

Results and Taxonomic Implications of Cladograms

Analysis of our data set resulted in eight equally parsimonious trees, each with a consistency index of 29 and a retention index of 63. Different topologies resulted from conflicting placements of three arctiine species (*Apantesis* + *Spilosoma* clade, *Paracles*) and two phaegopterines (*Euchaetes*, *Halysidota*). In Fig. 94, a strict consensus tree is presented showing traditional subfamilial and tribal nomenclature (see *Overview of the Taxonomic History* section). The most obvious results of our analysis are the polyphyletic nature of the Ctenuchinae as traditionally recognized and the paraphyly of the Arctiinae. Our revised nomenclature based largely on monophyletic groupings is illustrated in Fig. 95.

Out-group Relationships

The Herminiinae (Noctuidae) arises as the sister-group of the Arctiidae in all eight trees. Kitching (1984) had found herminiines more closely related to arctiids and aganaines (as a polytomy) than to other noctuid subfamilies. More recently, molecular studies have shown a similar relationship between herminiines and arctiids (Weller et al. 1994). We found that larval mandibles of *Renia* are more similar to those of basal arctiids than to those of any of the other out-groups. The tympanal hood in herminiine adults is prespiracular in the species we studied. When we allowed for ambiguity in tympanal hood location within Herminiinae by coding as a '?', tree topology changes little; the clade Pantheidae + Herminiinae is placed as sister to Arctiidae (not shown). Lymantriidae never arise as sister to Arctiidae in our analyses.

Placement of Herminiinae as sister to Arctiidae is intriguing. Our results are consistent with recent molecular studies that suggest that the Noctuidae are paraphyletic (Weller et al. 1994, Mitchell et al. 1997). Obviously, additional taxon sampling is needed in a broader morphological study of Noctuidae to establish placement of problematic noctuid lineages.

Our trees do not support a close relationship between Nolidae and Arctiidae as suggested by Kitching and Rawlins (1998). Holloway (1988) had suggested that the nolid genus *Eligma* was more closely related to the Arctiidae because