Possible Function of Spatulate Setae Surrounding the Papillae Anales of Sarota Butterflies (Riodinidae: Helicopini)

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POSSIBLE FUNCTION OF SPATULATE SETAE SURROUNDING THE PAPILLAE ANALES OF *SAROTA* BUTTERFLIES (RIODINIDAE: HELICOPINI)

Additional key words: Camouflage, Costa Rica, Ecuador, epiphylls, oviposition

Lepidopteran eggs can face high levels of mortality due to a variety of factors including environment, predators, and parasitoids (e.g., Hilker 1994; Obermaier et al. 2006; Sansone & Smith 2001). Ovipositing females are thought to show various traits that may help escape these pressures, including egg placement, shell toxins, and chemical crypsis (e.g., Obermaier *et al*. 2006; Scoble 1992).

During the course of fieldwork in Central and South America, we observed oviposition by several species of *Sarota* (Riodinidae) butterflies. As far as is known, larvae of this genus feed on tiny epiphyllic lichens, mosses, and liverworts growing on the surface of tropical leaves (DeVries 1988, 1997). We observed a distinctive behavior associated with egg laying in *S. subtessellata* (Costa Rica, n = 1), *S. gyas* (Ecuador, n = 2), and *S. chrysus* (Ecuador, n = 1). After landing on a leaf, females walked slowly across its surface, dragging the tips of their abdomens, sometimes for up to five minutes before depositing an egg (Fig. 1). They occasionally walked to the lower surface of the leaf, sometimes pausing for several minutes, but always returning to oviposit on the upper surface. Upon close examination of the eggs, we noted that each was entirely covered with scraps of epiphylls glued to the chorion. Subsequently, when observing the external morphology of female genitalia of these and other *Sarota* spp., we noted the obvious presence of strange, stiff, apically-recurved, spatulate setae surrounding the papillae anales. These have been described and illustrated by Hall (1998), though he indicated their function remains a mystery. Although these setae are considered a synapamorphy of the Helicopini, encompassing *Helicopis*, *Sarota*, *Anteros*, and *Ourocnemis* (Hall 1998), similar structures are present in some moths in the Geometridae and Tortricidae (Pellmyr 1980; Scoble 1992). For *Sarota*, we also clearly observed the spine-like setae described by Hall (1998), located between the spatulate setae and the ostium bursae.

In at least one tortricid moth these spatulate scales are considered to facilitate covering eggs with debris (Scoble 1992). In concert with these assertions, our observations strongly suggest that spatulate and spine-like scales and setae of *Sarota* are used to scrape and gather scraps of epiphylls, which are then glued to the egg. This behavior likely provides effective visual and chemical camouflage for eggs deposited on their epiphyll-covered oviposition substrates. Future observations and experiments on the covering of eggs with debris by lepidopterans may yield important clues as to the effectiveness of this behavior in deterring ants and/or egg parasitoids. Similarly, observations on the function of these structures in other genera within the Helicopini may shed light on their evolutionary origin.

Fig. 1. A female *Sarota subtessellata* drags her abdomen across an epiphyll-covered leaf, presumably using modified setae surrounding the papillae anales to scrape and gather epiphyll scraps for camouflaging her eggs. (Photo P. J. DeVries).

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