Life History of the Double Tufted Wasp Moth, Didasys belae Grote (Erebidae: Arctiinae)

Authors: Wagner, David L., and Slotten, Jeff R.

Source: The Journal of the Lepidopterists' Society, 64(4) : 219-221

Published By: The Lepidopterists' Society

URL: https://doi.org/10.18473/lepi.v64i4.a9

Journal of the Lepidopterists' Society
64(4), 2010, 219–221

LIFE HISTORY OF THE DOUBLE TUFTED WASP MOTH, *DIDASYS BELAE* GROTE (EREBIDAE: ARCTIINAE)

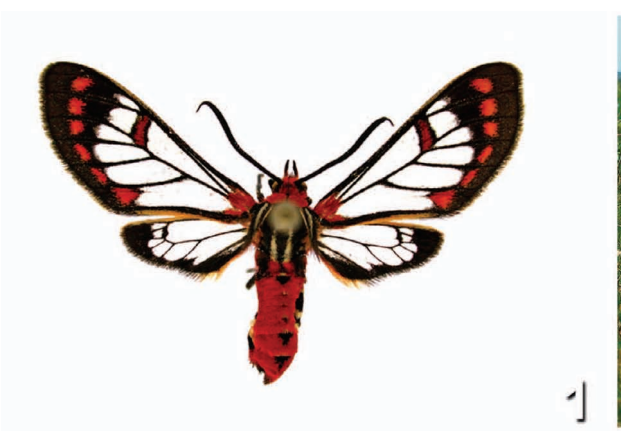
Additional key words: sedge, wasp mimicry, *Fuirena*

The Double Tufted Wasp Moth, *Didasys belae* Grote (Fig. 1), is one of eastern North America's most beautiful tiger moths. Adults are scarce in collections, in large measure because the species is extremely local, but also because *Didasys* is believed to be diurnal or crepuscular and closely tied to its hostplant, *Fuirena scirpoidea* Michaux (southern umbrella sedge). Despite the moth's broad distribution in Florida, the early stages of *Didasys* were unknown prior to this report (Heppner 2007).

Didasys belae occurs from Monroe County north to Escambia County, Florida. There is also a specimen from Delchamps, Mobile County, Alabama collected in August 1933 (Vernon A. Brou, Jr. personal communication). While adults are seen in a variety of habitats, the species is most frequently encountered in marshlands (Kimball 1965) and other wetlands. The adults occur nearly year-round in southern Florida. JS discovered the larva by scouring a marsh along Lake Mary Jane in Orange County (Fig. 2), where the adults can be found flying or resting on various plants including the host. Larvae were found resting upon and were reared to maturity on *Fuirena scirpoidea*. Below we describe the insect's early stages, emphasizing the last instar larva, and provide notes on the insect's life history.

Description of immature stages: *Egg.* 0.86–0.92 mm in diameter by 0.63–0.66 mm high (n=3), hemispherical, pale cream, without obvious surface sculpturing (Fig. 3). *First instar.* Pale red-orange, shiny, with long dark primary setae borne from raised pinacula; T2 thickened; D and SD setae on T2, T3, and A8 grouped onto a single pinaculum (Fig. 4). *Middle instars.* Ground color dark to nearly black with white dorsal and subspiracular stripes, both of which become obscure rearward of A8; both stripes may include ill-defined yellowish patches in intersegmental areas of the first eight abdominal segments; T1 with numerous forward-directed setae; T2 enlarged with hypertrophied setae that extend well forward of head; A7 and A8 elongate, nearly half again as long as preceding segments; long, caudally directed setae on A8–A10 extend beyond abdominal terminus (Fig. 5). *Last Instar.* Length: 27 mm. Body modestly compressed dorsoventrally with prominent black and creamy yellow striping (Figs. 6, 7). Thick middorsal, broad lateral, and narrow subventral black stripes separate thick yellowish dorsal and mostly white subspiracular stripes. Yellow dorsal stripe includes both the D1 and D2 verrucae; mostly white subspiracular stripe narrower than dorsal and infused with more yellow. T1 with reduced secondary setae and verrucae. Dorsal verrucae fused on T2 and T3. T2 with subdorsal verrucae bearing elongate, black, splayed hairpencils that project forward of head. A9 and A10 with elongated black setae that project behind body. No setae gathered into pencils. Venter dusky orange on segments bearing legs and prolegs; intervening segments more yellow. Most setae pale but longer ones darkened at mid-length and becoming nearly black by apices. Setae with conspicuous barbs; elongate black setae somewhat feathery in appearance. Head slightly broader than thorax with diagnostic pattern: dark patch above and to either side of frons; frons edged with white along upper half; red-brown snowflake spotting over each lobe (Fig. 8). Clypeus yellow. Base of antenna yellow, second segment black. *Pupa* (described from two exuviae). Length: circa 10 mm. Orange with conspicuous (aposematic?) black stripes or pattern elements on A5-A8, pupal appendages, and along wing veins (Fig.10). Spiracles borne from pimplelike warts on A2–A7. **Cocoon:** Length 17 mm (n=1), thin-walled (with pupa visible within), spun along axis of stem or blade (Fig. 9). Wall of cocoon with numerous, mostly white interwoven setae. Anterior end with numerous black setae extending forward of emergence exit. Pupa positioned ventral side up in cocoon.

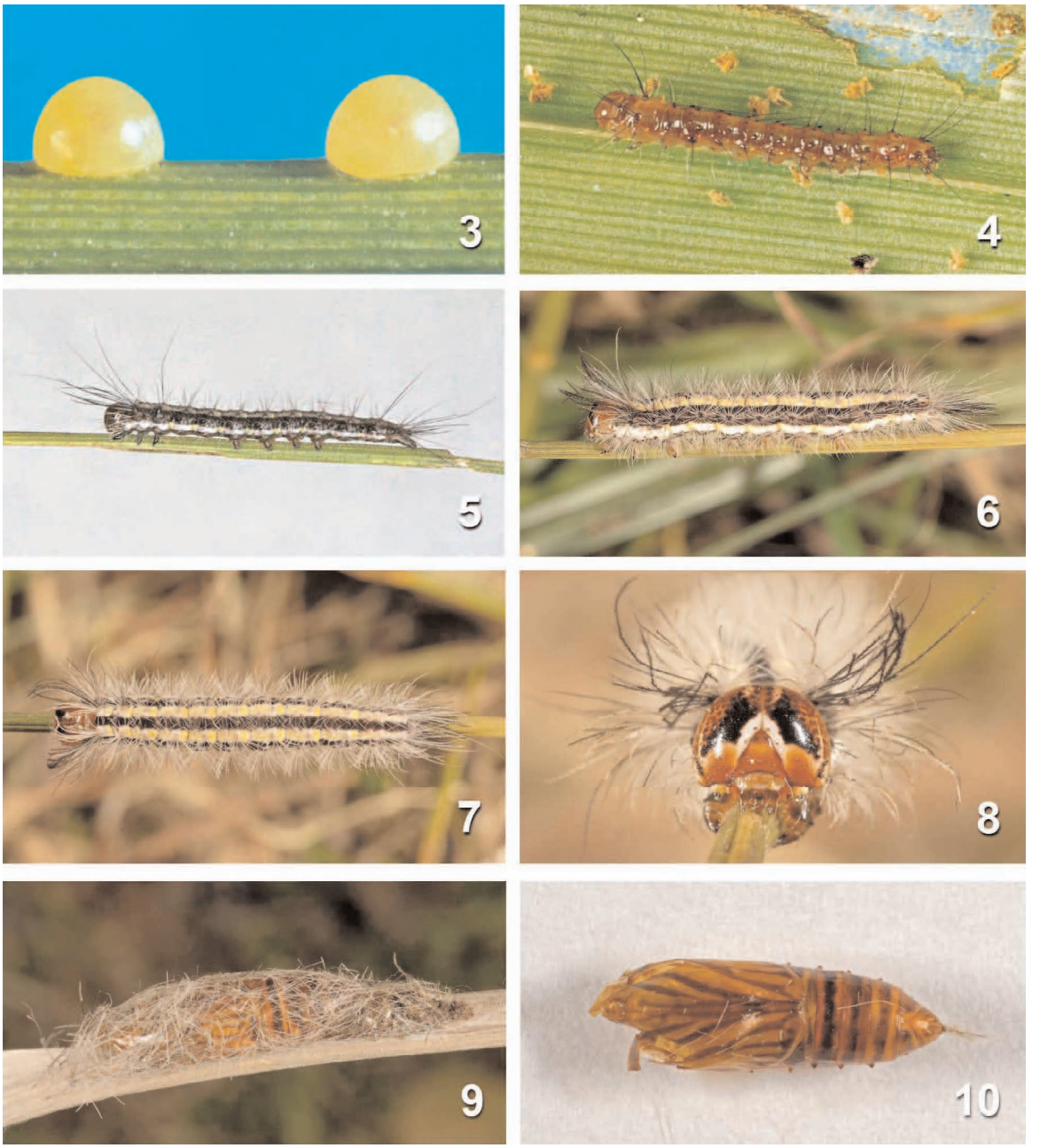
Life History Notes and Discussion. So far as known, southern umbrella sedge (*Fuirena scirpoidea*) is the only host. We observed a female oviposit on this sedge and we have found six larvae perched on this



FIGS. 1-2. *Didasys belae* (Orange County, FL). (1) Adult male. (2) Habitat.

plant in the wild. In 2007 we were able to rear a cohort of ex ova larvae through to maturity on southern umbrella sedge. Our efforts to switch the larvae to other sedges, grasses, or rushes were unsuccessful—larvae nibbled on *Carex stricta*, but straggled and died. Late instars perch conspicuously on stems, often about midway up a given stalk. In a crude fashion, the larvae resemble the white flower or seed heads of *Fuirena scirpoidea*. We are uncertain if larvae consume inflorescences, although one larva was found perched at the top of a stalk that showed signs of feeding. Larvae tend to occur in low numbers—we logged more than eight hours searching stems of southern umbrella sedge to recover six wild larvae.

Larvae displayed different defensive behaviors. When initially disturbed, caterpillars held their grip, but if further molested dropped to the ground and curled into a C or scurried off into vegetation, wedging their



FIGS. 3–10. *Didasys belae* early stages (all Orange County, FL). **(3)** Eggs. **(4)** First instar. **(5)** Middle instar. **(6)** Last instar, lateral. **(7)** Last instar, dorsal. **(8)** Last instar head, frontal. **(9)** Cocoon. **(10)** Pupal shell.

body into a hideaway, in a fashion common to other ground-dwelling arctiines (see Wagner 2009). Some displayed an animated alarm response after being touched, repeatedly snapping the anterior end of their body back towards the caudal end of the body—a response that would surely dislodge small invertebrate natural enemies (e.g., parasitic flies or ants).

Females flew low to the ground in a fashion similar to the flight of some wasps seen in the same habitat. Males tended to fly higher but were also noted to land head down on scattered sedge and plant stems. JS saw one mating pair in the late afternoon in June of 2008. Mindy Conner observed a single adult male feeding at dusk on the roots of a dog fennel plant (*Eupatorium capillifolium*) that had been pulled and hung up at the Archbold Biological Station to attract *Cosmosoma myradora* (Dyar) and other PA-collecting arctiids (Goss 1979; Conner & Jordan 2009; Mindy Conner personal communication).

We saved a single cocoon for study. While we endeavored to carefully extract the pupa from the wispy cocoon, a large portion of the cocoon wall tore free, attached to the cremaster, when the shell was removed for study. Upon microscopic examination, we noted that silk and setae from the cocoon wall had been tightly wound about the base of the cremaster, indicating that the pupa had spun repeatedly (in a single direction) while in the cocoon. The extent to which this represents an anomalous observation, or an adaptive behavior to ensure that the pupa is locked into the cocoon wall or that larval setae accompany the pupa should the pupa be ripped free of the cocoon, is worthy of further investigation.

The prominent orange and black patterning of the pupal shell and open nature of the cocoon suggest that the pupa enjoys some form of either physical or chemical protection. Such is common among ctenuchids (Subtribe Euchromiina) (see Wagner 2009). The fact that the cocoon is spun exposed on a stem, rather than secreted among dense vegetation or litter, also suggests that the pupa (and/or cocoon) is somehow protected. The basis of any chemical protection that the caterpillars and pupae might enjoy, presumably, would be based on self-manufactured defensive substances, as sedges are not known to produce defensive substances that could be sequestered by arctiine larvae.

ACKNOWLEDGEMENTS

DLW described the immature stages and prepared the text; JRS discovered the larva and hostplant, reared a cohort for *D. belae* larvae on umbrella sedge, and carried out the field work. Mindy and Bill Conner alerted JRS to the presence of *Didasys* at Archbold Biological Station, which catalyzed our efforts to discover the early stages of this seldom seen tiger moth. It was Don Stillwaugh that first discovered *Didasys belae* at the Lake Mary Jane site and who guided us to the marsh where the caterpillars were first found. Moria Robinson and one anonymous reviewer offered suggestions for improvements of an earlier draft. We thank Patti Anderson and Richard Weaver of the University of Florida Herbarium, who identified the plants mentioned in this note. Plates were assembled by Amy Fernald.

LITERATURE CITED

CONNER, W. E. & A. T. JORDAN. 2009. From armaments to ornaments: The relationship between chemical defense and sex in tiger moths, pp. 155–172. *In:* W. E. Conner (ed.), Tiger moths and woolly bears: behavior, ecology, and evolution of the Arctiidae. Oxford University Press.

GOSS, G. 1979. The interaction between moths and plants containing pyrrolizidine alkaloids. Environmental Entomology 8: 487–493.

HEPPNER, J. B. 2007. Lepidoptera of Florida. Part 1. Introduction and catalog. Florida Department of Agriculture and Consumer Science, Gainesville, Florida. 670 pp.

KIMBALL, C. P. 1965. The Lepidoptera of Florida. State of Florida Division of Agriculture, Gainesville, Florida. 363 pp.

WAGNER, D. L. 2009. The immature stages: structure, function, behavior, and ecology, pp. 31–53. *In:* W. E. Conner (ed.), Tiger moths and woolly bears: behavior, ecology, and evolution of the Arctiidae. Oxford University Press.

DAVID L. WAGNER, *Department of Ecology and Evolutionary Biology, University of Connecticut, Storrs, Connecticut 06269-3043, USA; email: david.wagner@uconn.edu, and* JEFF R. SLOTTEN, *Research Associate McGuire Center and FSCA, Gainesville. Florida, 5421 Northwest 69th Lane, Gainesville, FL 32653, USA; email: jslotten@bellsouth.net*

Received for publication 21 July 2009, revised and accepted 14 January 2010.