

The Evolution of Stinging Hairs and Other Characters in Nettle Family

Urticaceae Juss. is a large cosmopolitan family and taxonomically difficult group, partly because it encompasses a broad range of morphological diversity and many of the diagnostic characters (e.g. flower, achene, stipule, bract) require a microscope for accurate determination. Meanwhile, most *Urticaceae* species have stinging hairs which make them more difficult to collect and identify. As a result, the infra-familial classification of *Urticaceae* has been controversial for more than a century.

A research group led by Prof. LI Dezhu from the Kunming Institute of Botany, Chinese Academy of Sciences has been working on the systematics and biogeography of *Urticaceae* for many years. Based on field observations and materials in major British and Chinese herbaria, as well as the latest phylogenetic hypothesis and Ancestral State Reconstruction (ASR), the team chose 19 diagnostic morphological characters in *Urticaceae* to study their character evolution.

The results showed that 16 of the 19 characters exhibited

multiple state changes within the family, and morphological synapomorphies were identified for many clades. Recognition of the four major clades of the family as subfamily lineages can be supported by a small number carefully chosen defining traits for each. Some character evolution may be attributed to adaptive evolution in *Urticaceae* due to shifts in habitat or vegetation type. This study demonstrated the value of using phylogeny to trace character evolution, and determine the relative importance of morphological traits for classification.

Their findings have been published online by PLOS ONE.

Their research was supported by the National Natural Science Foundations of China, the Chinese Ministry of Science and Technology, and the Applied and Fundamental Research Foundation of Yunnan Province. The paper's first author, Dr. WU Zengyuan, was sponsored by the China Scholarship Council for one-year study at the Natural History Museum and the Royal Botanic Gardens Kew, in the United Kingdom.



Representatives of morphological diversity in *Urticaceae*. A-B herbaceous habit; C-D shrubby habit; E hemi-epiphyte habit. G fused interpetiolar stipule. H linear cystolith. I stinging hair. J filiform stigma. K linolate ornamentation of achene; L tuberculate ornamentation of achene; M ribbed ornamentation of achene. N inflexed filament. All photographed by Zeng-Yuan Wu except for J by Cheng Liu.

A. *Lecanthus peduncularis* (Wallich ex Royle) Weddell; B. *Elatostema monandrum* (D. Don) H. Hara; C. *Debregeasia orientalis* C. J. Chen; D. *Pipturus arborescens* (Link) C. B. Robinson; E. *Poikilospermum lanceolatum* (Trécul) Merrill; F. *Dendrocnide kotoensis* (Hayata ex Yamamoto) B. L. Shih & Yuen P. Yang; G. *Urtica thunbergiana* Siebold & Zuccarini; H. *Elatostema densistriolatum* W. T. Wang & Zeng Y. Wu; I. *Girardinia diversifolia* subsp. *Diversifolia*; J. *Pipturus arborescens* (Link) C. B. Robinson; K. *Elatostema longistipulum* Handel-Mazzetti; L. *Elatostema atroviride* W. T. Wang; M. *Elatostema imbricans* Dunn; N. *Pilea sinofasciata* C. J. Chen.