record from the Early Cretaceous of Hebei Province. Cupedidae, the richest Archostemata family, were abundant in Mesozoic lacustrine ecosystems. Previously, *Apriacma* were mainly from the Yixian Formation, so this extends their stratigraphic range. Lee *et al*. (2025) document *Cryptocoelus minimus*, an elaterid beetle from the Jinju Formation, the third Elateridae and youngest *Cryptocoelus*. The Jinju Fomation has produced coptoclavids, ommatids, hydrophilids and staphylinids. This adds to Korean Cretaceous beetle diversity. Cai (2025) describes a new genus and two new species, *Paracretosaja newtoni* and *Cretosaja thayerae*, from the Yixian Formation. These silphines, with stridulatory files and well-developed frontoclypeal sutures, can be placed in the extant Nicrophorini. Zhou and Huang (2025) describe two uncased caddisfly pupae from the Shouchang Formation in Zhejiang Province. While fossils from the Shouchang Formation are normally considered part of the broader Jehol biota in southeastern coastal China, this study of these caddisfly pupae fossils provide one case differences between the "Jehol biota" of southern China and the traditional Jehol biota of northeastern China.

Biogeographic and palaeoecological implications

A striking aspect is the biogeographic continuity across regions of eastern Asia during the Cretaceous. The Yixian and Jinju formations, separated by modern national boundaries but share genera like *Cretosaja* (Staphylinidae) and *Cryptocoelus* (Elateridae) as described in this issue, as well as other insect lineages described previously (Lee *et al*. 2023, 2024; Li *et al*. 2023), suggesting faunal exchange across eastern Laurasia. Jouault *et al*. (2025) extend *Ghilarella* and *Meiaghilarella* from China, Mongolia to Korea and even Spain, indicating trans-Laurasian dispersal. These patterns align with palaeogeographic models. During the Early Cretaceous, eastern Asia formed part of a contiguous landmass with minimal barriers, facilitating migration. Homogeneous entomofaunas support a unified Jehol-like biota extending southward, with the Shouchang Formation representing a southern variant. Overall, the presence of shared taxa across wide geographic distances challenges models of regional isolation and instead highlights dynamic biogeographic connectivity during a period of active tectonism on the North China Craton. These emerging distributional patterns underscore the importance of integrating fossil evidence with refined palaeogeographic models to better resolve Early Cretaceous dispersal corridors.

Palaeoecological reconstructions based on these fossils highlight insects as key components of Mesozoic ecosystems. In particular, multiple fossils document carrion-feeding beetles exhibiting derived traits linked to parental care behaviour. Modern carrion beetles (Staphylinidae: Silphinae) comprise two tribes: Silphini, which feed on large carcasses without providing parental care, and Nicrophorini, which bury small vertebrate carcasses and display biparental care. The fossils described by Cai (2025) belong to Nicrophorini and show definitive adaptations for this ecology. Interestingly, the carrion beetles from the Yixian and Jinju formations possess paired stridulatory files on abdominal tergite V and clubbed antennae, features also seen in extant *Ptomascopus* and associated with parent–offspring communication. These traits indicate that sub-social behaviour had already evolved by the Early Cretaceous. As in their modern relatives, these beetles likely contributed to nutrient recycling and broader ecosystem functioning roughly 125 million years ago.

In conclusion, the articles in this special issue demonstrate that Early Cretaceous eastern Asia harboured a diverse and complex insect fauna. These papers document a rich insect fauna that includes new species of hemipterans, sawflies, mecopterans, beetles, and caddisflies, many of which extend the known diversity or temporal ranges of key lineages such as Procercopidae, Lalacidae, Palaeontinidae, Orthophlebiidae, Cupedidae, Elateridae, and Silphinae (Staphylinidae). Several taxa show clear affinities across China, Korea, Mongolia, and even Europe, revealing strong

faunal continuity across eastern Laurasia. Shared genera between the Lower Cretaceous Yixian and Jinju formations highlight active biogeographic connectivity consistent with Early Cretaceous palaeogeographic models of a largely continuous East Asian landmass. These studies illuminate the diversity, distributions, and ecological significance of Early Cretaceous insects in eastern Asia.

References

Bashkuev A. S. & Jarzembowski E. A. 2023. The first British Cretaceous eomeropid scorpionfly (Mecoptera: Eomeropidae). *Palaeoentomology* 6(3): 255–259.
https://doi.org/10.11646/palaeoentomology.6.3.8

Boderau M., Nel A. & Fu Y. Z. 2025. A new *Lapicixius* planthopper species (Fulgoromorpha: Lalacidae) from the Lower Cretaceous Yixian Formation of northeastern China. *Journal of Insect Biodiversity* 77(1): 85–90.
https://doi.org/10.12976/jib/2025.77.1.12

Cai C. Y. 2025. Carrion beetles from the Lower Cretaceous Yixian Formation of northeastern China (Coleoptera: Staphylinidae: Silphinae). *Journal of Insect Biodiversity* 77(1): 50–59.
https://doi.org/10.12976/jib/2025.77.1.9

Fabrikant D. & Davranoglou L. R. 2025. First record of Palaeontinidae (Hemiptera: Cicadomorpha) from the Jiufotang Formation illustrates entomofaunal continuity of the Jehol Biota. *Journal of Insect Biodiversity* 77(1): 36–42.
https://doi.org/10.12976/jib/2025.77.1.7

Fu Y. Z., Boderau M., Fabrikant D. & Nel A. 2025. New data on Cicadomorpha from the Early Cretaceous Jehol Biota of China. *Journal of Insect Biodiversity* 77(1): 71–84.
https://doi.org/10.12976/jib/2025.77.1.11

Gui S. M., He L., Zhang Y. G., Yun J., Zhou J., Tian L., Luo X. C., Sun X. & Cai C. Y. 2025. *Apriacma acoronata* sp. nov., a new cupedid beetle (Coleoptera: Archostemata) from the Lower Cretaceous Jiufotang Formation of North China. *Journal of Insect Biodiversity* 77(1): 18–27.
https://doi.org/10.12976/jib/2025.77.1.5

He H. Y., Wang X. L., Zhou Z. H., Wang F., Boven A., Shi G. H. & Zhu R. X. 2004. Timing of the Jiufotang Formation (Jehol Group) in Liaoning, northeastern China, and its implications. *Geophysical Research Letters* 31(12): L12605.
https://doi.org/10.1029/2004GL019790

Jouault C., Kopylov D. S., Rasnitsyn A. P., Nam G. S., Kwon S. H. & Oyama N. 2025. Farther East: New Ghilarellinae wasps (Hymenoptera: Sepulcidae) from the Albian of the Republic of Korea extend the geographic range of the subfamily. *Journal of Insect Biodiversity* 77(1): 60–70.
https://doi.org/10.12976/jib/2025.77.1.10

Lee S. B., Cai C. Y. & Nam G. S. 2025. Cretaceous beetles of the Jinju Formation: *Cryptocoelus minimus* sp. nov. (Coleoptera: Elateridae) from the Early Cretaceous of South Korea. *Journal of Insect Biodiversity* 77(1): 28–35.
https://doi.org/10.12976/jib/2025.77.1.6

Lee S. B., Cai C. Y., Engel M. S., Nam G. S. & Park J. K. 2024. Cretaceous beetles of the Jinju Formation (Coleoptera: Hydrophiloidea). *Palaeoentomology* 7(3): 443–452.
https://doi.org/10.11646/palaeoentomology.7.3.14

Lee S. B., Nam G. S., Park J. K., Lee B. H. & Li Y. D. 2023. Cretaceous beetles of the Jinju Formation (Coleoptera): Archostemata. *Palaeoentomology* 6(5): 496–506.
https://doi.org/10.11646/palaeoentomology.6.5.8

Lee T. H., Park K. H., Chun J. H. & Yi K. W. 2010. SHRIMP U-Pb zircon ages of the Jinju Formation and Silla conglomerate, Gyeongsang Basin. *The Journal of the Petrological Society of Korea* 19(1): 89–101.

Li Y. D., Tihelka E., Newton A. F., Huang D. Y. & Cai C. Y. 2023. New species of *Notocupes* (Coleoptera: Archostemata) from the Middle Jurassic Daohugou beds, with discussion on the generic circumscription. *Palaeoentomology* 6(4): 398–415.
https://doi.org/10.11646/palaeoentomology.6.4.11

Lian X. N. 2025. The first genus and species of Orthophlebiidae sensu stricto from the Lower Cretaceous Dabeigou Formation of Northern China. *Journal of Insect Biodiversity* 77(1): 9–17.
https://doi.org/10.12976/jib/2025.77.1.4

Pan Y. H., Sha J. G., Zhou Z. H. & Fürsich F. T. 2013. The Jehol Biota: definition and distribution of exceptionally preserved relicts of a continental Early Cretaceous ecosystem. *Cretaceous Research* 44: 30–38.

https://doi.org/10.1016/j.cretres.2013.03.007

Qin Z. H. 2024. Development of fluvial-lacustrine systems in the rift basins fostered Jehol Biota origin: Palaeobiogeographic insights on Dabeigou-type ostracod fauna. *Geological Journal* 59(5): 1599–1619.
https://doi.org/10.1002/gj.4963

Rosse-Guillevic S., Kopylov D., Rasnitsyn A., Nam G. S., Kwon S. H. & Jouault C. 2023. Blurring the limits of anaxyelid subfamilies: a new genus and species (Hymenoptera: Anaxyelidae) from the Albian of the Republic of Korea. *Palaeoentomology* 6(4): 424–434.
https://doi.org/10.11646/palaeoentomology.6.4.13

Xu X., Zhou Z. H., Wang Y. & Wang M. 2020. Study on the Jehol Biota: recent advances and future prospects. *Science China Earth Sciences* 63(6): 757–773.
https://doi.org/10.1007/s11430-019-9509-3

Yin Y. Q., Shih C., Engel M. S. & Ren D. 2024. The first dermapterid earwigs from the Lower Cretaceous Yixian Formation of northeastern China (Dermaptera: Dermapteridae). *Palaeoentomology* 7(4): 513–528.
https://doi.org/10.11646/palaeoentomology.7.4.11

Zhong Y., Huyskens M. H., Yin Q. Z., Wang Y. Q., Ma Q. & Xu Y. G. 2021. High-precision geochronological constraints on the duration of 'Dinosaur Pompeii'and the Yixian Formation. *National Science Review* 8(6): nwab063.
https://doi.org/10.1093/nsr/nwab063

Zhou J. L. & Huang D. Y. 2025. Caddisfly pupae (Trichoptera) from the Early Cretaceous of eastern China. *Journal of Insect Biodiversity* 77(1): 43–49.
https://doi.org/10.12976/jib/2025.77.1.8

Zhou Z. H. & Wang M. 2025. Cretaceous fossil birds from China. *Geological Society, London, Special Publications* 544(1): 477–499.
https://doi.org/10.1144/SP544-2023-129

Zhou Z. H. & Wang Y. 2010. Vertebrate diversity of the Jehol Biota as compared with other Lagerstätten. *Science China Earth Sciences* 53(12): 1894–1907.
https://doi.org/10.1007/s11430-010-4094-9

Zhou Z. H. 2014. The Jehol Biota, an Early Cretaceous terrestrial Lagerstätte: new discoveries and implications. *National Science Review* 1(4): 543–559.
https://doi.org/10.1093/nsr/nwu055

Zhou Z. H., Barrett P. M. & Hilton J. 2003. An exceptionally preserved Lower Cretaceous ecosystem. *Nature* 421(6925): 807–814.
https://doi.org/10.1038/nature01420

Zhou Z. H., Meng Q. R., Zhu R. X. & Wang M. 2021. Spatiotemporal evolution of the Jehol Biota: Responses to the North China craton destruction in the Early Cretaceous. *Proceedings of the National Academy of Sciences* 118(34): e2107859118.
https://doi.org/10.1073/pnas.2107859118