Phylogenomic Analysis of Ultraconserved Elements Resolves the Evolutionary and Biogeographic History of Segmented Trapdoor Spiders

Xin Xu, Yong-Chao Su, Simon Y W Ho, Matjaž Kuntner, Hirotugu Ono, Fengxiang Liu, Chia-Chen Chang, Natapot Warrir, Varat Sivayapram, Khin Pyae Pyae Aung, Dinh Sac Pham, Y Norma-Rashid, Daqin Li

Systematic Biology, syaa098, https://doi.org/10.1093/sysbio/syaa098
Published: 08 February 2021 Article history

Abstract
The segmented trapdoor spiders (Liphistiidae) are the sole surviving family of the suborder Mesothelae, which forms the sister lineage to all other living spiders. Liphistiids have retained a number of plesiomorphic traits and their present-day distribution is limited to East and Southeast Asia. Studying this group has the potential to shed light on the deep evolutionary history of spiders, but the phylogeny and divergence times of the family have not been resolved with confidence. We performed phylogenomic and molecular dating analyses of 2765 ultraconserved element loci from 185 liphistiid taxa. Our analyses show that the crown group of Liphistiidae appeared in the mid-Cretaceous at 102 Ma (95% credibility interval 92–113 Ma), but it was not until the Neogene that much of the diversification within the family occurred in mainland Southeast and East Asia. This diversification was coincident with tectonic events such as the extension of the East Asian continental margin, as well as geological upheavals in Indochina induced by the collision between India and Asia. Our study highlights the important role of major tectonic events in shaping the evolutionary history, present-day diversity, and geographical distribution of mesothelae and liphistiid spiders.

[biogeography; concatenation; Liphistiidae; molecular dating; summary coalescent; UCEs.]