

THE LIFE HISTORY AND IMMATURE STAGES OF
AGAPEMA HOMOGENA (SATURNIIDAE)

PAUL M. TUSKES

7900 Cambridge #141G, Houston, Texas 77054

AND

MICHAEL J. SMITH

3135 S. Magda, Tucson, Arizona 85730

ABSTRACT. *Agapema homogena* is a nocturnal, montane species of saturniid. The larvae of *homogena* feed on *Rhammus californica* in Arizona, and have four instars. The immature stages are black and yellow with numerous white setae. Adults fly from late May to late July in the United States but have been taken as late as mid-September in Mexico. The ova are deposited in clusters, and upon hatching the larvae feed gregariously. In Arizona pupation occurs from September to November.

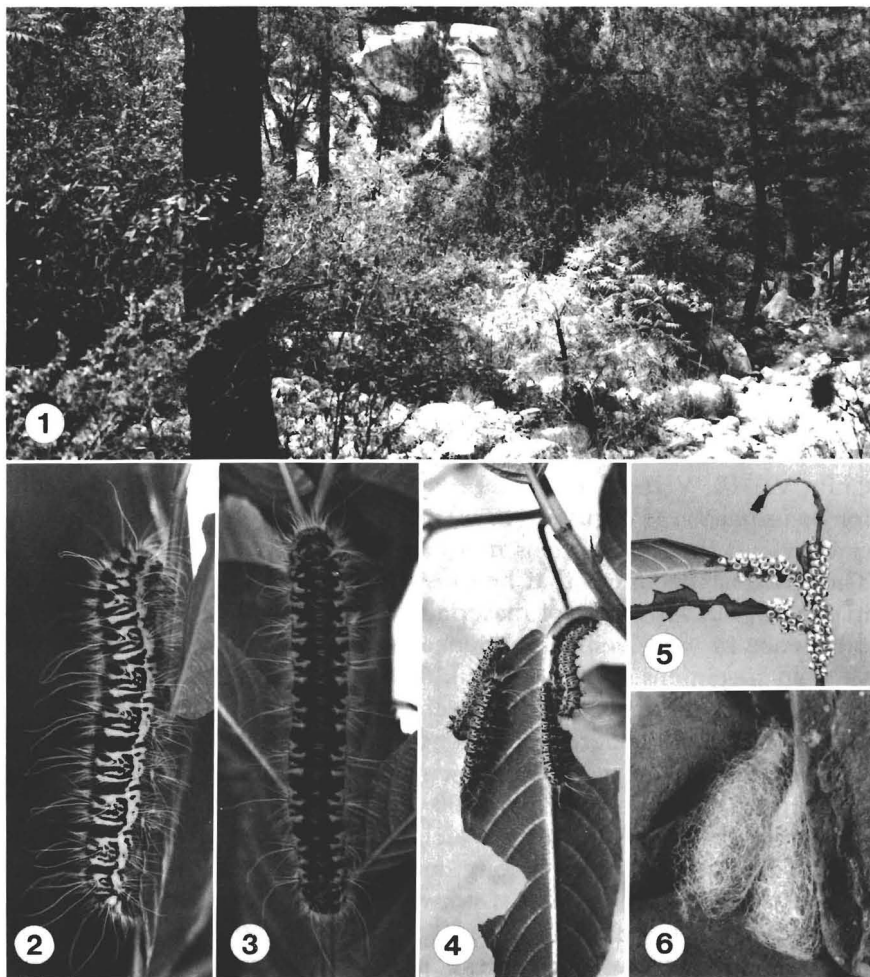
Agapema homogena Dyar is a gray to black saturniid of moderate size that occurs in Mexico, Arizona, Colorado, New Mexico, and western Texas. The species occurs in montane habitats at elevations from 1500 to 3500 m and in Arizona is most frequently associated with mixed oak woodlands (Fig. 1). In this paper the biology of *A. homogena* is discussed and the immature stages described for the first time. Most of our observations are based on a population in the Santa Catalina Mts. north of Tucson, Pima Co., Arizona.

Description of Larvae
(Figs. 2-4)

First instar. Head: Black with short white setae; diameter 0.6 mm. Body: Length 5.2 mm, width 1.3 mm. Ground color black. White setae extend from black scoli. True legs, prolegs and spiracles black.

Second instar. Head: Black with short white setae; diameter 1.4 to 1.5 mm. Body: Length 11 mm, width 3 mm. Ground color black and yellow. Dorsal, ventral, and intersegmental areas black. Segmental area from dorsal scoli to just ventral of lateral scoli yellow with 3 black lines. Black "j"-shaped line begins subspiracularly and extends dorsally to meet second black line that extends ventrally from mid-dorsal area. 3rd black line extends from dorsal area anterior of dorsal scoli, towards dorsolateral scoli but terminates dorsoanteriorly of dorsolateral scoli. All scoli black and compressed with few short black spines and white setae extending from each. White setae extending from dorsal scoli of thoracic segments, abdominal segment VIII, and caudal scoli elongated, measuring 2 mm or more in length. Prolegs, true legs, and spiracles black.

Third instar. Head: Black and covered with short white setae; diameter 3.2 mm. Body: Length 34-38 mm, width 6 mm. Ground color black and yellow. Ventral and intersegmental area black. Yellow subspiracular line encompasses black lateral scoli and extends entire length of larva. Lateral segmental area with 4 vertical yellow stripes. Posterior-most stripe extends from subspiracular line dorsally just past dorsolateral scoli then folds ventrally to form inverted "v" (often broken) that terminates at spiracle. Line 2 extends from spiracle to mid-dorsal area and encompasses dorsolateral and dorsal scoli. On thoracic segments and abdominal segments I, VIII, and IX this line terminates at dorsal scoli, therefore, mid-dorsal area of those segments black rather than yellow. Line 3



FIGS. 1-6. 1, Habitat of *Agapema homogena* in the Santa Catalina Mts., Pima Co., Arizona. Prominent vegetation includes *Arctostaphylos* sp., *Fraxinus* sp., *Juglans* sp., *Pinus ponderosa*, *Prunus demissa*, *Quercus arizonica*, *Q. emoryi*, *Q. gambelli*, *Rhamnus californica* and *Rhus trilobata*; 2, lateral view of mature larva; 3, dorsal view of mature larva; 4, second instar larvae feeding on *Rhamnus*; 5, wild cluster of eggs from which the larvae have already hatched; 6, two cocoons found in narrow space between rocks.

anterior to line 2 and extends from posterior edge of spiracle to midway between dorsolateral and dorsal scoli. Fourth line anterior to 3rd and extends dorsally from yellow subspiracular line to point even with dorsal scoli. Tufts of white secondary setae cover mid-dorsal segmental area. All scoli are black and compressed with white setae and few black spines extending from each. Dorsolateral and dorsal scoli each with 1, occasionally 2, setae 5 mm or longer extending from each. Prolegs, true legs, spiracles, and planta black.

Fourth instar. Head: Black and covered with short white setae; diameter 4.2–5.4 mm. Body: Length 58–65 mm, width 11 mm. Ground color black and yellow. Yellow subspiracular line encompasses lateral scoli and extends length of larva. Segmental area with 4 vertical yellow stripes on each segment as in 3rd instar, but with one exception: the 2nd yellow line extends from spiracle dorsally through dorsolateral scoli and terminates at dorsal scoli instead of crossing over mid-dorsal area. Mid-dorsal area black with segmental tufts of white secondary setae. Lateral scoli appear as yellow verrucae with dense clusters of elongated white setae. Dorsal scoli and dorsolateral scoli are distinct but flattened with short black spines and 1 to 3 elongated and numerous short white setae. Small clusters of white secondary setae extend from white or yellow patch on upper lateral surface of prolegs. Prolegs, true legs, and spiracles black. Planta red.

Discussion

In southern Arizona the flight season of *homogena* extends from late May to late July. Records from Colorado and New Mexico indicate a slightly shorter flight period, while specimens from central and northern Mexico have been taken through late September (5 km S Temoris, Chih. VII-16, VIII-28, IX-19-69). Based on limited material available for examination, Ferguson (1972) noted that Arizona specimens are smaller and their wing veins more prominent than those from Texas. The Arizona specimens that he illustrated are smaller than usual, and in general the wing span of material from the two states is similar. The difference in wing vein prominence is probably an artifact of reared vs. wild specimens since scales rub off the forewing veins of an active moth. Material from Colorado to central Mexico has been examined, and no consistent geographical trends were found.

Emergence from the cocoon occurs in the morning. Females begin emitting pheromone between 2100 and 2300 h. The pair remain together for about an hour, after which the female begins her oviposition flight. The ivory eggs are oblong, measure 1×2 mm, and are deposited in clusters near the apical growth (Fig. 5). In the Santa Catalina Mts. the larval hostplant is *Rhamnus californica ursina* (Greene), but in Colorado Don Bowman (pers. comm.) has recently collected larvae near Steamboat Springs (Routt Co.) on willow. Each egg cluster contains 45 to 160 eggs. This suggests that females may deposit all of their ova in 1, 2 or possibly 3 clusters with 1 or 2 clusters per female being the norm. Upon emergence the larvae are gregarious and begin feeding on the leaves adjacent to the egg cluster. First instar larvae are black but from the second through last instar they are black and yellow with long white setae extending from the scoli (Figs. 2–4). Larvae lose most of their gregarious tendencies in the last instar. During late August larvae in the second through early last instar can be field collected. There are four larval instars, and the mature larva measure 55 to 65 mm. Mature larvae leave the hostplant and wander prior to pupating in cracks or crevices among rocks, tree trunks, or man-made structures.

Pupation occurs from September to November. Both Mike Collins and Mike Van Buskirk (pers. comm.) have observed that field collected cocoons, which still contain prepupae or newly molted pupae in November or December, were usually parasitized by tachinid flies. Newly spun cocoons are light beige but turn a uniform brown with age; the change may be hastened by moisture. The cocoon (Fig. 6) is loosely woven but somewhat compact. This is in sharp contrast to that of *A. galbina anona* (Ottolengui), which forms a pale brown, bulbous, loose mesh cocoon on its hostplant.

There are many differences between the immature stages of *Agapema* and west coast species of *Saturnia*. Morphologically, the scoli of *homogena* and *galbina* are reduced and bear far fewer and shorter black spines when compared to *Saturnia*. *Agapema* larvae are long and thin with numerous white secondary setae, especially on the dorsal area. The larvae of *Saturnia* are more compact, and although secondary setae are present, they are inconspicuous. The spines of *Saturnia* are urticating, whereas, those of *Agapema* are not. In addition *Agapema* larvae tend to be gregarious, while *Saturnia* larvae feed singly and are cryptic. The evolution of the New World *Saturnia* and *Agapema*, and their hostplant relationships were recently discussed by Tuskes and Collins (1981). In general the larvae of *Agapema*, especially those of *homogena*, are more divergent from those of *Saturnia* than might be expected considering adult characters and their earlier congeneric status (Michener, 1952).

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