

HYLESIA ACUTA (SATURNIIDAE) AND ITS AGGREGATE LARVAL AND PUPAL POUCH

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ABSTRACT. Developmental stages of *Hylesia acuta* are described and illustrated, and two examples of aggregate larval and pupal pouches are reported. Larval development from eggs gathered in Chiapas, Mexico, required ca. 80 days at 25–32°C. Late instars constructed a tough, silk pouch where they remained by day, emerging to feed at night. The first instar is pale yellowish tan with a black head; the mature larva is dark saffron mottled with green. All instars possess urticating spines, but not adults. Larvae constructed individual cocoons before pupating together in the pouch, in which they remained for eight months before emergence. A wild pupal pouch found in Veracruz, Mexico, contained 46 pupae from which 42 adults emerged. A dissected female yielded 374 ova. The species appears to be univoltine, adults emerging during the tropical wet season.

Additional key words: Mexico, silkmths, immature stages.

The American genus *Hylesia* contains about 100 species of small silkmths (C. Lemaire pers. comm.), the biology of most unknown. The genus has achieved notoriety in parts of South America because of urticating abdominal hairs of some females (Lamy & Lemaire 1983) used to cover egg masses (Gardner 1982). Hairs in some species cause severe dermatitis in man (Pesce & Delgado 1971, and others).

In the Central American *Hylesia lineata* Druce, ova pass the dry season in a felt nest (Janzen 1984). Though *H. nigricans* Berg, whose immature stages and behavior were illustrated by Lampe (1986), also has overwintering eggs, at least several other species do not (Gardner 1982). Pupation is solitary in most known species.

Aggregate pupation above ground in a silk pouch is unusual among Saturniidae. A "communal cocoon" of an unidentified species of *Neodiphthera* (Saturniinae) from New Guinea contains about a dozen cocoons (R. S. Peigler pers. comm.). Stoll (1791) illustrated a "gregarious cocoon" ascribed to *Phalaena Bombyx bibiana*, which Bouvier (1925) believed was a *Hylesia* (Hemileucinae) species. Beutelspacher (1985) found *Hylesia frigida* Schaus gregarious larvae and pupae in loose silk pouches in Mexico. Cockerell, in Packard (1914), quoted Dyar as having a specimen of *Hylesia tapabex* Dyar "bred from a 'gregarious podlike cocoon.'" Bouvier (1924a, 1924b, 1925) described two aggregate pupal pouches of this species from Venezuela. A nest of *H. tapabex* is preserved in the Muséum national d'Histoire naturelle, Paris (C. Lemaire pers. comm.). The present study establishes that *Hylesia acuta* Druce, closely related to *H. tapabex*, also pupates in a shared pouch.

Hylesia acuta is a small moth (forewing length 2.5–3.1 cm) with marked sexual dimorphism, the female resembling many *Hylesia* species,

while the male is distinctive (Fig. 3). Described by Druce (1886) from "North Mexico," its known range extends along the eastern and western lowlands of central Mexico S into Guatemala and E into Yucatan and British Honduras (Schüssler 1934, Hoffmann 1942, C. Lemaire pers. comm.). Its biology and aggregate pupation behavior have not been previously reported.

REARED MATERIAL

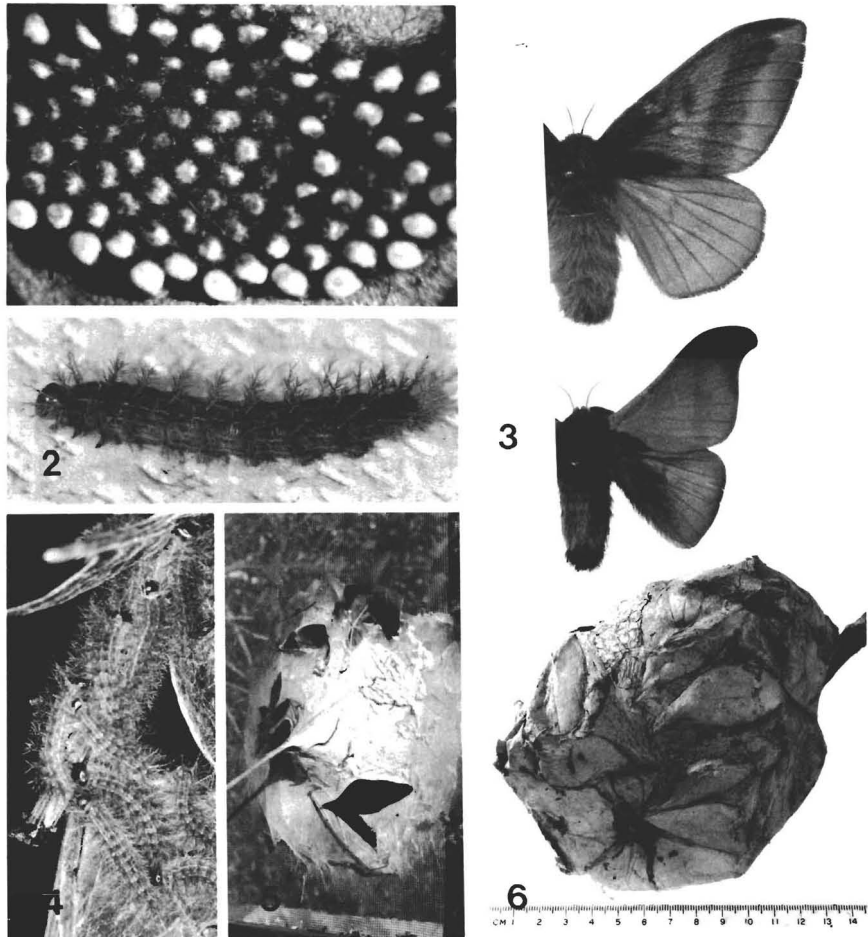
A wild female captured near Huixtla, Chiapas, Mexico, oviposited in a paper bag on 10 July 1983. The eggs were white, upright ovals placed in a single-layered dense cluster, partially hidden with brown abdominal hairs (Fig. 1). They numbered ca. 100. Refrigerated at ca. 50°C for 8 days to delay hatching, the eggs were then kept in a covered plastic petri dish under natural daylight at temperatures varying between 25 and 32°C. They hatched in 25 days, and were transferred to a tight styrene box 11 × 11 × 4 cm. During the first week they refused to feed on any plants offered, instead eating eggshells. Occasionally they wandered in single file, returning to the nest without feeding. Eventually most did accept Brazilian pepper tree, *Schinus terebinthifolius* Raddi (Anacardiaceae). Plants refused included plum, *Robinia pseudoacacia* L., *Rhus laurina* Nutt., *Quercus agrifolia* Née, and others. Larvae were then placed on small pepper tree branches in a container of water in a screened cage in a humid greenhouse at 25–32°C, with foliage replaced daily. From the earliest stages they spun a loose silken platform to which they returned after group wanderings or feeding.

Six weeks after hatching, the half-grown larvae spun a silk tent at the end of a branch. It appeared as a small, broad cone (ca. 7 cm diam.), of dense silk tipped on its side. A hole near the vertex allowed larval access; frass fell through a slit at the bottom.

When the tent was completed, the larvae became nocturnal, not appearing until at least 1 h after dark when they emerged and traveled in single file, stopping to feed in densely packed rows on mature (darker) leaves. Such tandem movement in early instars is typical among hemileucines as noted in *Hemileuca oliviae* Cockerell (Capinera 1980), *Hylesia lineata* (Janzen 1984), and other species (Lemaire 1971).

The earliest instars were pale yellowish tan, with typical hemileucine spination retained by all subsequent instars (Figs. 2, 4). This color deepened, and after the fourth instar was dark saffron indistinctly mottled with green. One dorsal and two subdorsal longitudinal stripes were straw colored. Mature larvae were plump (Fig. 2). Instar duration and number were not determined.

Half-grown larvae became diurnally active during two days as they spun a larger tent (ca. 15 cm diam.). Incorporating material from the



FIGS. 1-6. *Hylesia acuta*. 1, Eggs partially hidden by female abdominal hairs; 2, Mature larva; 3, Adult female (upper) and male (lower); 4, Early instars feeding on *Schinus terebinthifolius*; 5, Aggregate larval and pupal "nest" pouch of captive reared larvae; 6, Pouch containing wild pupae.

first tent, its walls resembled thin leather, shiny on the inside, and white on the outside (Fig. 5).

Larvae molted within the tent, and the cast-off skins fell through the bottom slit. Shortly before pupation larval mortality increased. Five survivors ceased feeding at 10 weeks, reaching a length of ca. 50 mm. A flashlight beamed through the tent at night revealed their silhouettes, which became progressively less visible as they worked during three weeks to fill it with firm, woolly white silk. Four small holes or "escape"

tunnels to the outside were made, two by larvae chewing through the cage's fiber glass screen where it adhered to the pouch.

By 1 December noticeable larval activity had ceased. Several weeks later, the pouch was opened, revealing a small mass of cocoons imbedded in silk. From hatching to pupation was ca. 80 days. The next year in the first week of August, five imagines emerged.

WILD MATERIAL

A cordiform pupal pouch of *H. acuta* with viable pupae was found near Papantla, Veracruz, Mexico, in a small, dead tree ca. 4 m above ground on 27 July 1986. Surrounded by a fresh growth of tall grasses, the tree appeared to have been *Bursera simaruba* (L.) Sarg. (Burseraeaceae). Imprints of fresh leaves were imbedded on the surface of the pouch. The pouch measured 13.0 × 9.5 × 5.0 cm, and contained 46 pupae. It had been constructed during the previous wet season, since a new wet season was just beginning.

This pouch was angular (Fig. 6), and possessed three widely spaced holes on its upper surface, providing access for feeding larvae and exits for emerging imagines.

Inside, pupae were arranged in double-walled, fusiform cocoons, tightly fit and adhering to one another. Cocoons were parallel in a band three layers thick which wrapped around the supporting branch within the pouch. Exit vents were oriented upward, and opened on several smooth-lined corridors through the dense silk wool to the outside openings of the pouch.

The pupae conform to Bouvier's (1924a, 1924b, 1925) description of *Hylesia tapabex*. He pointed out that while *H. tapabex*, known to pupate aggregately, does not possess a cremaster, solitary pupating *Hylesia* species do possess one. This is further evidenced in the solitary pupae of *H. nigricans* (Lampe 1986) and *H. lineata* (pers. obs.) which possess cremasters.

Emergence of imagines began in September. From 46 pupae, 19 males and 23 females emerged during three weeks. Average emergence was at 1715 h PDT (SD = 1554–1836 h PDT, n = 9). Notably, no parasitism was found. Numerous attempts were made to achieve matings between emerged siblings without success.

Observations of captive females suggest that *H. acuta* oviposits three or more clusters. Dissection of a newly emerged female yielded 374 ova. Females produced no stinging when their abdomens were rubbed on the author's skin.

Voucher imagines are in the San Diego Museum of Natural History, and collections of C. Lemaire, S. Stone, M. Smith, D. Herbin, and the author.

DISCUSSION

Hylesia are among the smallest American saturniids. Those that live under extreme seasonal conditions have evolved strategies to survive the harsh conditions of a dry season (Janzen 1984). In *H. acuta*, a protective nest has evolved in which pupae survive the dry season. The tough, leathery pouch filled with silk wool protects them against adverse weather and perhaps parasites. Its light silvery gray color reflects heat, and its resemblance to a wasp nest may discourage avian predation.

Published records (Beutelspacher 1978), correspondence (C. Lemaire pers. comm.), and labels of wild collected specimens indicate dates of capture predominately from June through August, with records as late as September, during the season of heaviest rains.

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LITERATURE CITED

- BEUTELSPACHER B., C. R. 1978. Familias Sphingidae y Saturniidae (Lepidoptera) de Las Minas, Veracruz, México. An. Inst. Biol. Univ. Nal. Autón. México 49 (Zoolo-gía)(1):219-230.
- 1985. Ciclo de la vida de *Hylesia frigida* Schaus (Lepidoptera: Saturniidae), una plaga forestal en Chiapas. An. Inst. Biol. Univ. Nal. Autón. Mexico 56 (Zoolo-gía)(2):465-476.
- BOUVIER, E.-L. 1924a. Sur la nidification et les métamorphoses de quelques Saturniens hémileucides. Compt. Rend. Acad. Sci. Paris (Biology) 179:858-861.
- 1924b. Contribution à l'étude des Saturniens. Ann. Sci. Nat. (Zool.), Série ioème 7:138-178.
- 1925. Contributions a la connaissance des métamorphoses chez les Saturniens hémileucides. Encyclop. Entomol. B. III(1):3-10.
- CAPINERA, J. L. 1980. A trail pheromone from silk produced by larvae of the range caterpillar *Hemileuca oliviae* (Lepidoptera: Saturniidae) and observations on aggregation behavior. J. Chem. Ecol. 6:655-664.
- DRUCE, H. 1886. Insecta. Lepidoptera—Heterocera. In Godman, F. and O. Salvin, Biologia Centrali-Americana, I. Taylor & Francis, London. 197 pp.
- GARDINER, B. O. C. 1982. A silkmoth rearer's handbook. 3rd ed. (Amateur Entomologist 12) 255 pp.
- HOFFMANN, C. C. 1942. Catálogo sistemático y zoogeográfico de los lepidópteros mexicanos. Parte 3. Sphingoidea y Saturnioidea. An. Inst. Biol. Mexico 13(1):213-256.
- JANZEN, D. H. 1984. Natural history of *Hylesia lineata* (Saturniidae: Hemileucinae) in Santa Rosa National Park, Costa Rica. J. Kansas Entomol. Soc. 57:490-514.
- LAMPE, R. E. J. 1986. Die Präimaginalstadien von *Hylesia nigricans* Berg 1875 (Lep.: Saturniidae). Entomol. Z. 96(1-2):7-12.
- LAMY, M. & C. LEMAIRE. 1983. Contribution à la systématique des *Hylesia*: étude au microscope électronique à balayage des fléchettes urticantes Lep.: Saturniidae. Bull. Soc. Entomol. France 88:175-192.
- LEMAIRE, C. 1971. Révision de genre *Automeris* Hübner et des genres voisins. Biogéographie, éthologie, morphologie, taxonomie. Mém. Mus. Nat. Hist. Natl. N. Sér., Sér. A, Zool. 68(92):1-232.

- PACKARD, A. S. 1914. Monograph of the bombycine moths of North America, pt. 3. Mem. Natl. Acad. Sci. 12: 1-276, 503-516.
- PESCE, H. & A. DELGADO. 1971. Poisoning from adult moths and caterpillars, pp. 119-156. In Bucherl, W. and E. B. Buckley (eds.), *Venomous animals and their venoms*. Vol. III. *Venomous invertebrates*. Academic Press, New York.
- SCHÜSSLER, H. 1934. Saturniidae, in E. Strand, *Lepidopterorum Catalogus*, pars 58, pp. 325-484. W. Junk, Berlin.
- STOLL, C. [1787-1790] 1791. A Anhangsel van het werk de uitlandsche Kapellen voorkomende in de drie Waereld-Deelen Asia, Africa en America, door den Heere Pieter Cramer . . . (1791). S. J. Baalde, Amsterdam, B. Wild, Utrecht. Pp. 1-184, pls. 1-92.

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