

EARLY STAGES OF SPHINX SEQUOIAE ENGELHARDTI (SPHINGIDAE)

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A distinctive type of larva with highly adapted maculation was found resting upon an upper branch of a large *Juniperus californica* bush at Red Rover Mine Canyon, northwest of Acton, Sierra Pelona Valley, Los Angeles County, Calif., July 20 1962, El. 3,150'. An adult female Sphinx moth emerged on August 13 of the same year and was first erroneously designated by Henne prior to the correct determination of our west coast reference collection series, as *Sphinx dolli australis*. It was so reported in the season's summary of the Lepidopterists' News, 1963, 4. p. 2, and as *Sphinx dolli* in Lep. News, 3. p. 4, 1965. Both statements will be rectified in a subsequent issue of the Lep. News.

B. P. Clark, (1919), described *S. engelhardti* as a subspecies of *Sphinx dolli*, but a year later, (1920) corrected the specific assignment and recorded it as *Sphinx sequoiae engelhardti*.

Brief notes were made of this first larva just prior to its entering the soil of a rearing cage for pupation, the night after it had been collected. It was considered inadvisable to publish these notes until a more complete study had been made of the early stages of this subspecies, and illustrations could be included. An opportunity did not arise for this until the summer of 1965, when two gravid females were collected (at 15 w. black light) at Juniper Hills, Mojave Desert, L. A. County, Calif., on July 29, and July 31. Fertile eggs were laid by both moths August 2, on fresh *Juniperus* placed in a jar of water, and covered by a large brown paper bag. These eggs hatched August 14, 1965.

One problem in determination gave us some difficulty. Williams (1905) writing on the larva of *Sphinx sequoiae*, stated that the pupa had "no protruding tongue case," and that the larva fed on *Cerasus*, [properly now designated *Prunus virginiana* var. *demissa* (Nutt.) Sarg.] (western choke cherry). He repeated that statement in 1909. We felt this must have been an error in larval identification, and Dr. Williams confirmed our suspicion, kindly calling our attention to a paper (1958) wherein he corrected the error. In this he stated that what he probably described "were the early stages of *Smerinthus jamaicensis* Drury," and that "the pupa . . . did not hatch." His closing paragraph read "As far as I am aware, the early stages of *Sphinx sequoiae* are still unknown, but its caterpillar may well feed upon one of the coniferous trees."

GEOGRAPHICAL DISTRIBUTION

The four specimens which constituted the type series of *Sphinx sequoiae engelhardti* were collected at Bellevue, Washington County, Utah, by Jacob Doll and George Engelhardt in 1917. Two examples were recently taken by Fred Truxal in Baja California, locality not stated. Rick Westcott reported collecting one at Jacumba, San Diego County. The California Insect Survey has specimens taken by Jerry A. Powell at Scissors Crossing, 6 miles E. of Banner, San Diego County, July 13, 1963 (det. C. D. MacNeill). Our series are all from the Mojave Desert of California and Sierra Pelona Valley, L. A. County, as are also those in the Los Angeles County Museum collection.

Lloyd Martin of the L. A. Museum staff is of the opinion that the species "follows the juniper belt from the Great Basin into margins of Mojave and Colorado Deserts." Probably it will be found through the entire ranges of *Juniperus californica* Carr, and *J. osteosperma* (Torr.) Little.

A detailed description of the early stages follows:

Egg: (Figs. 1 and 2) Length, 2.33 mm. Width, 1.8 mm. Form oval. Surface texture appearing, superficially, smooth, lustrous, on high magnification seen to be covered with shallow ovoid cells, all in close contact. Glistening green.

LARVA, First instar: (Figs. 3 and 4) Length, 5 mm. Head width, 1.2 mm to 1.4 mm. Head, uniform orange-yellow. Ocelli black tipped. Mandibles dark.

Body tapering from first segment to narrower cauda. Ground color light yellow-green. First thoracic segment with a raised, black anterior margin along its upper half. A pair of raised black knobs on this dark margin, one on each side of middorsal space. A semilunar prothoracic raised shield, dull green in color. Longitudinal lines of raised black dots along the length of the body, most or all of which bear minute black setae.

Caudal horn on the 11th segment rising superiorly, then arches anteriorly; height 3 mm, width 0.3 mm; topped by two minute spurs. In some examples the horn erect.

Body dull orange-gray, heavily incrustated with minute black nodules. Thoracic legs, black, proximal segments yellow. Prolegs, yellow.

Second instar: Length, 9 mm. Width across 5th segment approximately 2 mm. Head width, approximately 1.8 mm. Head green, slightly more yellowish than the color of juniper twigs. Mandibles tinged with brown.

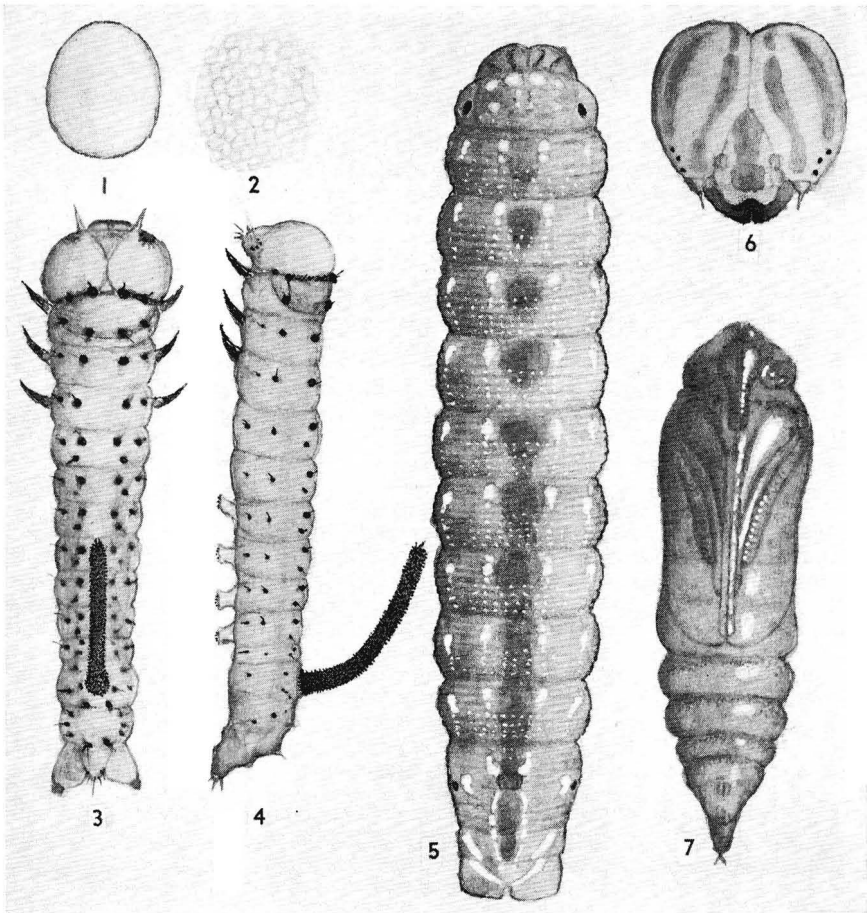
Body, uniform green, exactly matching juniper foliage. First segment with same ridges and nodules as in first instar, but yellow. Caudal horn, dull yellow, with a black bifurcated tip; held constantly at right angles to body; surface roughened by minute spicules; base tinged with orange; height, 3.3 mm.

Thoracic legs, green, with black terminal segments. Prolegs concolorous with body. Crochets light brown.

Third instar: Length, just prior to moult, 15 mm. Width, in mesothoracic segment, 3 mm.

Head, uniform green, covered with minute punctations. Mandibles, dark brown. Head width, 2.1 mm.

Body surface minutely rugose and glistening. Shallow transverse creases between segmental junctures. Ground color greenish-yellow to greenish-white, with green blotches dorsally and subdorsally, partially obscuring ground color, giving a scaled appearance, somewhat resembling juniper leaves. Dorsal and sublateral green



EXPLANATION OF PLATE

Sphinx sequoiae engelhardti Clark. Fig. 1, Egg. Fig. 2, Highly magnified surface of egg. Figs. 3 and 4, First instar larva, dorsal and lateral aspects. Fig. 5, Mature larva, dorsal aspect. Fig. 6, Frontal view of head, enlarged. Fig. 7, Pupa, ventral aspect.

Reproduced from water color drawing by J. A. Comstock.

blotches slightly tinged with pinkish-tan internally. The dark spiracles contained within large semicircles of greenish-yellow merging with infrastigmatal fold. Caudal horn yellowish-green, slender and long, originating from a brownish hump, rising vertically, 3 mm in height, to a dark brown forked and recurved tip. Minute, stiff, erect, brown spines throughout its length.

A fine dark pile covering dorsal surface of body, observable under an $8\times$ lens. Ventral surface more uniform in surface pattern than remainder of body, concolorous with it.

Thoracic legs, dark brown. Prolegs, translucent green.

Fourth instar: Length, 30 mm, width through widest segment, 3 mm.

Head width, 3 mm; mottled yellowish-green and darker green; covered with minute setae arising from small nodules, such as occur over body surface. Mandibles and antennae dark brown.

Body ground color, glistening bright green with a yellowish cast. Under $8\times$ magnification body seen to be covered with minute yellow nodules bearing colorless setae. Fine transverse creases on posterior portion of each segment terminating laterally at infrastigmatal fold. Four rows of pure white spots in the form of droplets subdorsally and laterally (about 9 per row); interspaced by finely traced white lines. Six transverse, somewhat triangular, red-brown markings middorsally shading to slightly darker at perimeters. These beginning segment 5 between the white spots, continuing to caudal hump. Latter superimposed by a rugose, rather bulbous, fleshy-appearing excurved horn, tipped by a pair of short, dark brown, tooth-like processes.

The black spiracles encircled by a dense, light tan pile with a frosted appearance under a lense; becoming lighter and less dense, tending to terminate sublaterally. At the lower broken line of white spots, a slight covering of pile continuing down to upper portion of each proleg.

Cervical shield dorsally with four yellowish, transverse dashes on anterior edge, four centrally located radiating whitish dashes.

Frontal spiracle diagonally placed, larger, more intensely marked than the others, with a conspicuous red-brown mark near it; the adjoining white spot with a yellowish cast.

Thoracic legs translucent green. Prolegs translucent green, with a dark band encircling their lower extremity; distal margins and crochets dark brown. Ventral surface, mottled yellow-green and darker green.

Fifth instar: (Fig. 5, 6) Length, fully extended, 45 mm. Width through center, 7.5 mm.

Head width 4.25 mm. Ground color of head yellow-green; center of front dark green, shading to yellow laterally. Center of maxilla and mandibles colored similarly to front. Each side of head capsule crossed longitudinally by two greenish bars (See Fig. 6) superimposed on a yellow-green base. Antennae, green proximally, yellow distally. Three of the ocelli on each side black, the remainder translucent.

Ground color of body, rich green, of same tone as juniper foliage.

A longitudinal wide bar or line of large red-brown spots middorsally, discontinuous on the first four or five segments, becoming confluent caudally. Along lateral edge of these large spots a line of conspicuous, raised, white spots, running from the meso thoracic segment to cauda. A similar line of white spots parallel dorso-laterally. A third line of large triangulate raised spots running along spiracles yellow-brown; spiracles resting on upper margin of these spots, conspicuously black, with narrow white rims.

Caudal horn stubby, short (2.35 mm in length), green, tipped with yellow; resting on an elevated, red-brown base.

Body segments ridged transversely, each segment with from seven to ten ridges, along edges of which are lines of minute white dots.

Thoracic legs green with brown tips. Prolegs, green, with pinkish-brown crochets.

A single larva was used for the description and drawing of this instar having been reared from eggs deposited by the confined female taken on July 31, 1965.

PUPA: (Fig. 7) Length 28 mm. Width through midthoracic area 8 mm. Head and thorax dark brown. Eyes not prominent. Wings tinged with green, sufficiently translucent to faintly indicate the underlying segmental lines.

Glossotheca (tongue case) relatively short (approximately 5 mm), curving toward body, resting on ventral surface of thorax; expanding at base, tapering caudally. Thoracic segments reddish-brown. Antennae extending two-thirds the distance toward wing tips, shorter than maxillae.

Cremaster dark, conical, tapering to a point, from which two small spines extend distally.

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THE MONARCH BUTTERFLY (DANAIDAE) IN NORTHERN SASKATCHEWAN

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There seems to be little known about the northern distribution of the monarch, *Danaus plexippus* (L.), in Canada. This species is the best known butterfly migrant; it migrates southward in the fall to the southern United States before the advent of heavy frosts in Saskatchewan. In the Riding Mountains of Manitoba occasional stragglers will linger into mid-September as I observed in 1962, while in southern Manitoba fresh individuals can be netted around Winnipeg into the third week of September. Very likely these do not survive the cold weather. The monarch is actually abundant during some years around the outskirts of Winnipeg, but apparently no records of mass movements exist in the literature for the Winnipeg area. It is, nevertheless, quite likely that these movements do occur.

During fifteen years of rather intensive butterfly collecting in the area of The Pas, Manitoba, 500 miles north of Winnipeg, I have not seen a single individual of the monarch. From time to time dismembered specimens are found around garages at The Pas. These probably have fallen