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TWO NEW *AUTOMERIS* FROM WESTERN MEXICO (LEPIDOPTERA: SATURNIIDAE: HEMILEUCINAE)

CLAUDE LEMAIRE[1] AND KIRBY L. WOLFE[2]

La Croix des Baux, F- 84220 Gordes, France[1]
3090 Cordrey Drive, Escondido, California, 92029, USA[2]

ABSTRACT.– *Automeris stacieae* new sp. and *Automeris ahuitzotli* new sp. are described from the states of Guerrero and Oaxaca in western Mexico. They belong to the groups of *Automeris io* (Fabricius) and *Automeris cecrops* (Boisduval) respectively. Both are montane species, inhabitants primarily of the Pacific slope of the Sierra Madre del Sur. Male and female gentalia are figured, species variation and distribution are indicated when known, and specific characters are discussed and compared with those of their most closely related species. The last instar larva of *A. ahuitzotli* is described, figured and compared with larvae of Mexican and southern USA species of the same group.

RESUMEN.– Se describen *Automeris stacieae* sp. nov. y *Automeris ahuitzotli* sp. nov. de los estados de Guerrero y Oaxaca en México occidental. Pertenecen a los grupos de *Automeris io* (Fabricius) y de *Automeris cecrops* (Boisduval) respectivamente. Ambas son especies montañezas, habitantes esencialmente de las vertientes pacíficas de la Sierra Madre del Sur. Se figuran los genitales de macho y hembra, se indican la variación y la distribución conocidas, y se discuten los caracteres específicos en comparación con las especies de más parentezco. Se describe e ilustra la larva de último estadío de *A. ahuitzotli*, comparándola con las de otras especies mexicanas y estadounidenses sureñas del mismo grupo.

KEY WORDS: Arizona, *Automeris ahuitzotli* **new sp.**, *Automeris stacieae* **new sp.**, Costa Rica, distribution, Fabaceae, genitalia, Guatemala, hostplants, immature stages, Leguminosae, Mexico, Sierra Madre del Sur, USA, variation.

The genus *Automeris* is a well-known member of the Hemileucinae, restricted to the new world. The genus is in various habitats from Canada to Argentina, with more than 120 species, most are similar in having a large ocellus on the hindwing giving rise to the common name "bull's eye moths." Since the revisions of *Automeris* (Lemaire, 1971-74), increased collecting and new roads into previously inaccessible areas has resulted in the discovery of about 20 new species. Mountain ranges are often sources of endemic species.

The geography of southwestern Mexico's Sierra Madre del Sur provides much opportunity for endemism. The series of high mountains in proximity to the coast precipitate abundant rainfall, producing a string of "islands" of consistently very humid environment surrounded by vast areas which are subject to long dry or torrid periods. Highest peaks above 2600m support a mixture of firs, pines, and oaks (Vargas-Fernández, 1991). Pines dominate the drier ridges, with evergreen oaks on the slopes merging with other broadleafed evergreens at mid elevation and more deciduous species in foothills and lowlands. Canyons, protected slopes and peaks receiving greater precipitation support more broadleafed evergreens, whereas forests on exposed lower slopes receiving less rainfall are predominantly deciduous, with isolated stands of oak or pine. Burning and grazing have greatly altered much of the land at lower elevations, but from about 500-1500m in the more humid zones coffee plantations, some very old, rely on canopy forest for shade. Thus here, as elsewhere in Mexico, species which have practically disappeared from large areas due to annual burning have been preserved in the protected coffee plantations.

During trips to the Sierra Madre del Sur of Oaxaca and Guerrero in May-June of 1991 and June 1992, the junior author encountered a number of unusual saturniids, including the present two *Automeris* species. Most surprising was the capture, in the Cerro de Atoyac near Acapulco, of a large number of *Dirphiopsis* Bouvier, a genus of medium sized moths previously not known north of Costa Rica and representing a new species subsequently described as *wolfei* by Lemaire (1992). That *wolfei* and the present species eluded detection for so long in such proximity to one of Mexico's oldest cities and highways is perhaps partly due to the Cerro's longstanding and widespread reputation for banditry, expressed to the junior author by the admonitions of police and a number of passers-by. Collectors may fear to go there.

Automeris stacieae Lemaire & Wolfe, **new sp.**

DIAGNOSIS.– This new species is closely allied to *Automeris iris* (Walker) (Fig. 7) within the group of *Automeris io* (Fabricius). It differs from *A. iris* and from other relatives by the trajectory of the postmedial line of the forewing.

DESCRIPTION.– Forewing length: ♂ 36-41mm, ♀ 42mm.

Male (Fig. 3).– *Head:* orange brown, labial palpi three-segmented, color as on frontal area. Antennae rusty yellow, quadripectinate to the apex; apical rami on inner side of the flagellum about same length as basal

1. Correspondant du Muséum national d'Histoire naturelle, Paris
2. Field Associate, San Diego Natural History Museum, San Diego, California

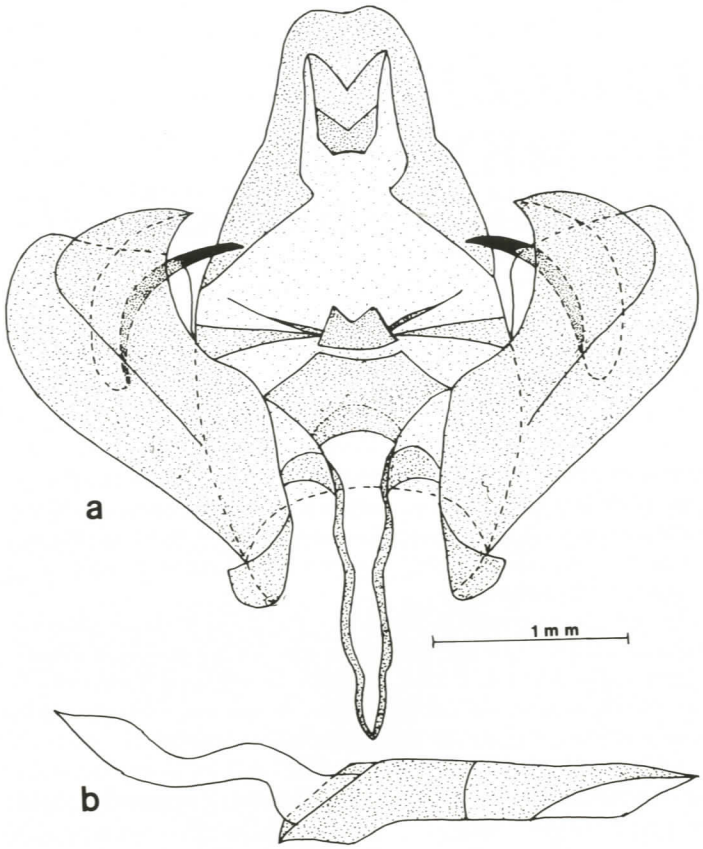

Fig. 1. *Automeris stacieae* new sp., ♂ genitalia: a) ventral view, aedeagus removed; b) lateral view of aedeagus.

rami, but on outer side about half the length of corresponding basal rami. *Thorax:* more or less dark orange brown. Legs orange brown with inner side of tibia densely covered with yellow hairs; epiphysis present, about two thirds as long as foretibia; metathoracic tibia with a single subapical and one pair of apical spurs. *Abdomen:* dull yellow, dorsally weakly ringed with purplish brown. *Forewing:* above deep rusty brown, in some specimens speckled with dark brown scales; lines as shown on Fig. 3, the antemedial usually very faint, the postmedial black, proximally underlined with white, outwardly concave and reaching the costa at about 5mm from the apex; submarginal band lunular, black, usually well contrasting; discal spot slightly darker than rest of the wing, surrounded with five to seven small black dots. Underside cadmium yellow with a pale pinkish area along the inner side of the wing; markings well contrasting, composed of a broad dark brown or purplish brown, outwardly concave postmedial line and a strong discal spot, black around the small white center. *Hindwing:* above yellow from the base to the submarginal band with a pinkish area along the inner margin; postmedial line and submarginal band black, marginal area the same color as on the forewing; ocellus typical of the representatives of the *A. io* group. Underside like forewing, with a straight or slightly convex dark purplish postmedial line and a small white discal spot; submarginal band inconspicuous. *Male genitalia* (Fig. 1): structure typical of an *Automeris* of the *A. io* group with characteristic folded apex of the uncus; specific characters are discussed below.

Female (Fig. 4).– Antennae shortly bidentate, yellow. Epiphysis two fifths as long as the tibia. Same markings as in male; ground color of the forewing above brown, turning to purplish brown in the median area of the hindwings (instead of orange brown as in male); ground color of wing undersides much darker cadmium yellow; discal spot of the forewing narrower than in male. *Female genitalia* (Fig. 2): the trident

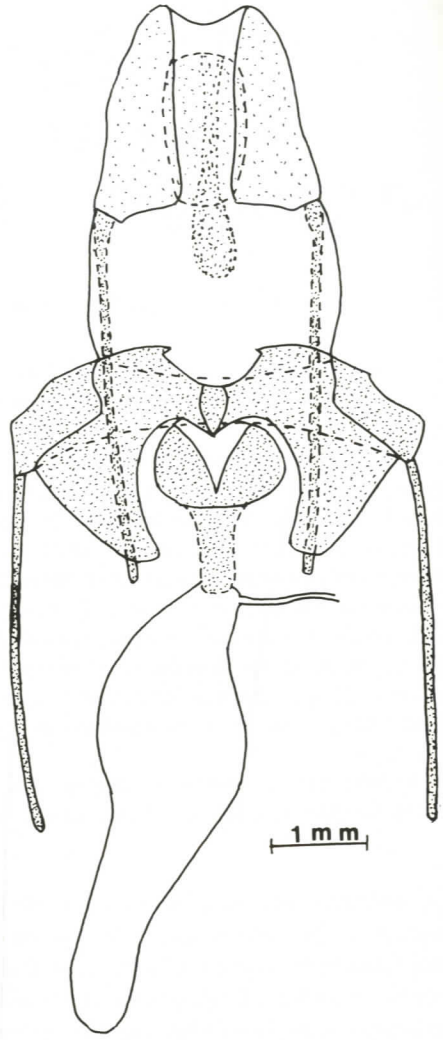

Fig. 2. *Automeris stacieae* new sp., ♀ genitalia, ventral view.

shaped ventral plate structure (eighth sternum) is typical for females o this group.

IMMATURE STAGES.– Unknown.

TYPES.– *Holotype* ♂: MEXICO.– Guerrero: 24 mi. N of Atoya de Álvarez, 925m, 31 May 1992, at UV and MV lights, leg. K Wolfe, S. Smoot, W. Rook. *Allotype* ♀: Guerrero, 43 mi N o Atoyac de Álvarez, 1324m, 16 Jun 1991, at UV and MV light leg. K. Wolfe, S. Smoot, D. Mullins.

Paratypes: C. Lemaire collection (Gordes, France): MEXICO. *Guerrero*: 2 ♂, same data as allotype; 1 ♂, 34 mi N of Atoyac d Álvarez, 925m, 15 Jun 1991; 1 ♂, 43 mi N of Atoyac de Alvare 1325m, 16 Jun 1991. *Oaxaca*: 2 ♂, 1 ♀, 3.2 mi N of San Gabri Mixtepec, 1300m, 5 Jun 1991. K. L. Wolfe collection (Escondid California): *Guerrero*: 4 ♂, same data as allotype; 2 ♂, same data holotype. *Oaxaca*: 1 ♂, 3.2 mi N of San Gabriel Mixtepec, 1300m, May 1992, Wolfe, Smoot & Rook.

The holo-allotype pair will be deposited in the United States Nation Museum and from the authors' collections one paratype male will b donated to each of the following institutions: Allyn Museum, America Museum of Natural History, Los Angeles County Museum, San Dieg Natural History Museum, Universidad Nacional Autónoma de Méxic

ETYMOLOGY.– This species is named in honor of Stac Smoot-Wolfe, abundantly supportive wife of the junior author, f

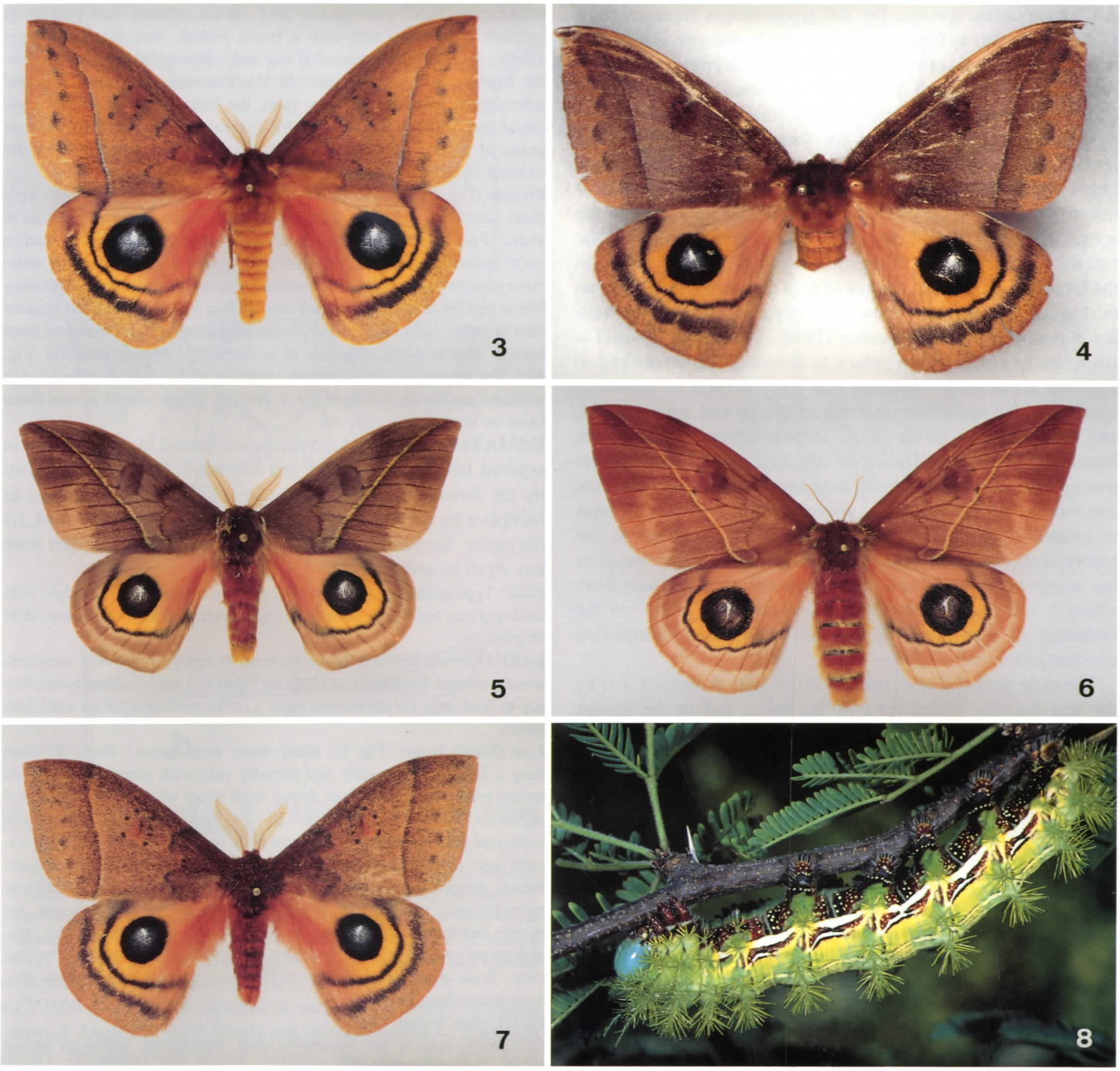

Fig. 3-4. *Automeris stacieae* new sp.: 3. ♂ Holotype (40mm); 4. ♀ Allotype (42mm). Fig. 5-6. *Automeris ahuitzotli* new sp.: ♂ Holotype (34mm); 6. ♀ Allotype (43mm). Fig. 7. *Automeris iris* (Walker) ♂ (34mm), brown morph, near Oaxaca City. Fig. 8. *Automeris ahuitzotli* new sp., last instar larva.

her invaluable contributions to the study of the Saturniidae.

DISTRIBUTION.– Widely distant localities of capture in Guerrero and Oaxaca suggest a wide distribution on the Pacific slope of the Sierra Madre del Sur in western Mexico, in humid montane forest and tree canopied coffee plantations at elevations from about 900-1350m.

FLIGHT PERIOD.– The type series was collected from 27 May to 16 June during 1991 and 1992. Monitoring of incoming moths to ultraviolet and mercury vapor lights in the type locality recorded the arrival of ten males and one female between 2000h-2045h.

VARIATION.– Very little variation in size and ground color was observed in the male and female known specimens, even in populations several hundred km apart.

REMARKS.– *Automeris stacieae* belongs to the *A. io* group of *Automeris* as defined by Lemaire (1973) and within this group to a phenotypically homogeneous complex of taxa that can be separated from other species of the group by the continuous, instead of lunular or punctiform, postmedial line of the forewing. Four previously described species exhibit this character: *A. iris* (Walker) with subspecies *hesselorum* Ferguson, *A. daudiana* Druce, *A. lemairei* Beutelspacher and *A. boudinotiana* Lemaire.

All are mountain species; the sub-group ranges from southern U.S.A. (Arizona) to Guatemala. *Automeris stacieae*, *A. iris* and *A. lemairei* are sympatric and synchronic in Guerrero, vicinity of Atoyac; *A. stacieae* and *A. lemairei* in Oaxaca, 15km N of San Gabriel Mixtepec. *Automeris stacieae* differs from its relatives by the more pointed apex of the forewing, especially in the female, and overall by the trajectory of the postmedial line on the upper side of the forewing, outwardly bent instead of straight or inwardly bent near the costa and thus terminating closer to the apex. It can be further separated by the ground color of the forewing: orange brown in the male and dark purplish brown in the female of *A stacieae*, compared with gray in *A. daudiana*, tan in *A. boudinotiana* and yellow in *A. lemairei* as described from the ♂ holotype by Beutelspacher [1990]. *Automeris lemairei* is suspected of varying from yellow to brown in the female and to light tan in the male, based on size and markings of numerous specimens, the occurrence together of the several color morphs, and their identical larvae in all instars; although only brown female and tan male offspring of this moth were obtained from rearing eggs of a brown female, there remains little doubt that the two morphs are conspecific. *Automeris iris* is a variable species in ground color. It is generally gray as *A. daudiana* in the topotypical population near Oaxaca City, but in some localities has orange brown variations (Fig. 7) resembling *A. stacieae*, from which it differs by having brownish instead of yellow on the underside of the wings, in addition to the above mentioned constant characters.

The male genitalia of *A. stacieae* differ from those of *A. iris* by the less dorsally folded apex of the uncus and in the shorter bulbus ejaculatorius, about equal to, instead of twice as long as, the aedeagus. Significant characters were not found in genitalia of the single female of *A. stacieae* studied.

Automeris ahuitzotli Lemaire & Wolfe, **new sp.**

DIAGNOSIS.– *Automeris ahuitzotli* belongs to the group of *Automeris cecrops* (Boisduval) and, within this group, is probably more closely allied to the nominotypical subspecies of *A. cecrops* than to any other taxon. It differs from its Mexican and southern USA relatives by the structure of the male genitalia and by the color and markings of the last instar larva.

DESCRIPTION.– Forewing length: ♂ 34-37mm, ♀ 43-44mm.

Male (Fig. 5).– *Head:* brown; labial palpi three-segmented, colored as in the frontal area. Antennae rusty yellow; quadripectinate to the apex, apical rami on inner side of flagellum about equal to basal rami, on outer side about half as long as corresponding basal rami. *Thorax:* dark brown, with a tuft of white scales at base of forewing; legs carmine, the inner side covered with grayish hairs; epiphysis present, about two thirds as long as foretibia, metathoracic tibia with a single subapical, and pair of apical, spurs. *Abdomen:* dorsally carmine, anal tuft and underside beige. *Forewing:* above dull brown with lighter grayish or slightly purplish zones in the medial and marginal areas; lines as shown in Fig. 5, dark brown, the antemedial usually faint, the postmedial proximally thinly outlined with white; submarginal band perceptible only in contrast with lighter marginal zone; discal spot slightly darker than surrounding area. Underside dull gray, in some specimens with purplish on the medial area; postmedial line dull brown, reaching the costa farther from the apex than on upper side; discal spot characteristic of the genus. *Hindwing:* above with typical ornamentation of the genus, the variable-sized ocellus followed by a black postmedial line and a broader brown submarginal band; baso-medial area yellow, shaded dull grayish or purplish under the costa with a broad pinkish area along the inner margin; area between postmedial line and submarginal band and outside the latter is pale gray. Underside like forewing, postmedial line and submarginal band usually very faint, the former tangent to the white discal spot. *Male genitalia* (Fig. 9): Typical structure of the *A. cecrops* group as figured by Lemaire (1973, Fig. 135) but remarkable for the extreme reduction of the inner spine (harpe) of the valves.

Female (Fig. 6).– Antennae shortly bidentate, yellow. Epiphysis very short, about one fourth as long as the tibia. Same ornamentation as in male. *Forewing:* above more reddish and plain ground color than in male; postmedial line reaching the costa further from the apex, its white inner margin more contrasting, especially in reared specimens. Forewing below similar but slightly duller than above; submarginal band broader than in male. *Hindwing:* above postmedian area paler, submarginal band broader than in male; underside as in forewing. *Female genitalia* (Fig. 10): The prevulvar sclerotizations, anterior to the ventral plate (eighth sternum) are characteristic of the *A. cecrops* group; corpus bursae about twice as long as anapophyses.

IMMATURE STAGES.– Species was reared by both authors in separate laboratories, in June and July 1991, from eggs deposited by the female allotype. *Robinia pseudacacia* L. was used as foodplant by the senior author and *Acacia baileyana* F. v. M. by the junior. Larvae underwent six instars and adults emerged from late April to early July 1992.

EGG: Typical for *Automeris*; white, slightly flattened oval, upright with micropyle on top which turns from pale green to black several days after oviposition.

LARVA: Newly hatched larvae ate most of eggshell and then wandered among offered foodplants to settle on types of Leguminosae, commencing to feed only on the second day. Larvae were gregarious until fifth instar.

Last (Sixth) Instar (Fig. 8): Head: 6mm wide, green. *Body:* 5.7-6cm long x 1cm wide; laterally and dorsally yellowish green, ventrally red brown mixed with black and dotted with small white spots; abdominal segments 1-9 with three pairs of longitudinal stripes, dorsal and subdorsal pairs pale green, faint, narrowly outlined with black, subspiracular pair much broader, pure white, broadly outlined above with red brown speckled with white and barred by oblique white patches; spiracles pale yellow, narrowly ringed with black; anal segment red brown bordering dorsal and paranal shields. Thoracic legs red, abdominal prolegs green, empodium black with a string of white beaded dots. Scoli green, some spines on thoracic segments tipped black; anal segment without scoli.

PUPA: dark brown, typical.

COCOON: typical for *Automeris*; thin, translucent yellowish brown tightly wrapped in foliage.

HOSTS.– Unknown, but laboratory acceptance of *Robinia pseudacacia* and *Acacia baileyana* suggests various Leguminosae in nature.

TYPES.– *Holotype* ♂: MEXICO.– Guerrero: 34 mi N of Atoyac de Álvarez, 925m, 15 JUN 1991, at UV and MV lights, leg. K. Wolfe, S. Smoot, D. Mullins. *Allotype* ♀: same data as holotype.

Paratypes (C. Lemaire collection, Gordes, France): MEXICO. *Guerrero*: 1 ♂, same data as holotype; 2 ♂, 24 mi N of Atoyac de Álvarez, 30 May 1992, leg. K. Wolfe, S. Smoot, W. Rook; 2 ♀ from eggs deposited by the female allotype, reared at Gordes, emerged 24 Apr and 5 May 1992. K. L. Wolfe collection (Escondido, California). *Guerrero*: 5 ♀ and 4 ♂ reared from eggs deposited by the female allotype; 1 ♂, same data as holotype. San Diego Natural History Museum. *Guerrero*: 6 ♂, 18 mi N Atoyac, 1-4 Jun 1989, N. Bloomfield.

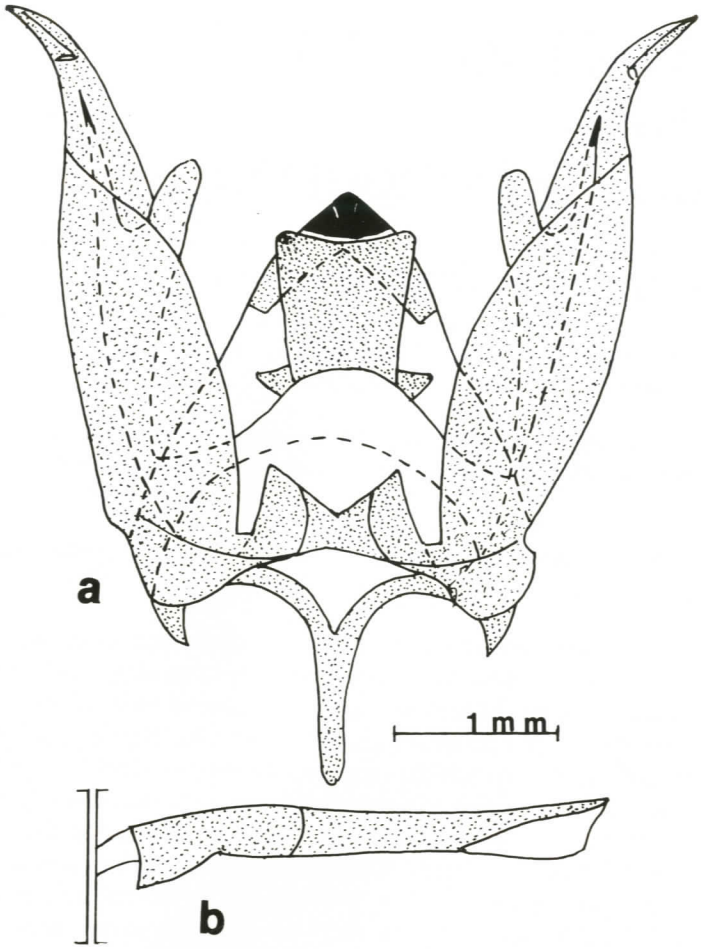

Fig. 9. *Automeris ahuitzotli* new sp., ♂ genitalia: a) Ventral view, aedeagus removed; b) Lateral view of aedeagus.

The holo-allotype pair will be deposited in the United States National Museum and one paratype male will be donated from the authors' collections and the San Diego Natural History Museum to each of the following institutions: Allyn Museum, American Museum of Natural History, Denver Museum, Los Angeles County Museum, and Universidad Nacional Autónoma de México.

ETYMOLOGY.– This species is named in memory of Aztec Emperor Ahuitzotl, third Royal son of Montezuma I. Ahuitzotl greatly expanded the Aztec empire, and for the first time extended Aztec control to the Pacific coastal regions of Oaxaca and Guerrero, where this species occurs.

DISTRIBUTION.– Most specimens of *A. ahuitzotli* are from moderate elevations (925m) on the Pacific Slope of the Sierra Madre del Sur in Guerrero, but specimens have also been captured as far inland as Oaxaca (5 mi NE of Oaxaca City, 1845m, 25 May 1992, Leg. K. Wolfe, S. Smoot, W. Rook) and Morelos (Tepotlixpa, 10/11 Sep 1986, leg. D. Mullins).

FLIGHT PERIOD.– The type-series was collected from late May to mid June, attracted to UV and MV lights. The above-cited specimen from Morelos was collected in mid September.

VARIATION.– Male forewing above more or less purplish on medial and marginal areas; below with or without baso-medial pink blush. White inner border of postmedial line of forewing of variable contrast, especially in the female; size of ocellus variable.

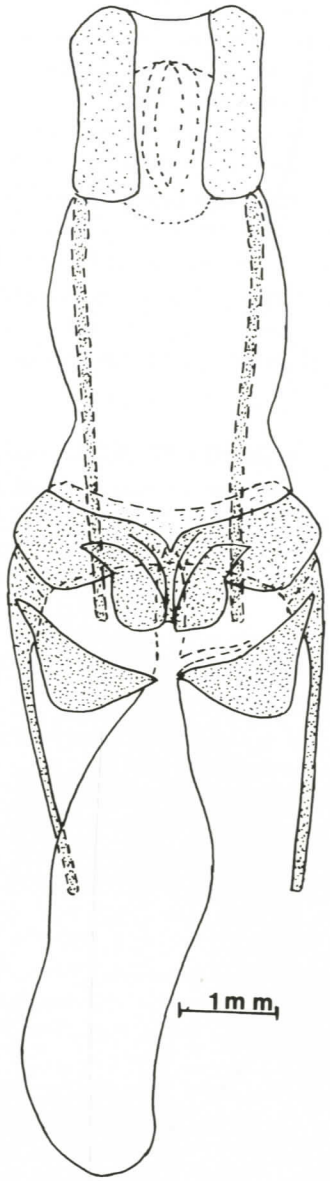

Fig. 10. *Automeris ahuitzotli* new sp. ♀ genitalia, ventral view.

REMARKS.– *Automeris ahuitzotli* belongs to the large group of *Automeris cecrops* as defined by Lemaire (1973). Within this group it is assigned to a partially artificial subdivision characterized by a red dorsum of the abdomen. In Mexico and southern U.S.A. this character can be observed in *A. cecrops* (Boisduval), including subspecies *pamina* (Neumoegen), and in species *A. peigleri* Lemaire, **new stat.**, *A. zephyria* (Grote) and *A. maeonia* (Druce). The latter two are very distinct, and *A. ahuitzotli* superficially resembles *A. cecrops*, especially its nominotypical subspecies, more than any other of the above taxa; it can be distinguished from *A. c. cecrops*, however, by minor characters of the habitus, such as the purplish shades of the male forewing above, and the reddish brown, darker and plainer ground color in the female forewing. The very tiny, if not absent, inner spine of the valves in the male genitalia is an extremely rare character in *Automeris* of this group, and has only been previously observed in *A. rougeoti* Lemaire from Bolivia and *A. castrensis* Schaus from Brazil. This character is absolutely decisive in separating

A. ahuitzotli from its above cited relatives. The last instar larva differs significantly from those of its allied taxon which are known. The larva of *A. cecrops pamina* was described and figured by Packard (1914: 102, Pl. 19, Fig. 1-6); the body is pale blue gray with very contrasting dorsal and subdorsal stripes, strongly outlined with black, and the markings connected to the white subspiracular stripe distinctively delineated and colored; the pale blue gray scoli have the spines abundantly intermixed with black. In *A. zephyria* (see Tuskes and Smith, 1989: 193, Fig. 1-2), the lateral and ventral areas are black and prolegs are red; *A. peigleri* larva (Lemaire, 1981: 238, Fig. 3) has the dorsal and subdorsal stripes sky-blue, the lateroventral area and the prolegs black.

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