

LIFE HISTORY OF *ANISOTA DISSIMILIS* (LEPIDOPTERA: SATURNIIDAE: CERATOCAMPINAE)

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ABSTRACT.— The immature stages of *Anisota dissimilis* from Mexico are described and figured in color. The head of the mature larva is orange-brown, and the body is black with a broad red lateral stripe on each side, with patches of white granular mottling on each segment. Larvae were reared to maturity on four oak species. Reproductive activity of the moths commences in midday, and copulation continues until after dusk.

RESUMEN.— Se describen e ilustran a colores los estadios inmaduros de *Anisota dissimilis* de México. La larva madura tiene la cabeza de color café anaranjado, el cuerpo negro con una raya gruesa de color rojo lateralmente, con manchas granuladas de blanco en cada segmento. Las larvas fueron criadas hasta madurez empleando cuatro especies de *Quercus*. La actividad reproductiva de las mariposas comienza por el mediodía con acoplamiento continuo hasta después del anochecer.

KEYWORDS: egg, Fagaceae, Guerrero, immatures, larva, Mexico, oakworms, phylogeny, pupa, rearing.

Anisota dissimilis (Boisduval) (Figs. 1-2) is a large oakworm moth recorded widely in Mexico from Durango and Hidalgo, south through Chiapas and into Guatemala (Riotte and Peigler, 1981; Lemaire, 1988). Typical habitat (Fig. 3) is montane, with oaks and pines dominant. Except for a brief description of the mature larva by Schaus (1884), the immature stages of *A. dissimilis* have not been described. Although the description by Schaus does not agree with our material in certain characters, we believe that his larval description was indeed of this species. His material was from Jalapa (=Xalapa), Veracruz. Our material from Guerrero represents a new state record for the species in Mexico.

FIELD AND REARING OBSERVATIONS

Eggs were obtained by the senior author from a female taken at light on 1 June 1992, 8 km east of Chichihualco, Guerrero, Mexico, at 1600 m, by him, Stacie A. Smoot, and Warren Rook. This female was confined overnight in a paper bag with an oak branch, on which she deposited 28 eggs in a single oval mass on the underside of a mature leaf (Fig. 4). Eclosion of ova began on and continued throughout day 12. Larvae remained on the egg mass for several hours, eating chorions. They moved in small groups to a young yet mature oak leaf, grouping tightly, feeding in turns on the edge of the leaf blade (Fig. 5).

Larvae were reared on foliage of several oaks. These were, following the nomenclature of Miller and Lamb (1985): California live oak (*Quercus agrifolia* Née), Holm oak (*Q. ilex* L.) (introduced from Europe), California black oak (*Q. kelloggii* Newberry), and canyon live oak (*Q. chrysolepis* Liebmann). Claude Lemaire (pers. comm.) also reared this species in France in 1992 on downy oak (*Q. pubescens* Willd.) from eggs he received from Daniel Herbin in Veracruz.

Typical for *Anisota*, larvae were gregarious in the early stages, less so in the last two. Larvae fed vigorously during both day and night. In all stages they preferred newly maturing leaves near tips of twigs, but freely accepted hardened leaves several months old. When disturbed, larvae thrashed their heads back and forth forcibly, sometimes tapping on nearby branches or sides of the container, behavior which is normal typical of other species in the genus (Riotte and Peigler, 1981).

Instar duration was 6-7 days each for the first four instars, and 7-14 days for the fifth (last) instar. Pupation was at the bottom of plastic pots under damp soil about 6cm deep. Adults emerged during midmorning 6-8 weeks after pupation. In our only breeding attempt, a 1-day old female was caged with a newly emerged male; copulation began before midday, after the male had expanded and hardened its wings. The pair remained in copula, with the male hanging head down, throughout the day until shortly after dark (ca. 1830h PST). Female deposited ca. 200 eggs the first night. The senior author has seen about 6 females at light, but never any males. Riotte and Peigler (1981) noted that females were almost twice as common as males in museum collections. These observations indicate a probability that the males are diurnal and therefore infrequently collected at light.

Voucher material from the rearing is in the Los Angeles County Museum of Natural History, San Diego Museum of Natural History, and Denver Museum of Natural History.

DESCRIPTION OF IMMATURE STAGES

The terminology for larval morphology used below is based on that of Stehr (1987).

Egg. 1.2mm X 1.8mm X 2.0mm. Translucent dull yellow, developing a red patch centered over much of the upper surface several days after deposition.



Fig. 1-11. *Anisota dissimilis*. 1. Male. 2. Female. 3. Typical habitat 14 km NE of Las Margaritas, Comitán, Chiapas. 4. Eggs. 5. 1st-instar larvae. 6. 2nd-instar larva. 7. 3rd-instar larvae. 8. 4th-instar larva. 9. Pupa, lateral view. 10. 5th-instar (mature) larva. 11. Male moth in living repose. Photos by K. L. Wolfe.

First instar. (Fig. 5). Head: 1mm wide; glossy but finely textured, rugose on periadfrontal area; black changing to reddish brown with short, curved primary setae. Body: 9mm long; thoracic legs black; integument yellow when newly hatched, changing to dark olive, lighter ventrally; narrow dorsal line obscurely black, faint subdorsal lines light greenish; most scoli simple chalazae each with a single seta; two setae on each of the prominent (1mm long), but minutely bifid dorsal scoli of mesothorax (T2), flat conical dorsal scoli of metathorax (T3), subdorsal scoli of T1-T3, lateral scoli of most abdominal segments, and subventral scoli of T1; all scoli and chalazae black, setae lighter; dorsal scoli of T2 with minute, dark setae; dorsal chalazae on 8th abdominal segment (A8) widely separated.

Second instar. (Fig. 6). Head: 1.8mm wide; color and texture as in 1st instar, but setae, including numerous secondary setae, lighter and more transparent. Body: 14mm long; legs black; integument glossy, greenish, lighter and yellower ventrally; faint dorsal stripe dark gray; scoli and chalazae as in 1st instar, but more thornlike, setae shorter; integument densely speckled with dark pinacula, each with a minute colorless seta; base of prolegs black.

Third instar. (Fig. 7). Head: 2.6mm wide, orange; texture and setae as in 2nd instar. Body: 23mm long; legs black; integument glossy, dark olive above, abruptly orange subventrally; lateral line broadly marbled chestnut with sparse yellow streaks; black dorsal stripe indistinct; spiracles black; prolegs as in 2nd instar; dorsal plate on T1, paranal lobes and anal plate orange; chalazae all replaced by black, slender conical scoli with short median setae and single apical seta; dorsal scoli of T3 distinctly bifid.

Fourth instar (Fig. 8). Head: 3.9mm wide; color, texture and setae as in 3rd instar. Body: 37mm long; legs chestnut, black apically; integument glossy black dorsally, abruptly orange subventrally, with chestnut, yellow, and black marbling; subventral black triangular blotches between some segments; first and last segments orange; scoli long black thorns curved slightly posteriorly; prominent white chalaza posterior to and between dorsal and subdorsal scoli on segments A1--A8; prolegs distally and plantae black.

Fifth instar. (Fig. 10). Head: 5.6mm wide, orange; setae and texture as in 4th instar, with reduced but more defined shading. Body: 55-65mm long, 10mm wide; legs chestnut, black apically; integument black dorsally and subventrally, abruptly orange ventrally; dorsal scoli on T2 7mm long; orange on T1, anterior half of T2, all of A9 and A10; a broad rectangular mottled patch of white, oval chalazae between dorsal scoli and below spiracle strikingly surrounding subdorsal scoli on each segment; broad subspiracular band of reddish chestnut marbled with yellow, bordered by black triangular patches, beaded with white circular chalazae; ventrum and anal shield yellow; scoli, setae, and prolegs as in 4th instar.

Pupa (Fig. 9). 30mm long, 9.5mm wide; color dark reddish brown; densely covered with small, variably-sized spines; cremaster 2.6mm long; pair of rugose, prominent gibber on T3 (gibba metanoti).

COMPARISON TO ALLIED SPECIES

Anisota dissimilis is the largest species in the genus and is probably the sister-species to *A. punctata* Riotte & Peigler of the Sierra Madre Oriental. Specimens of the previously unknown male of *A. punctata* were recently found in the Allyn Museum of Entomology (Sarasota, Florida) by Claude Lemaire (pers. comm.). The larva of *A. assimilis* (Druce), figured in color by Riotte and Peigler (1981: pl. 1, fig. 7), appears very similar to that of *A. dissimilis*. It is thus reasonable to predict that the larva of *A. punctata* will, as in those two species, be black with a lateral orange stripe and numerous white chalazae. These relationships

are in agreement with the conclusions of Lemaire (1988: 298) whose intrageneric classification of *Anisota* relied mainly on genitalia of the adult moths.

A mature larva of *A. dissimilis* from Guerrero in alcohol was compared to one of *A. assimilis* from Creel, Chihuahua, collected by Roy O. Kendall. In *A. dissimilis* the white chalazae are more numerous and closely clustered, and the dorsal, subdorsal, and lateral scoli are all black, sometimes brown apically. In *A. assimilis* the white chalazae are fewer and sparser, and all subdorsal and lateral scoli are mainly white with black spines apically. The dorsal scoli are brown except those on A1-A3 which are white with black tips. The anal shield of *A. dissimilis* bears no white chalazae (solidly yellow), whereas that of *A. assimilis* has several white chalazae (5 on one side, 6 on the other side, in the one specimen examined). Larvae of *A. oslari* W. Rothschild from Arizona are solidly brick red and significantly differs from these Mexican species structurally, despite the superficial resemblance of the adults of *A. oslari* and *A. assimilis*.

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