

## Overview of the Taxonomic History

### Characters Indicating Monophyly

The family name is derived from Leach's (1815) Arctiidae. He characterized the group by "Palpi two. Antennae pectinated or ciliated. Tongue visible, but often short, and somewhat membranaceous. Wings trigonate, deflexed, undivided. Caterpillar with sixteen feet." According to Leach (1815), only *Arctia* and *Callimorpha* fit this description.

The seven characters have been described by various authors to distinguish the Arctiidae, but all are problematic:

(1) *Two Subventral (SV) Setae on the Larval Meso- and Metathorax.* Gardner (1941) described this feature in arctiids with simple-haired larvae, i.e., *Utetheisa* Hübner and *Argina* Hübner. The presence of this condition cannot be determined in larvae with verrucae. Kitching (1984) used this character to help characterize the Arctiidae.

(2) *Larva with Heteroideous Crochets.* Although most arctiids have heteroideous crochets, homoideous crochets are found in the Syntomini, Thyretinae, and some Lithosiinae. Outside of the Arctiidae, heteroideous crochets are found in some Euteliinae (Noctuidae) (Forbes 1960).

(3) *Pupa with Labial Palpus Not Visible Except as a Small Triangle.* An exception is *Halysidota* Hübner, where more of the palpus is visible (Mosher 1916).

(4) *Tymbal Organ on the Metepisternum.* This structure was first described by Guenée (1861), although he thought it was used for stridulation. Also referred to as a "striate band" (Forbes and Franclemont 1957), the tymbal is a series of grooves or corrugations located on the metepisternum (Watson 1975). The individual ridges are referred to as microtymbals (Fenton and Roeder 1974). The occurrence and development of microtymbals is not consistent within the Arctiidae. They may be present, degenerate, or absent within a single genus (Forbes 1960).

The tymbal organ produces ultrasonic sound (Blest et al. 1963) that deters predatory bats by interfering with the bat's perception of its own ultrasonic emissions (Fullard et al. 1979), by advertising the moth's distastefulness (Surlykke and Miller 1985, Dunning et al. 1992), or by startling the bat (Humphries