NOTES ON THREE SPECIES OF HEMILEUCA (SATURNIIDAE) FROM EASTERN OREGON AND CALIFORNIA

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The information in this paper has been extracted from notes recorded by the author between 1962 and 1964. As basic information on the larvae of *H. n. nutalli* and *H. h. hera* apparently still remains to be published (Ferguson, 1971, p. 137-147), it seems worthwhile to publish these notes without further delay. The larval descriptions that follow remain valid, despite the passage of time, although it is quite conceivable that one or more of the localities mentioned has since been altered (perhaps even obliterated) by those activities of *Homo sapiens* popularly termed "development" and "progress."

*Hemileuca (Pseudohazis) nuttalli nuttalli* (Strecker)

In late April 1962, more than 100 completely-black and unmarked *Hemileuca* larvae (of the subgenus *Pseudohazis*), in various instars from quite small (second or third instar) to nearly fullgrown, were given to me by Ken Goeden, who collected them on 25 April 1962, near the highway in low hills between 11 to 13 mi. west of Vale, Malheur Co., Oregon (elevation about 2800 ft.). He found them resting and feeding on bitterbrush, *Purshia tridentata* (Pursh) DC. (Rosaceae), which was
growing there in an association with the abundant and widespread Great Basin sagebrush, *Artemisia tridentata* Nutt. (*Asteraceae*).

The living final instar larvae of this eastern Oregon population of *nuttalli* were briefly described (and readily recognized) as follows: Skin uniformly dull black, with NO maculation; a slight shading toward brown on the venter, especially in thoracic region. Body covered with a floccose pubescence of fine, soft, grayish-white hairs. No variation in body (or spine) coloration evident. Spines and spine clusters all jet black. The unbranched, short, sharp, clustered dorsal spines have a mild but definite urticating ability, if pushed firmly against tender skin. Head and thoracic legs blackish to brownish-black; faintly shiny. Head pubescent. Several of these larvae (code-numbered St.7), including the corresponding notes, are preserved in my former North American larval collection (most of which now belongs to the Natural History Museum of Los Angeles County, California).

As an interesting aside, concerning foodplant tolerances, I should mention that a number of the larvae collected by Goeden (1962) were also sent to Christopher Henne, at Pearblossom, Los Angeles Co., California. It was necessary for him to locate a substitute plant species, and as a natural first guess he offered them (the viscid) antelope brush, *Purshia glandulosa* Curran, which grows south and southeast of Pearblossom (near Valyermo), but this plant was absolutely refused by the larvae! Next, *Cercocarpus betuloides* Nutt. ex T. & G. (also Rosaceae) was offered; surprisingly, they readily accepted this substitute of another genus in preference to the other *Purshia*. Several of Henne's larvae ultimately pupated and later produced perfect adults. I attempted to feed some of my captive larvae on *Artemisia*, but this was completely refused. The rest of my series died in the larval stage, due to lack of proper treatment in captivity. (See notes at end.)

The adult moths (reared by Henne) emerged in the summers of 1962 and 1964 (3 ♀ ♂ between 12–28 Aug. 1962; one ♀ on 13 Aug. 1964). Showing only minor variation in colors and markings, they were briefly described as follows: Forewing upperside groundcolor dull but chalky whitish, sharply-marked with black; sometimes with a suffusion of yellow-orange at outer margin, just inside the narrow black border. Hindwing upperside rich yellow-orange, sharply marked with black. Undersides of both wings uniformly dull yellow-orange, sharply-marked with black. Thorax and abdomen yellow-orange, in some cases slightly marked with black.

J. S. Buckett mentioned that he observed a diurnal flight of moths, fitting the above description, at around 1400 hrs. on 4 September 1963, in an area about 2 mi. W of Irrigon, Morrow Co., Oregon (elevation
about 400 ft.). Many of the freshly-emerged adults were resting on *Purshia* bushes, and "thousands" were seen on the wing. At the time of this observation the temperature was about 90° F.; there had been a substantial rain in the locality some days before the emergence. It was noted that the moths were restricted to areas where *Purshia* was growing. Two of the adults (♂ and ♀) collected by Buckett are in my present collection; presumably others are in the Buckett collection.

**Hemileuca (Pseudohazis) eglanterina eglanterina** (Boisduval)

On 14 June 1964, David L. Mays gave me 40 gregarious first instar larvae of an unidentified *Hemileuca* sp. (subgenus *Pseudohazis*), which he had collected a few days earlier on *Purshia tridentata* (det. Mays), about 3 mi. N of Markleeville, Alpine Co., California, southeast of Lake Tahoe (at about 7500 ft. elevation). I transported these larvae south, to White Cliff Ranch, near Valyermo, Los Angeles Co., California, hoping to continue the rearing; there they readily accepted mature and semi-mature leaves of the local *Cercocarpus betuloides* as a substitute food-plant, and grew rapidly from second and third instars to maturity on *that plant*; this was followed by healthy pupae. (Incidentally, they also practically refused to accept the local *Purshia glandulosa*, which was offered as the first potential substitute, although a little feeding did take place on it.)

The **final instar larvae** (20 July 1964), were briefly described as follows: Dorsum contrasting abruptly with venter. Skin dull black down to the prominent, undulate cream-white subspiracular line; below this line, including prolegs completely, skin grayish-flesh-pink to pinkish-brown. Subspiracular line white, with two narrower whitish supra-spiracular lines; the uppermost lines much-suffused by large blotches of pale pinkish-purple centered between them, and blocking them out at intervals. Spines in the two dorsal rows of short, sharp (stinging) spine-clusters black, toward center of each cluster, but outermost spines of these clusters pale straw-yellow, minutely black-tipped. (In earlier instars, these identical spine-clusters contained predominantly light golden-brown spines.) The longer subdorsal and lateral spines primarily black. Body covered with fine, soft, grayish-white hairs. Head shiny blackish-brown with faint reddish-purple tinge; pubescent. Thoracic legs black and glossy. This description was drawn from notes on several of the **living Markleeville larvae**; some of these were preserved under my code-number St.16 (now in the Natural History Museum of Los Angeles County). It would not be surprising if larvae of *this species*, from various widely-separated populations, were found to show considerable variation in color and/or maculation.
These larvae were gregarious when small, clustering together both while resting and while feeding. They always followed each other in a perfect single file procession when moving to new locations. This gregarious behavior was gradually lost as they grew older, becoming essentially non-existent in last instar.

All pupae obtained were given to Christopher Henne; adults (1 ♂; 1 ♀) emerged in July 1965. Pupation took place in the typical "Hemileuca-type" of surface-debris cocoon or cell, under some sheltering object (such as a rock or board), but always on or only just below the soil surface; soil grains, small pebbles, and any other nearby particles of litter, were densely-incorporated into the relatively soft and flexible, silk-tied cell walls.

_Hemileuca (Pseudohazis) hera hera_ (Harris)

For comparison with the larvae just described, a brief description of the final instar larva of _Hemileuca hera_ (based on a few living individuals from one population) seems worthy of inclusion here. I collected these larvae on 26 July 1964, when on a brief trip with Edmund C. Jaeger, in the Inyo Mountains, Inyo Co., California, at approximately 10,000 ft. elevation, about 3 mi. SW of Waucoba Peak. They were feeding on _Artemisia tridentata_ (Great Basin sagebrush), which was growing patchily in the more open areas of a bristlecone pine forest (_Pinus aristata_). On this date both penultimate and last instar larvae were present on their foodplant; unhatched egg-masses were also noticed, and a few females were observed in the act of ovipositing. Many adult males were on the wing; a few pairs were seen in copulation, resting on the sagebrush.

When transported to White Cliff Ranch, near Valyermo in the San Gabriel Mts., (elevation close to 5000 ft.), these larvae hardly nibbled at the local sagebrush (probably a distinct subspecies or variety of _A. tridentata_), and soon began to decline as starvation ensued. None of them filled out or reached a prepupation condition. They were also offered _Cercocarpus betuloides_ as a last resort, but this plant was totally refused. Daily sunlight and fresh air were provided, so it was not for lack of these that the larvae died. It is possible that the rapid drop in elevation had as much of a bad effect on them as did my attempt to force them onto a distinctly different form of the foodplant species; both of these factors were probably responsible for their decline.

The final instar larvae (McFarland code-number _St.17_ in the Los Angeles County Museum), were briefly described as follows: Skin of dorsum and sides dull black; venter, including bases of prolegs, pale grayish-brown. Dorsum and sides marked with several full-length lines
of cream-white: a closely-parallel pair of narrow, broken middorsal lines; a broader and nearly solid subdorsal line; a slightly narrower, undulate supraspiracular line; a similar undulate subspiracular line. Body covered with a fine, soft, grayish-white pubescence. Spines in the two dorsal rows of short, sharp (stinging) spine-clusters mostly pale straw-yellow basally and widely-tipped with black. Longer lateral spines primarily glossy black with some straw-colored basal branches. Thoracic legs and lateral shields of prolegs glossy black. Head deep glossy black; pubescent.

Eggs collected on *Artemisia tridentata* at the Inyo Co. locality, were briefly described as follows: deposited on the foodplant twigs, in compact, and securely-glued encircling-bands, with no covering of scales, "fluff," or dried froth, etc. Among those egg "masses" observed, numbers ranged between 20 and 80 eggs per mass. The chorion was very tough, smooth, and glossy. Color at this stage (not long after oviposition) was a uniform pale whitish-gray-green, without bands, spots, or other maculation. The egg color was rather close to that of the (Inyo Mts.) sagebrush leaves, but had less green in it. The eggs probably overwinter, hatching perhaps in late May or sometimes in June at this elevation.

*H. hera,* and its abundant (often dominant) widespread foodplant, *Artemisia tridentata* Nutt., are also present in eastern Oregon, but the Purshia-feeding *H. nuttalli nuttalli* appears to be of more localized distribution there, probably only occurring in certain areas where its (less-abundant) foodplant grows.

Some reared adults from the above-described *Hemileuca* larvae, with the exception of *hera,* are in the Henne collection.

Notes on Rearing *Hemileuca* Larvae Successfully in Captivity

Most *Hemileuca* larvae can prove to be delicate in captivity, and will usually decline (slowly) and die IF deprived of fresh air and sunlight. Daily SUNLIGHT appears to be particularly important to stimulate vigorous feeding and normal, healthy growth in these larvae. (Electric lighting can be used but is only a poor substitute; never use "Cool White" fluorescent.) If housed in thoroughly-ventilated cages, with sprigs of foodplant kept fresh in water, and if given about one hour of sunlight daily (or at least as often as it is available), they will thrive and are definitely NOT difficult to rear. A light sprinkling of water over the foodplant, at least every second or third day (in the early morning), is highly desirable. With reference to the sun requirement, it is imperative that some shade also be available at all times during the sunning-period, so that the larvae can move quickly and easily from a sunny location into the shade as individually required. To provide such condi-
tions, a cage that is all plywood on top and on two opposite or adjacent sides, with screen only on the other (two) sides, is ideal. This makes it possible to safely leave the cage in a completely sunny location all morning, without any need of further attention, while insuring that there will constantly be areas of both sun and shade within; ample ventilation is also provided. If it is semi-cloudy, it may sometimes be necessary to leave the cage in a potentially sunny location all morning in order to accumulate enough actual "sun-time" to benefit the larvae; yet, on a hot and clear morning, they might be urgently needing to seek shade within less than an hour after the sunning began. The constant presence of some zones of shade in the cage will also guarantee less drastic wilting of (at least a portion of) the foodplant sprigs—another important factor in many cases.

Incidentally, the above suggestions will also be found helpful in connection with a number of other "difficult" bombycoid larvae in captivity, such as the rare Californian saturniid, *Saturnia albofasciata* (Johnson), and certain Australian anthelids (some *Pterolocera* and *Anthela* spp.); also applicable to a few arctiids (some *Apantesis* spp.), many agaristids, and to a wide scattering of unrelated genera in various other macro families where strictly diurnal-feeding larvae are involved.

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**Literature Cited**