The Evolution of Landscapes and Lineages in Pitcher Plants and Their Moths.

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Date of Award
1997

Document Type
Dissertation

Degree Name
Doctor of Philosophy (PhD)

Department
Entomology

First Advisor
Dorothy Prowell

Abstract
Pitcher plants and pitcher plant moths exhibit two prominent themes in the long evolutionary history between plants and insects. These themes are carnivory and herbivory. In pitcher plants, the leaf has been modified into an elegant pitfall trap enabling these plants to subsist at both the producer and consumer trophic levels. Of the numerous insect species intimately associated with pitcher plants, pitcher plant moths are the only inquilines which have evolved the capacity to disrupt both the carnivore and photosynthetic functions of the host plant. The carnivorous habit, considered an adaptation for nutrient deficient environments, has contributed to species radiations on three continents in the pitcher plant lineage and the allied insect trapping South African flybush lineage. In addition, pitcher plant moths display incipient host species specialization in larval feeding preference so that speciation in the moths may be a response to radiation in the host plants. The focus of this study has been the elucidation of patterns of speciation in both the pitcher plant and moth lineages. In chapters two and four, molecular phylogenetic reconstructions based on DNA sequence data are derived for the pitcher plant and moth lineages respectively. The sequence of origination of genera in the pitcher plant lineage was also approached by cladistic analysis of morphological data (chapter three). Trends in the evolution of host plant use by the moths are examined in parallel with species radiation in the host in chapter four. Insights regarding landscape evolution gleaned from the palynological literature were then combined with laboratory investigations of biological evolution at the molecular level in order to derive speciation models for both the plant and moth lineages (chapter five). Levels of divergence were commensurate with Holocene age estimates of landscape evolution reported in the palynological literature.

Recommended Citation

ISBN
9780591614619

Pages
88
Thus, carnivorous plants provide an opportunity to explore and quantify macro evolutionary patterns and processes across different angiospermic lineages (Albert et al., 1992). Pitcher plants exhibit high variation within species and population, thereby, rendering inadequacy of characters from the vegetative part for use in taxonomy and species delimitation (Jebb and Cheek, 1997; Cheek and Jebb, 2001). Locals of Khasi and Jaintia hills use fluid of the unopened pitcher in treating various skin diseases. Other treatment includes cholera, stomach troubles, urinary troubles and blockages (Kumar et al., 1980; Kharkongor and Joseph, 1981). The Evolution and Classification of Flowering Plants. New York, NY: New York Botanical Garden. Google Scholar. Pitcher plants are several different carnivorous plants which have modified leaves known as pitfall traps—a prey-trapping mechanism featuring a deep cavity filled with digestive liquid. The traps of what are considered to be "true" pitcher plants are formed by specialized leaves. The plants attract and drown their prey with nectar. The term "pitcher plant" generally refers to members of the Nepenthaceae and Sarraceniaceae families, but similar pitfall traps are employed by the monotypic Cephalotaceae