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Global carnivorous plant diversity - Insights and incentives

Jan Schlauer

Zwischenstr. 11, 60594 Frankfurt/Main, Germany

Although the taxonomy of some notoriously "difficult" species or aggregates is not settled yet, and although systematic ranks are not necessarily equivalent in different phylogenetic contexts, carnivorous plant diversity can be assessed systematically by an analysis of the global distribution (presence or absence in floristic regions and provinces) of species, sections, subgenera, genera, and families, which adjusts artifacts from differing taxonomic interpretations (Schlauer, 2000). These diversity data can be evaluated from various viewpoints.

Phytogeography: carnivorous plant taxa can be classified according to their distribution pattern. Only few taxa display a pantropical or cosmopolitan distribution, and even these can be referred to more localized groups if their closest relatives are compared. Endemisms frequently indicate geographic origins of superordinate taxa. Thus, primary and secondary centers of diversity can be identified.

Evolution/Systematics: phylogenetic processes can not only be deduced from the mutual similarity (in morphological or molecular characteristics) of extant taxa but also from geographic distribution patterns, because evolution takes place in both time and space. Vast disjunctions are the exception rather than the rule, and spatial analysis can be refined considerably by considering distribution patterns at progressively higher systematic ranks. With this method general trends and obvious exceptions in both geographic distribution and distinguishing characteristics can be identified. By comparison of geographic origins and present day geographic distribution, lineages can be reconstructed even in cases where time courses are unknown and fossils are missing or scant, like in many groups of carnivorous plants.

Conservation: both the alpha diversity (number of taxa present in a given phytogeographical unit; a quantitative measure of diversity) and the degree of endemism (number of endemic taxa vs. total number of taxa present; a qalitative measure of diversity) provide important clues to the reasonability of conservation efforts in a given phytogeographic unit. Arbitrary political boundaries (that are still the effective limits of legislation) are almost meaningless in a global conservation perspective.

General: centers of diversity also display a high degree of endemism, and this trend is frequently paralleled also at higher taxonomic ranks. The 6 primary regions (from a total of 35 regions distinguished here) of high species diversity and endemism are SW Australia (*Drosera*), Malesia (*Nepenthes*), Mexico (*Pinguicula*), the Guayana Highlands and the Brazilian Uplands (*Utricularia* and *Genlisea*), and N Australia (*Utricularia*). 7 Province endemics (from 152 provinces distinguished in total) at generic and familial rank are present in the Cape (*Roridula*, Roridulaceae), the Guayana Highlands (*Heliamphora*), N California and adjacent Oregon (*Darlingtonia*), the Atlantic Coastal Plain of SE N America (*Dionaea*), the SW Mediterranean (*Drosophyllum*, Drosophyllaceae), Upper Guinea (*Triphyophyllum*, Dioncophyllaceae), and SW Australia (*Cephalotus*, Cephalotaceae). *Sarracenia* is almost endemic in SE N America, only one species (*S. purpurea*) has reached a wide distribution further N, reflecting a rapid, postglacial range extension. *Byblis* (Byblidaceae) is almost restricted to Australia, only one species (*B. liniflora*) is known to extend to E Malesia. The remaining carnivorous plant genera, of which only *Aldrovanda* is monotypic (but remarkably represented by several different species in the fossil record), are more widespread. Their infrageneric diversity and distribution are discussed in more detail in the oral presentation.

Reference

Schlauer, J., 2000. Carniv. Pl. Newslett., **29**: 75-82.