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THE SPHINGID FRENULUM AS A PREDATOR DEFENSE

Sphingidae, because of their large body size, must present a tempting target to vertebrate predators. It has been pointed out how tibial spurs can be used to discourage would-be predators (Allen, 1982, J. Lepid. Soc. 36:155–157), and in this note I suggest an additional defense mechanism.

As with Dr. Allen, my knowledge of this mechanism came through personal contact. In December 1977, I spent three weeks collecting insects in a remote area of western Panama (IRHE camp at Fortuna, Chiriqui Province). Here moths came to light in abundance, and the largest were several species of Sphingidae. Since I did not have killing jars large enough to hold big moths, my collecting method was to grasp these moths by the thorax below the wings and quickly inject several drops of alcohol with a hypodermic needle.

When I collected the largest sphingids (*Coctyius* and *Eumorpha*) in this manner, my fingers were pricked on several occasions by something extremely sharp. On close examination I found that this was caused by the moth's frenulum. Whenever I grasped the moth directly over the wing bases, my fingers would push the forewings up enough to expose the frenulum, and at this point it was perfectly positioned to stab into the tips of my thumb and forefinger. In the case of the *Coctyius* and the *Eumorpha* species at Fortuna, the frenulum was thick and stiff enough to pierce my skin.

The defensive use of the frenulum is, of course, secondary and probably unintentional. Nevertheless, my experience leads me to believe that, at least occasionally, sphinx moths may be able to escape predators when a well placed jab occurs. The frenulum defense would be most effective if a bat, toad or lizard were to seize the moth from the front or from above. Holding the moth by the front of the thorax would leave the predator out of range of the tibial spurs but the struggling moth might be able to stick the frenulum into the lining of the predator's mouth.

R. W. FLOWERS, *Entomology & Structural Pest Control, Florida A&M University, Tallahassee, Florida 32307.*

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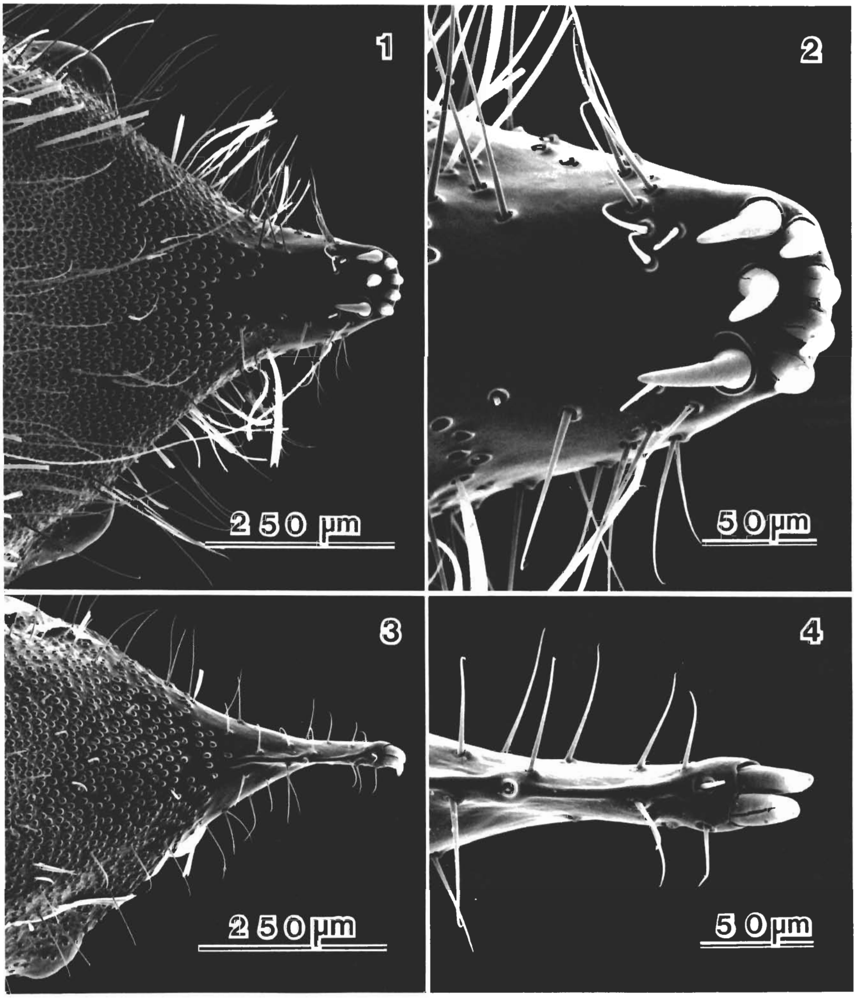
ANOTHER LOOK AT SNOUT BUTTERFLIES (LIBYTHEIDAE: *LIBYTHEANA*)

The two species of snout butterflies of the southwestern United States and Mexico, *Libytheana bachmanii* (Kirtland) and *L. carinenta* (Cramer) are commonly confused in spite of treatments by Field (1938, J. Kansas Entomol. Soc. 11:124–133), Michener (1943, Amer. Mus. Novitates No. 1232), Ehrlich and Ehrlich (1961, How to know the butterflies, Wm. C. Brown Co. Publ., Dubuque, Iowa, pp. 174–175), and Heitzman and Heitzman (1972, J. Res. Lepid. 10:284–286). They are easily separated in males by the shape of the eighth abdominal tergite and less easily (especially in females) by the shape and coloration of the wings. Since the adults have been adequately figured, this note serves to illustrate differences in the male eighth abdominal tergites.

Michener figured the eighth abdominal tergite of *L. bachmanii* in dorsal and lateral views but did not provide a figure of *L. carinenta* for comparison. As can be seen in Figs. 1–4 the species differ in the lateral width of the median apical process and number of setae, but more strikingly, in the number of terminal spines. *L. bachmanii* was found to have between 2 and 4 spines (n = 26, mode of 2), while *L. carinenta* has between 6



FIGS. 1–4. **1 & 2,** Dorsal view of eighth abdominal tergite of male *L. carinenta* (many scales have been removed and a few setae broken during preparation); **3 & 4,** similar view and preparation of *L. bachmanii* (the crease along the median apical process is an artifact from papering the specimen after capture).

and 9 spines (n = 9, mode of 7). The dorsally projecting spines can be seen by using a hand lens or microscope once the overhanging scales have been brushed aside, without having to do any dissecting.

During the morphological investigation of specimens at hand, genitalic dissections were done which revealed consistent differences between the species for both sexes. These will not be reported here owing to the limited number of specimens investigated and must await a comprehensive treatment. However, this look at the terminalia allowed the assignment of all but a few female specimens to one species in preference to the other.

Geographically, *L. carinenta* must be considered a rare find in the United States and is not commonly encountered until well below the Tropic of Cancer. *L. bachmanii* broadly overlaps its distribution along the western side of the Gulf of Mexico and is found as far south as the Rio Tehuantepec in Oaxaca, Mexico.

One can only guess as to the function of the terminal spines of males of these butterflies. Detailed observations of the mating behavior of snout butterflies might provide the answer. Comparative studies of other members of the genus and family of both morphology and behavior need to be done as part of a revision of this interesting group.

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TIMOTHY P. FRIEDLANDER, *Department of Entomology, Texas A&M University, College Station, Texas 77843-2475.*

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COMMUNAL ROOST FIDELITY IN *HELICONIUS CHARITONIA*: COMMENTS ON A PAPER BY DRS. D. A. WALLER AND L. E. GILBERT

In the recent paper by Waller and Gilbert appearing on the pages of this journal (J. Lepid. Soc. 36:178–184), the authors failed to include other substantial data sets on communal roosting in *Heliconius charitonia* and related aspects of this butterfly's population biology which have significant bearing on their conclusions and comments (Young & Thomason, 1975, J. Lepid. Soc. 29:243–255; Cook, Thomason & Young, 1976, J. Anim. Ecol. 45:851–863).

Waller and Gilbert imply that at least a portion of the daily instability in roost membership observed for two other studies of *H. charitonia* in Costa Rica (Young & Carolan, 1976, J. Kansas Entomol. Soc. 49:346–359; Young, 1978, Entomol. News 89:235–243) was due to disturbance of butterflies for marking, something they apparently avoided in their study. This is a serious accusation, one that is not merited as seen by the examination of Young and Thomason (op. cit.) and Cook et al. (op. cit.), two additional Costa Rican studies of the same organism not cited by Waller and Gilbert, and ones that report a significant amount of both population cohesiveness and fidelity to communal roosts.

There is no doubt that butterflies are disturbed to some extent by the handling effects associated with marking, a condition that I seriously doubt even Waller and Gilbert could have avoided entirely in their study. The same techniques associated with marking, however, were used in **all** of the Costa Rican studies cited above, and therefore, any handling effects causing roost disturbance would have been the same for all data sets. Yet Young and Thomason (op. cit.) reported for Roost A in that study, that of 69 butterflies marked, 36 were seen again at least once, and 23 seen from one to three times on subsequent days of observation. We concluded that roost fidelity can be high in *H. charitonia,* but that the spatial distribution of multiple roosts within the same home range area used by the butterflies on any one roost results in considerabe "exchanges" among roosts on a day-to-day basis. Admittedly, this level of roost fidelity is still somewhat lower than the findings of Waller and Gilbert in Mexico, yet higher than observed for other roosts in Costa Rica (Young & Carolan, op. cit.). Furthermore, the study of Cook et al. (op. cit.) on *H. charitonia* population dynamics spanned a period of 155 days and involved the marking of 586 butterflies and concluded that the movement of individual