

NEW OR LITTLE-KNOWN CRANE-FLIES FROM CALIFORNIA

(TIPULIDAE, DIPTERA), III

By CHARLES P. ALEXANDER

The preceding part under this general title was published in 1946 (Bull. So. California Acad. Sci., 45 1-16, pls. 1-2). At this time I am discussing some unusually interesting collections from Palomar Mountain, San Diego County, collected chiefly by Dr. John A. Comstock, with the able assistance of Mrs. Comstock, most of the specimens having been taken between July 1st and 7th, 1945. From July 11th to 13th, 1946, I was privileged to camp at this same place with Dr. Comstock and so personally investigate this most interesting station. Dr. Comstock observed that Tipulidae were much less common in 1946 than in the preceding year, when they came abundantly to his Coleman lanterns at the camp ground. At this place a small stream flows nearby but at the time of our visit in 1946 this was very low to intermittent and relatively few crane-flies were found here, either at light or by careful sweeping. The finest collecting was along the upper reaches of Doane Creek, along the Doane Valley trail, at an approximate altitude of 4700 feet. Here there is a beautiful permanent stream flowing down the mountain valley, providing ideal haunts for these flies. The forest cover was heavy and protected a rich under story of shrubs and herbs, the most evident being incense cedar, poison oak, box elder, brake, hellebore, nettle, red columbine, lupine, sweet cicely, yellow mimulus and many others. From such rank vegetation many of the flies were swept during the daytime while various others came to the Coleman lanterns operated at the head of the ravine on the evenings of July 11th and 12th. I cannot sufficiently thank Dr. Comstock for his appreciated interest in collecting these flies on Palomar Mountain and elsewhere in southern California. In accordance with the practice adopted in Part II of this series of papers the various species are numbered serially, those that had been reported in earlier papers under this title being given their original number, placed in parenthesis. Undoubtedly many further additions to the Palomar list will be made as a result of collecting at different places and at various seasons.

24. *Holorusia* (*Holorusia*) *grandis* (Bergroth) (*rubiginosa* Loew, nec *rubiginosa* Bigot).
Doane Valley Creek, July 6, 1945; July 12, 1946.
25. *Nephrotoma occidentalis* (Doane).
July 7, 1945.
- (11) *Tipula* (*Trichotipula*) *beatula* Osten Sacken.
July 3-4, 1945; July 12, 1946.
26. *Tipula* (*Yamatotipula*) *meridiana* Doane.
July 12, 1946.
27. *Tipula* (*Oreomyza*) *comstockiana* sp. n.

Belongs to the *unca* (*borealis*) group; size large (wing over 16 mm.); general coloration of mesonotum light gray to buffy, the praescutum with darker stripes that are heavily and conspicuously bordered by brown, the anterior ends of the intermediate stripes much expanded; a short dorsopleural stripe; femora and tibiae obscure yellow, the tips narrowly infuscated; wings with a highly contrasted pattern of whitish subhyaline, medium brown and darker brown; *Rs* long, nearly three times *m-cu*; abdominal tergites trivittate with brown; male hypopygium with the outer dististyle short and broad; crest of inner dististyle with a brush of long fimbriate setae; lateral appendage with three processes, the median one a weak spinous lobe on the margin of the pendulous lower blade; eighth sternite trilobed, the lateral lobes distinctly longer than the median one, all provided with conspicuous yellow setae.

MALE: Length about 16-17 mm.; wing 17-17.5 mm.; antenna about 5.5-5.6 mm.

FEMALE: Length about 20-23 mm.; wing 18-22 mm.

Frontal prolongation of head buffy above, dark brown on sides; nasus usually long and slender; palpi dark brown. Antennae with scape whitened; pedicel obscure yellow; first flagellar segment brown, the remaining ones black; segments feebly incised. Head light gray, especially in front, with a capillary dark line on vertex.

Pronotum gray, restrictedly variegated with brown. Mesonotal praescutum light gray to buffy, heavily and conspicuously patterned with brown, the latter appearing as margins to the slightly darker gray stripes, the anterior ends of the intermediate dark pair much expanded and confluent with the margins of the lateral

stripes, isolating the posterior interspaces; posterior sclerites of notum gray, the scutal lobes slightly patterned with gray; mediotergite with an oval brown area on either side of the midline, the posterior border similarly darkened. Pleura and pleurotergite whitish gray, patterned with brown, including an incomplete dorsal stripe from the cervical region across the anepisternum, and the ventral sternopleurite, meron and katapleurotergite. Halteres light brown, base of stem yellow; knob infuscated. Legs with the coxae gray, in cases darkened basally; trochanters yellow; femora and tibiae obscure yellow, the tips narrowly infuscated; tarsi black, the proximal ends of the basitarsi yellow; claws (male) toothed. Wings with a highly contrasted pattern of whitish subhyaline, medium brown and darker brown, the amount of dark color slightly exceeding the pale, being much more extensive in the cubital and anal fields; cell *C* light brown, *Sc* yellow; stigma obscure yellow, especially the more costal portion; white band beyond cord completely traversing wing and involving almost all of cell *R*₅; further white areas in bases of cells *M*₁ and 2nd *M*₂ and again basad of cord; cells *R*₁, *R* and *M* chiefly white; no postarcular darkening; veins brown, more yellowed in the pale fields. Venation: *Rs* long, nearly three times *m-cu*.

Abdominal tergites buffy, trivittate with brown, the posterior and lateral borders conspicuously of the ground color; sternites uniformly pale; hypopygium extensively pale brown. Ovipositor with cerci long and slender, nearly straight, much exceeding the hypovalvae. Male hypopygium having the spines of the ninth tergite, *9t*, slender. Outer dististyle, *od*, unusually broad, only about twice as long as wide, the apex obliquely obtuse. Inner dististyle, *id*, with the beak short but slender, slightly upcurved; lower beak stout; dorsal crest behind beak with a brush of long fimbriate or roughened setae; lateral appendage with three processes, including a flattened upper blade and a long pendulous lower one, the latter bearing a weak spinous lobe on outer margin before midlength. Gonapophysis, *g*, appearing as a narrow flattened sinuous blade, a little shorter than the aedeagus, not strongly bent at base, as in certain allied species. Eighth sternite, *8s*, distinctive; trilobed, the lateral lobes distinctly longer than the more truncated median one; all lobes densely provided with conspicuous yellow setae. Male hypopygium (Plate 9, Fig. 1).

Holotype, ♂, Palomar Mountain, altitude 4700 feet, July 5, 1945 (J. A. Comstock). *Allotopotype*, ♀, pinned with the type. *Paratopotypes*, 8 ♂ ♀, with the type; also July 12, 1946 (C. P. Alexander).

I take great pleasure in naming this striking fly for my good friend, Dr. John A. Comstock, distinguished authority on the West Coast Lepidoptera. The most similar Western Nearctic species is the more northern *Tipula* (*Oreomyza*) *alia* Doane,

which differs especially in the details of pattern of body and wings, in the shorter *Rs*, and in important details of structure of the male hypopygium, including the inner dististyle, lateral appendage and eighth sternite. The Wyoming record (Amer. Midl. Nat., 33; 406-407; 1945) of *alia*, based on a single female specimen may well pertain to the present fly but the male sex is necessary for exact determination.

28. *Tipula* (*Hesperotipula*) *micheneri* Alexander.
July 3-6, 1945; July 12, 1946.

29. *Tipula* (*Lunatipula*) *praecisa* Loew.
July 3, 1945; July 12, 1946. It seems probable that more than a single species is involved in this and other material from the general area.

30. *Tipula* (*Lunatipula*) *flavomarginata* Doane.
July 6, 1945.

31. *Tipula* (*Lunatipula*) *awanichi* sp. n.

Allied to *armata*, differing especially in the structure of the male hypopygium; basistyle not produced into a spine; outer basal lobe of inner dististyle a broadly flattened disk, at apex abruptly produced into a slender straight spine.

MALE: Length about 17-18 mm.; wing 19-20 mm.; antenna about 5.5-6 mm.

FEMALE: Length about 19-21 mm.; wing 18-19 mm.

Male with the frontal prolongation of head yellow; nasus elongate; palpi with basal segments brownish yellow, the outer segments passing into black. Antennae with basal three segments yellow, the succeeding ones weakly to strongly bicolored, yellow to obscure yellow, the small basal swellings darkened; outer segments more uniformly darkened. Head light gray with a narrow brown median stripe that is narrowed behind; setigerous punctures on posterior vertex blackened, conspicuous.

Pronotum brownish yellow. Mesonotal praescutum obscure yellow, with four reddish brown stripes, the intermediate pair separated by a yellow line that is about one-half as wide; posterior sclerites of notum gray, the scutal lobes with two confluent reddish brown areas. Pleura gray pruinose. Halteres with stem brownish yellow, knob brownish black basally, the apex pale. Legs with the coxae gray pruinose; trochanters yellow; femora yellow, the tips narrowly dark brown; tibiae obscure yellow; tarsi light brown, the outer segments darker; claws (male)

toothed. Wings with a weak brownish ground, rather conspicuously patterned with darker, including a small spot in cell *R* at near one-third the length, adjoining vein *R*; a larger area at origin of *Rs*; stigma; dark markings in centers of outer radial cells; prearcular and costal fields yellow; conspicuous whitened areas along the cord and beyond the stigma, the former reaching the posterior border along vein *M*₄; whitish streaks along outer end of vein 1st *A* and at outer end of this cell closer to vein 2nd *A*; veins brown. Venation: *Rs* about two and one-half times *m-cu*; *m* and petiole of cell *M*₁ subequal.

Abdomen yellow, the tergites with a narrow median stripe that is broken at the posterior borders of the segments and a much broken sublateral stripe, the latter restricted to spots on the basal rings; sternites yellow; hypopygium castaneous. Male hypopygium (Fig. 3) with the basistyle not produced into a spine, its outer end truncate; inner dististyle with both the beak and lower beak very obtuse and blackened at tips, in shape very similar to one another; outer basal lobe a broadly flattened disk, at apex abruptly produced into a slender straight spine. A single paratype (Yosemite) has the apex of the basistyle produced into a weak spine but otherwise agrees entirely with the present fly.

The female is darker throughout, including the mesonotal pattern. Ovipositor with both the cerci and hypovalvae elongate, the latter longer than the former.

Holotype, ♂, Palomar Mountain, altitude 4700 feet, July 4, 1945 (J. A. Comstock). *Allotopotype*, ♀, pinned with type. *Paratopotypes*, ♂ ♀, July 3-6, 1945, July 12, 1946; *paratypes*, 10 ♂ ♂, Mirror Lake, Yosemite, altitude 4000 feet, June 6, 1939 (Aitken & Downes); 1 ♀, Miami, Mariposa Co., June 7, 1940 (Cazier); 3 ♂ ♂, Wawona, Mariposa Co., altitude 5000 feet, June 6, 1939 (Downes); 1 ♂, Meadow Valley, Plumas Co., altitude 3500-4000 feet, June 15, 1924 (E. C. Van Dyke), California Academy of Sciences; ♂, Barton Flats, San Bernardino Mts., July 16, 1946 (J. L. Sperry).

The specific name, *awanichi*, is the Miwok name for the Yosemite Indians of the same stock. The present fly is close to *armata* Doane (*varia* Doane) and may prove to be a southern race of the same. In the latter fly the basistyle is produced caudad into a long spine; inner dististyle with its outer basal lobe obtuse or with only a slight indication of an apical point; lower beak of the inner style much smaller than the beak itself.

32. *Tipula* (*Lunatipula*) *vitabilis* sp. n.

Size medium (wing, male, 13 mm.); general coloration of mesonotum dull gray with three slightly darker stripes, the me-

dian one with slightly darker lateral borders; pleura and pleurotergite chiefly light yellow; wings with a weak brown tinge, the stigma darker; oblitative areas restricted; abdomen yellow, both the tergites and sternites with a median brown stripe; male hypopygium with the tergite and gonapophyses complicated by blackened spinous processes; basistyle with its outer end produced into a flattened black plate that is unequally bidentate at apex; eighth sternite with three groups of setae.

MALE: Length about 12.5 mm.; wing 13 mm.; antenna about 4.2 mm.

FEMALE: Length about 13-14 mm.; wing 14-15 mm.

Frontal prolongation of head yellow; nasus lacking; palpi with basal two segments brownish yellow, outer segments black, the terminal one elongate. Antennae (male) of moderate length, as shown by the measurements; basal three segments yellow, the apex of the third weakly darkened; remainder of flagellum uniformly black; flagellar segments only slightly incised, the basal swellings very small; verticils shorter than the segments; terminal segment an elongate thimble. Head above light gray, with a brown central stripe; vertical tubercle very low.

Pronotum buffy yellow, slightly darker above. Mesonotum with the ground dull gray, the three stripes very slightly darker gray, the median one delimited by more infuscated lateral margins; scutum and scutellum dark gray, the mediotergite light gray. Pleura and pleurotergite chiefly light yellow, the ventral sternopleurite gray. Halteres with stem obscure yellow, clear yellow at base; knob brownish black, the apex restrictedly yellow. Legs with the coxae and trochanters yellow; femora yellow, the tips narrowly infuscated; tibiae yellow, the tips evenly more narrowly darkened; tarsi passing into black; tarsal claws (male) toothed. Wings with a weak brownish tinge, the stigma darker brown; prearcular and costal fields, especially cell *Sc*, more yellowed; vague streaks or lines in certain of the cells; two small isolated oblitative areas, one before the stigma, the other across cell *1st M*₂; veins brown, more brownish yellow in the brightened fields. Venation: *R*₁₊₂ entire; *m* oblique, about three-fifths as long as the basal section of *M*₃; petiole of cell *M*₁ longer than *m*.

Abdomen yellow, the tergites with a broad conspicuous central stripe, slightly interrupted at the posterior borders of the segments; no sublateral darkenings; sternites with a comparable but somewhat less distinct stripe; hypopygium brownish yellow. Male hypopygium with the ninth tergite and basistyle entirely cut off by sutures, the latter with its lower cephalic angle nearly square. Ninth tergite, *9t*, with a cephalic portion and a more caudal flat-

tened plate, the cephalic border of which is elevated into a transverse ridge, with the ends more elevated into spinous points that are directed dorsad; a smaller posterior pair of spines that are directed more caudad; beyond these spines, the outer part of the tergite is produced into a yellow plate on either side. (It is possible that this entire outer flattened structure, with the blackened armature, may fold backward onto the ventral surface of the tergite, as does the so-called "*tergal saucer*" in some species of the subgenus *Vestiplex*). Outer portion of ninth sternite, *9s*, ventrad of the basistyle, paler than the more basal portion. Appendage of sternite very low to scarcely developed, provided with several strong black setae; the small free ventral end with a few weaker yellow bristles. Basistyle, *b*, with the entire outer end produced caudad into a flattened black plate that is unequally bidentate at tip, the more dorsal spine longer and more acute. Outer dististyle, *od*, inserted near base of the major inner style, slightly expanded at base, narrowed outwardly. Inner dististyle, *id*, with the whole apical third a blackened head that is produced into a beak, the lower beak lacking; outer basal lobe lying unusually far distad, immediately back of the blackened head, appearing as a low lobe provided with long yellow setae. Gonapophyses, *g*, jutting from the genital chamber, appearing as paired blackened arms that are produced into an acute spine and an outer more elongate rod. Eighth sternite, *8s*, moderately sheathing, narrowed outwardly, the caudal margin with a triangular group of long yellow setae, subtended on either side by low lobes that are similarly provided with long yellow setae, the outermost a little shorter. Male hypopygium (Plate 9, Fig. 2).

Holotype, ♂, Palomar Mountain, altitude 4700 feet, July 4, 1945 (J. A. Comstock). *Allotype*, ♀, Del Mar, April 29, 1945 (J. A. Comstock). *Paratopotype*, 1 ♂, July 6, 1945; *paratypes*, 2 ♂♂, 1 ♀, with the allotype, April 1-29, 1945; 1 ♂, Hastings Reservation, Monterey County, along Finch Creek, June 21, 1943 (Jean Linsdale).

Although this fly shows some points of resemblance to species such as *Tipula* (*Lunatipula*) *mariposa* Alexander and *T. (L.) yosemite* Alexander, I believe it is closer to *T. (L.) atrisumma* Doane, a belief that is strengthened by the structure of the ovipositor. This structure is short and obtuse, somewhat as in *atrisumma*; cerci oval, with blunt tips, the entire surface covered with setae; hypovalvae very small, the tips produced into slender acute spines.

33. *Tipula* (*Lunatipula*) *bifalcata* Doane.
July 3-7, 1945.

34. *Tipula* (*Lunatipula*) *megalabiata referta* subsp. n.

Characters as in the typical subspecies, *megalabiata* Alexander (Washington, Oregon, south to Yosemite, California; No. 7 of this series), differing in the details of structure of the male hypopygium, particularly the dististyles and the aedeagus.

As compared with *megalabiata*: Inner dististyles only slightly asymmetrical, both with a large foot-shaped lobe connecting the base of main body of style on outer face with the outer basal lobe. On one of the styles, the outer basal lobe is a trifle broader than on the style of the opposite side and bears a short marginal spine; otherwise the two styles appear quite similar in general outline, both provided with very long yellow setae. Aedeagus differently constructed; on either half with a single major spine occupying the outer edge, with two much smaller, more inner spines that are approximately equal to one another in size and shape.

Holotype, ♂, Palomar Mountain, altitude 4700 feet, along Doane Creek trail, July 12, 1946 (C. P. Alexander). The specimen was swept from shrubbery on the dry hillside, remote from water.

35. *Limonia* (*Limonia*) *sciophila* (Osten Sacken).
July 12, 1946.
36. *Limonia* (*Limonia*) *simulans concinna* (Williston).
July 6-7, 1945.
37. *Limonia* (*Dicranomyia*) *brevivena* (Osten Sacken).
July 4, 1945.
38. *Limonia* (*Dicranomyia*) *humidicola* (Osten Sacken).
July 7, 1945; July 11-12, 1946.
39. *Limonia* (*Dicranomyia*) *stigmata* (Doane).
July 3, 1945.
40. *Limonia* (*Geranomyia*) *canadensis* (Westwood).
July 6, 1945; July 12, 1946.
41. *Limonia* (*Geranomyia*) *diversa* (Osten Sacken).
July 3-6, 1945; July 12, 1946.
42. *Dicranoptycha laevis* Alexander.
July 12, 1946; type material.
- (10) *Elliptera clausa* Osten Sacken.
July 3-7, 1945; July 12, 1946.

43. *Pedicia (Tricyphona) septentrionalis* (Bergroth), var.
July 4-6, 1945.
44. *Dicranota (Rhaphidolabis) cazieriana* Alexander.
July 4-6, 1945.
45. *Dicranota (Rhaphidolabis) neomexicana* (Alexander).
July 5, 1945.
46. *Austrolimnophila badia* (Doane).
July 6, 1945.
47. *Limnophila (Elaeophila) apiculata* Alexander.
July 7, 1945; 1 female.
48. *Limnophila (Elaeophila) edentata* Alexander.
July 4-7, 1945; July 12, 1946.
49. *Limnophila occidens* Alexander.
July 7, 1945.
50. *Hexatoma (Eriocera) palomarensis* sp. n.

Allied to *californica*; general coloration of thorax light brown or reddish brown, the praescutum with four darker brown stripes, the intermediate pair narrow; vestiture of body short and sparse; antennae (male) elongate, approximately twice the length of wing; femora obscure brownish yellow, the tips narrowly brownish black, the amount subequal on all legs; wings with a strong light brown ground, vaguely patterned with slightly darker brown and more yellow areas, the former including the stigma; sparse macrotrichia on outer radial and medial veins.

MALE: Length about 14-15 mm.; wing 16-17 mm.; antenna about 34-35 mm.

FEMALE: Length about 23 mm.; wing 18 mm.

Rostrum obscure yellow; palpi with the first segment obscure yellow, the remainder black, provided with conspicuous black setae. Antennae (male) elongate, as shown by the measurements; scape, pedicel and base of first flagellar segment obscure yellow, the remainder of the organ black; flagellar segments provided with elongate spinous setae that become longer, more delicate and more widely spaced on the outer segments; proportions of flagellar segments, 1-4.4 mm.; 2-6.1 mm.; 3-10.5 mm. In average *californica*, flagellar segment 1-6.5 mm.; 2-9 mm.; 3-14 mm.;

total length 40 mm. Head light reddish brown, golden yellow pollinose.

Pronotum brownish yellow. Mesonotal praescutum with the disk reddish brown, the lateral borders gray; four darker brown stripes, the intermediate pair narrow, representing the borders of a much paler central stripe, the darkened portions only about one-third as wide as the pale central line; lateral stripes broader; posterior sclerites of notum reddish brown, the centers of the scutal lobes and the scutellum slightly darker, the mediotergite vaguely pruinose. Pleura and cephalic portion of pleurotergite more heavily pruinose; dorsal portion of pleura, before the wing-root, restrictedly more darkened. Vestiture of body, especially the head, mesonotum and abdomen very short and sparse, as compared with *californica*. Halteres short, stem yellow, knob conspicuously blackened. Legs with the coxae heavily light gray pruinose; trochanters obscure yellow; femora obscure brownish yellow, clearer yellow at bases, the tips narrowly brownish black, the amount subequal on all legs; tibiae and tarsi brownish yellow, the terminal segment more blackened. Wings (Fig. 4) with a strong light brown ground, vaguely patterned with slightly darker brown and more yellowish areas; the darker portions include the proximal part of the costal field and the poorly indicated stigma; the paler areas occur as central streaks in cells R , R_1 , M and 1st A ; veins beyond cord dark brown, basad of cord becoming yellow. Macrotrichia on outer radial veins, in the medial field restricted to three or four trichia on veins M_1 and M_2 , the trichia more abundant than in *californica*. Venation: R_{2+3+4} variable, from a little shorter to slightly longer than the basal section of R_5 ; cell M_1 subequal to its petiole.

Abdominal tergites obscure brownish yellow, vaguely more darkened medially but not forming a stripe; sternites and hypopygium more uniformly yellow.

Holotype, ♂, Palomar Mountain, altitude 4700 feet, along stream, July 6, 1945 (J. A. Comstock). *Allotype*, ♀, near Seven Oaks, San Bernardino Mts., altitude 5800 feet, August 10, 1946 (J. L. Sperry). *Paratopotype*, ♂, along dry trail above stream, July 12, 1946 (J. A. Comstock); *paratypes*, 1 ♂, pinned with allotype; a few ♂♂, Barton Flats, San Bernardino Mts., altitude 6300 feet, swarming beneath incense cedar trees at camp, July 15, 1946 (C. P. Alexander).

This interesting fly is most nearly allied to *Hexatoma* (*Eriocera*) *californica* (Osten Sacken), of the costal redwood belt of central California. The latter differs in the somewhat larger size, details of coloration, conspicuously hairy body, and markedly different proportions of the antennal segments.

51. *Hexatoma (Eriocera) saturata* (Alexander).

July 12, 1946; 1 badly eaten body, with a single wing, found in a spider's web, altitude 4700 feet.

52. *Gnophomyia (Gnophomyia) comstocki* sp. n.

General coloration of mesonotum brownish gray, the thoracic pleura dark brown dorsally, reddish brown beneath, with a pale yellow longitudinal stripe; wings grayish yellow, stigma very pale brown; branches of *Rs* elongate, all extending generally parallel to one another; *m-cu* about one-fifth to one-sixth its length beyond the fork of *M*; male hypopygium with a large brush of blackened setae on mesal face of basistyle; outer dististyle a long curved blackened rod, at apex with a long row or brush of very long crinkly yellow setae; inner dististyle bent very strongly at near midlength, the apex obtuse.

MALE: Length about 6.5 mm.; wing 5.8 mm.; antenna about 1.2 mm.

Rostrum brown; palpi black. Antennae with scape and pedicel black, flagellum dark brown; flagellar segments elongate-oval to subcylindrical; longest verticils only slightly exceeding the segments. Head dark gray.

Pronotum above light yellow, dark brown on sides; pretergites clear light yellow. Mesonotal praescutum and scutum dark brownish gray, the former with an intermediate pair of more brownish stripes; humeral and lateral regions of praescutum yellow; pseudosutural foveae brownish black; scutellum obscure brownish yellow; mediotergite dark brown, the lateral portions, with the pleurotergite, more reddish brown. Pleura variegated brown and pale, the latter including a broad ventral stripe extending from behind the fore coxae to the base of abdomen; ventral pleurites reddish brown, the dorsal ones much darker, producing a short dorsal stripe from the cervical region to the pteropleurite. Halteres yellow, knob very insensibly darker. Legs with the coxae and trochanters yellow; femora obscure yellow, the tips more infuscated, broadest on the fore legs, very narrow on the posterior pair; tibiae and basitarsi obscure brownish yellow, the tips more infuscated; remainder of tarsi black. Wings (Fig. 5) with a grayish yellow tinge, the prearcular and costal fields clearer yellow; stigma very pale brown, poorly defined; veins pale brown, more yellowed in the brightened fields. Venation: Sc_1 ending nearly opposite the fork of *Rs*, Sc_2 far from its tip; R_2 about twice as long as R_{2+3} or one-half R_{2+3+4} ; R_{1+2} elongate, all extending generally parallel to one another; cell 1st M_2 nar-

row, about equal in length to vein M_4 ; $m-cu$ about one-fifth to one-sixth its length beyond the fork of M .

Abdomen light brown, the hypopygium more brownish yellow. Male hypopygium (Fig. 6) with the basistyle, b , relatively stout, on mesal face at near midlength with a large group or brush of abundant blackened setae, directed caudad; apex of basistyle a trifle produced beyond the bases of the dististyles. Outer dististyle, d , a long curved black rod, the tip with three or four pale teeth; immediately before apex of style with a long row or brush of very long crinkly yellow setae; mesal face of style near base with a series of blackened teeth or knobs. Inner dististyle shorter, very strongly bent at near midlength, the apex obtuse. Phallosomic plate, p , broad, the central portion a little elevated, at the summit restrictedly blackened. Aedeagus relatively slender, gently sinuous, the tip produced into a long spinous point.

Holotype, ♂, Palomar Mountain, altitude 4700 feet, July 4, 1945 (J. A. Comstock). *Paratopotypes*, 4 ♂♂, July 4-7, 1945; July 12, 1946 (Comstock & Alexander).

This entirely distinct fly is named for Dr. Comstock, in appreciation of his many kindnesses to me in our study of the Tipulidae of California. The species is entirely different from all others so far discovered in the New World. The very peculiar male hypopygium renders comparison with any other regional form quite unnecessary.

53. *Gonomyia (Idiocera) californica* Alexander.
July 6-7, 1945.

54. *Gonomyia (Idiocera) coloradica* Alexander.
July 3-7, 1945, July 12, 1946.

55. *Gonomyia (Idiocera) proserpina* Alexander.
July 12, 1946. This distinct fly, hitherto recorded only from the Rocky Mountain states, was common at Barton Flats, in the San Bernardino Mountains, later in July 1946.

56. *Gonomyia (Gonomyia) poliocephala* Alexander.
July 4, 1945.

57. *Gonomyia (Gonomyia) aciculifera* Alexander.
July 12, 1946. This specimen differs slightly from other California materials, particularly in wing pattern and venation, but I regard the identification as correct.

58. *Gonomyia* (*Gonomyia*) *flavibasis* Alexander (*tuberculata*) Alexander.
July 12, 1946.
59. *Rhabdomastix* (*Sacandaga*) *californiensis* Alexander.
lata Alexander).
July 3, 1945; July 12, 1946.
60. *Erioptera* (*Psiloconopa*) *bipartita* Osten Sacken.
July 12, 1946.
61. *Erioptera* (*Mesocyphona*) *eiseni* Alexander.
July 12, 1946.
62. *Erioptera* (*Symplecta*) *cana* (Walker).
July 4, 1945.
63. *Molophilus* (*Molophilus*) *palomaricus* sp. n.

Belongs to the *plagiatus* group; general coloration brownish black to black, the surface subopaque; antennae (male) elongate, about one-half the length of wing; flagellar segments elongate-subcylindrical, the longest verticils unilaterally distributed, one on each segment; knobs of halteres light yellow; legs brownish black, the femoral bases restrictedly obscure yellow; wings with a dusky tinge, the stigmal region slightly darker but diffuse; male hypopygium with the basal dististyle a long curved black rod, very gradually narrowed to the acute apex; phallosomic plate narrow, the apex obtuse, surface glabrous.

MALE: Length about 3.5 mm.; wing 3.8 mm.; antennae about 1.9-2.0 mm.

Rostrum and palpi black. Antennae (male) elongate, black throughout; flagellar segments elongate-subcylindrical to truncate-fusiform, with vestiture of four distinct sizes, the longest being single unilaterally distributed verticils, one near base of each segment; the next longest include pale erect setae of approximately two-thirds the length. Head blackish, the anterior vertex slightly more pruinose.

Thorax brownish black, the surface subopaque. Halteres with stem dusky, the base narrowly yellow, knob conspicuously light yellow. Legs with the coxae and trochanters yellow; remainder of legs brownish black, the femoral bases restrictedly obscure yellow, somewhat more extensively so on the posterior legs. Wings with a dusky tinge, the stigmal region slightly darker but diffuse; veins brown. Venation: R_2 some distance beyond level of $r-m$,

R_{2+3} being nearly three times as long as R_{4+5} ; petiole of cell M_3 a little more than twice $m-cu$; vein $2nd\ A$ sinuous, ending about opposite the caudal end of $m-cu$.

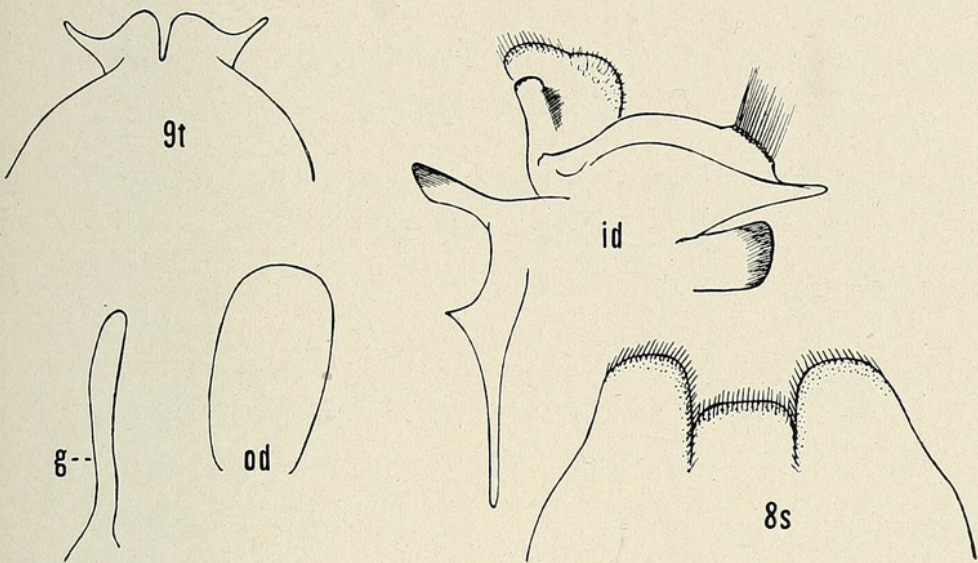
Abdomen, including hypopygium, black. Male hypopygium (Fig. 7) with the beak of ventral lobe of basistyle, b , slender, straight. Outer dististyle with both arms slender, the longer one even more narrowed. Basal dististyle, bd , a long curved black rod from a dilated base, very gradually narrowed to the acute apex; surface with scattered microscopic punctures over most of the length. Phallosomic plate, p , narrow, the apex obtuse, surface glabrous.

Holotype, ♂, Palomar Mountain, altitude 4700 feet, July 6, 1945 (J. A. Comstock). *Paratype*, ♂, Sequoia National Park, entrance, route 198, altitude 4000 feet, July 18, 1946 (C. P. Alexander).

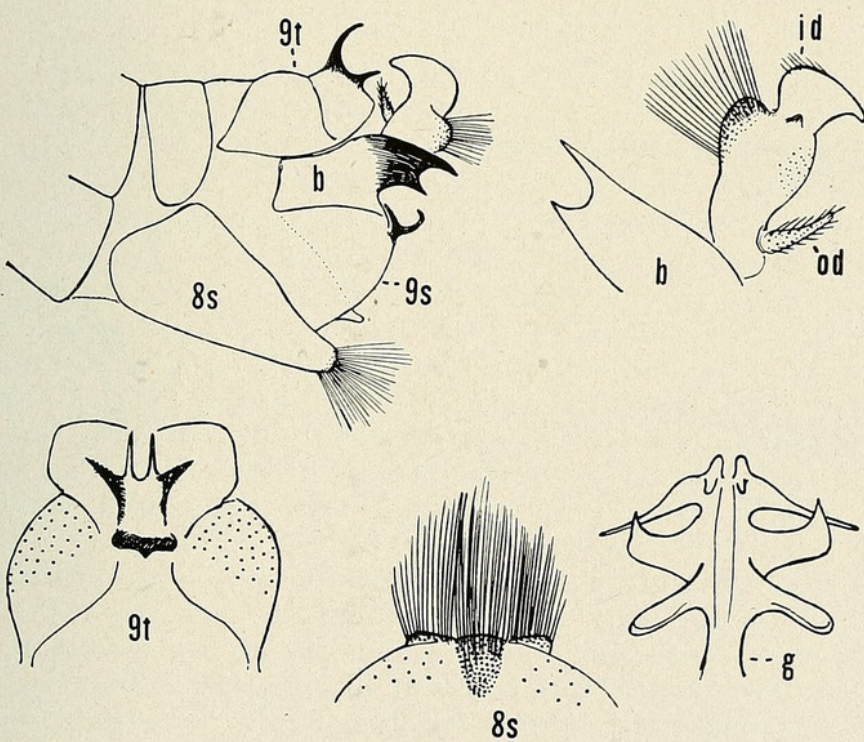
Molophilus (Molophilus) palomaricus is very distinct from the two other described species in the southwestern United States belonging to the same group (*arizonicus* Alexander, *ursus* Alexander). It differs decisively in the structure of the male hypopygium, particularly the basal dististyle. In this latter regard it somewhat suggests various Mexican species, such as *M. (M.) falx* Alexander, *M. (M.) sagax* Alexander, and *M. (M.) severus* Alexander, differing from all in the structure of the male hypopygium and antennae. As regards the antennae, it is most similar to *sagax*.

64. *Molophilus (Molophilus) perflaveolus* Alexander.
July 12, 1946.

65. *Molophilus (Molophilus) spiculatus* Alexander.
July 4, 1945.



1



2

PLATE 9

Details of male hypopygia

FIG. 1. *Tipula (Oreomyza) comstockiana* sp. n.

FIG. 2. *Tipula (Lunatipula) vitabilis* sp. n.

(Symbols: b, basistyle; g, gonapophysis; id, inner dististyle; od, outer dististyle; s, sternite; t, tergite).

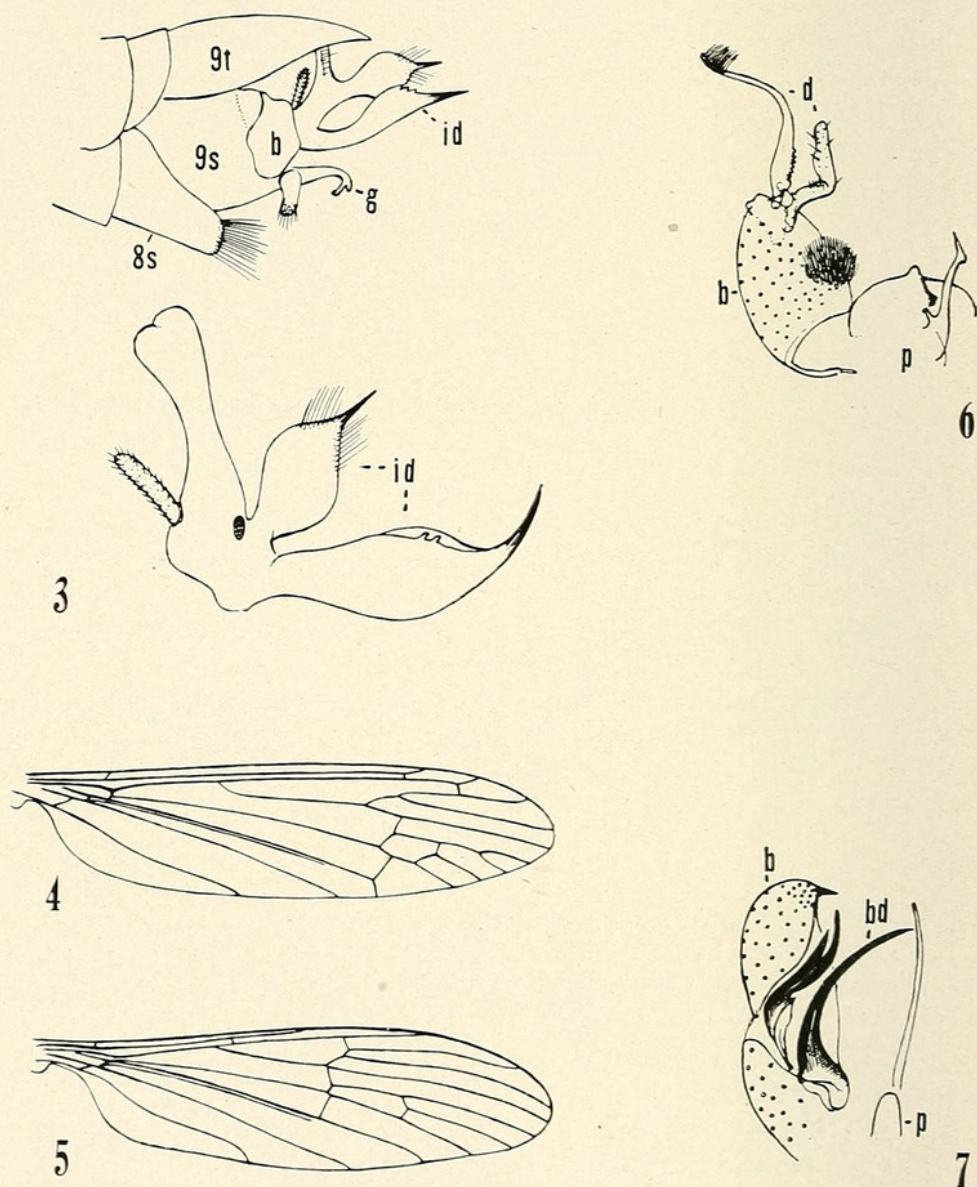


PLATE 10

FIG. 3. *Tipula* (*Lunatipula*) *awanichi* sp. n.; male hypopygium.

FIG. 4. *Hexatoma* (*Eriocera*) *palomarensis* sp. n.; venation.

FIG. 5. *Gnophomyia* (*Gnophomyia*) *comstocki* sp. n.; venation.

FIG. 6. *Gnophomyia* (*Gnophomyia*) *comstocki* sp. n.; male hypopygium.

FIG. 7. *Molophilus* (*Molophilus*) *palomaricus* sp. n.; male hypopygium.

(Symbols: *b*, basistyle; *bd*, basal dististyle; *d*, dististyles; *g*, gonapophysis; *id*, inner dististyle; *p*, phallosome; *s*, sternite; *t*, tergite).

THE FAUNA AND FLORA OF THE EL SEGUNDO SAND DUNES

16. A NEW EUCOSMA FROM THE EL SEGUNDO SAND DUNES

(Olethreutidae: Lepidoptera)

By J. F. GATES CLARKE

Bureau of Entomology and Plant Quarantine, Agricultural Research
Administration, United States Department of Agriculture

The following new species was submitted by Dr. John A. Comstock and is being described as a contribution to a series of papers by Dr. Comstock and his associates on the ecology of the El Segundo Sand Dunes of California.

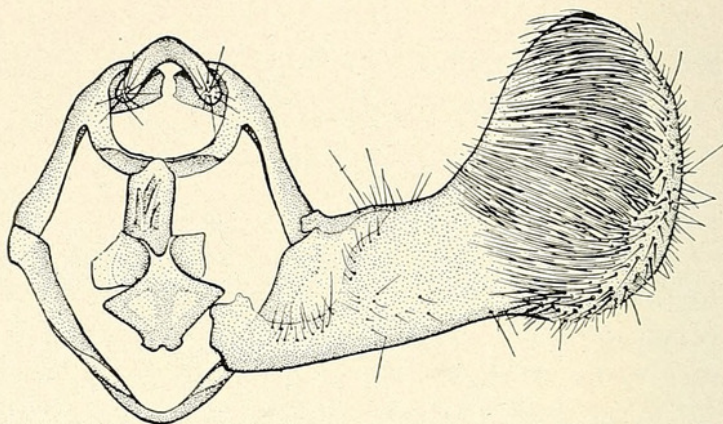
Dr. Comstock has generously consented to my naming this *Eucosma* and will add notes on the metamorphosis of the species at the end of the description.

The drawings of the genitalia were made by the author.

EUCOSMA HENNEL, new species

Labial palpus pale luteous to brown with sparse fuscous scaling exteriorly. Antenna fuscous with pale annulations. Head and thorax pale luteous to dark brown, with considerable fuscous shading posteriorly. Ground color of forewing pale yellowish fuscous overlaid and irrorated with varying amounts of fuscous scaling; basal patch ill-defined or absent but when present dark gray; from costa, at basal third a transverse, dark gray fascia extends almost to fold, turns outwardly to near middle, then continues transversely, and more broadly, to dorsum; in some specimens this fascia is represented only by a dark blotch on dorsum; from costa, an outwardly curved, crescentric dark gray, narrow fascia extends to tornus; this line is obsolete in some specimens; both fascia, though generally clearly visible, are not sharply contrasted to the remainder of the wing because of the large amount of dark scaling on the entire surface; the lighter areas of the wing are covered with fine brown reticulations and a distinct brown line borders the apex and termen; in the apical third of wing are dull leaden scales between the brown reticulations; cilia yellowish fuscous with a gray subbasal band. Hind wing pale yellowish fuscous basally shading to light fuscous around margins; cilia pale yellowish fuscous with a darker subbasal band. Fore- and midlegs brown; hind legs ochereous white shading to brown on the tarsi. Abdomen ochereous white tinged with fuscous beneath.

Male genitalia.—Harpe of about equal width to cucullus, the latter about twice as wide as neck of harpe and evenly rounded. Aedeagus short and stout; vesica armed with four or five cornuti.



Eucosma hennei, male genitalia



Eucosma hennei, female genitalia

Female genitalia.—Genital plate membranous with a rectangular sclerotized area posterior to the round ostium. Ductus bursae membranous; inception of ductus seminalis at middle, dorsally, of ductus bursae. Signa two.

Alar expanse 17-30 mm.

Type.—United States National Museum No. 58210.

Type locality.—El Segundo Sand Dunes, Los Angeles County, California.

Food plant.—*Phacelia ramosissima subsinuata* Mcbr.

Remarks.—Described from the male type, eight male and nine female paratypes, all from the same locality. The moths were reared from larvae collected by Mr. C. Henne, feeding in the roots of the food plant. The moths emerged from September 13 to October 13, 1940.

This stunning species is the more remarkable because of its great variation in size. Although considerable variation may be expected in borers, few show as much difference in sizes of individuals as does this species.

Because of the great variation between individuals, caution should be used by anyone comparing the description with specimens. The genitalia, however, should suffice to distinguish this species from all other described forms.

E. hennei is nearest to *E. dorsisignatana* (Clem.) but can be distinguished from that species by the absence of the sharply contrasted dark dorsal marking.

I take pleasure in naming this species for Mr. Henne, who has contributed greatly to the knowledge of western Lepidoptera.

17. NOTES ON THE EARLY STAGES OF EUCOSMA HENNEI Clarke

By JOHN ADAMS COMSTOCK

During the course of an ecological survey of the El Segundo Sand Dunes conducted by Dr. W. Dwight Pierce, a number of wood-boring lepidopterous larvae were collected by Dr. Pierce and others from the woody stems and upper portion of the roots of *Phacelia tanacetifolia* Benth. The first examples were taken August 31, 1938. Subsequently, in 1940, Chris Henne secured a quantity of the larvae which were reared to maturity.

Brief notes were made of the larva and pupa by the writer, as follows:

Mature Larva: Varies greatly in length depending on the girth and condition of the stems in which they occur.

Body color, light straw. Robust, and grub-like in appearance.

Legs, light straw colored, the terminal segment tipped with brown. Prolegs concolorous with body. Crotchets, brown. Spiracles, rimmed narrowly with brown, the centers concolorous with body.

A straw-colored glistening scutellum occurs on the first segment.

Head, orange brown, with orange mottling over the center of each cheek. Mandibles, dark brown.

Pupation occurs immediately within the exit of the burrow, and the pupa is partly extruded at the time of hatching.

Pupa: Length of average specimen 12 mm. Subfusiform, the cephalic end well rounded and the cauda blunt and free of cremasteric hooks.

The surface is relatively smooth throughout except for a series of spicules arranged in transverse rows. Each typical intersegmental juncture is margined anteriorly and posteriorly with one of these rows, all of which, however, occur only on the dorsum, and fade out laterally as they approach the spiracles.

The spicules aforementioned incline somewhat caudally, and undoubtedly assist the pupa in moving forward in the burrow.

Eyes, prominent and rounded. Antennae extending approximately $\frac{2}{3}$ the distance towards margin of wings. The ends of the metathoracic legs are in line with the wing margins.

Color of pupa, uniform light brown. The eyes become markedly darker as the time of emergence approaches.

Larvae collected in August emerged in September and October of the same year.

Plate 12 illustrates the pupa.

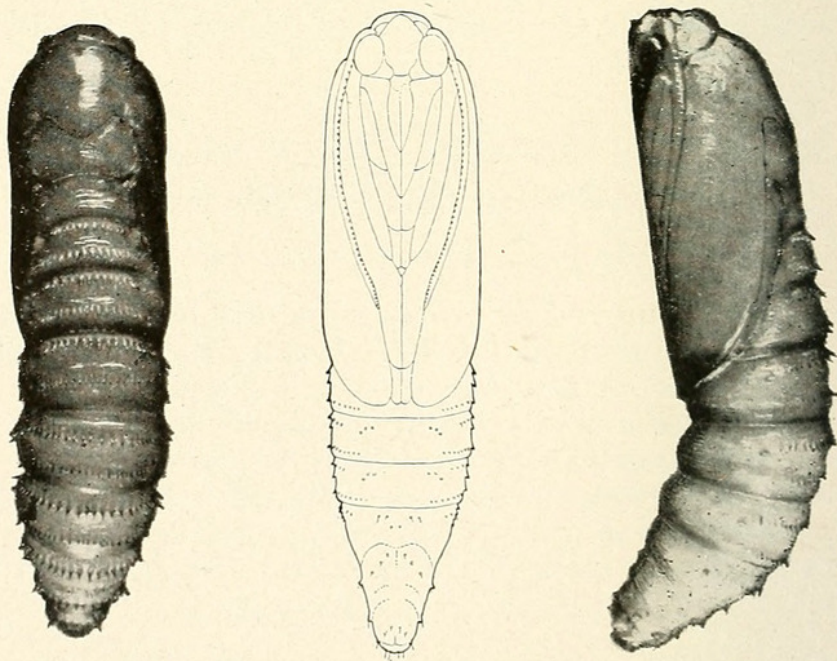


PLATE 12

Pupa of *Eucosma hennei*, enlarged X 5

EGG LAYING OF THE EUROPEAN BROWN SNAIL IN TERRARIA

By WILLIAM MARCUS INGRAM

Mills College, California

Data included here deal with the egg laying activity of the European Brown Snail, *Helix aspersa* Müller, in terraria during January and February of 1942, thus adding information pertinent to the natural history of this species in California.

The snails under observation were collected on the Mills College Campus, Oakland and were placed in terraria in pairs. The bottoms of the terraria were covered with moist clay soil and the tops with glass plates with air holes. The snails were fed on lettuce. Individuals were observed through just one egg laying. The room in which the snails were kept was shielded from direct sunlight throughout the day. During the observations the mean temperature of the room was 67 degrees Fahrenheit with a low temperature of 61 degrees and a high temperature of 73 degrees; the mean humidity was 66 with a low humidity of 56 and a high of 75.

In depositing eggs the snails never laid them on the surface of the soil, but dug a cavity in the substratum which varied in depth from one-half to one and one-half inches.

The greatest number of eggs deposited in a nest was ninety-nine and the least was thirty. (Table 1). The mean number of eggs laid by sixteen snails was fifty-eight. This number is much less than the mean number observed from twenty snails in the field in southern California by Basinger (1931); this investigator recorded a mean number of 86.6 eggs, with a maximum of 119 and with 33 as a minimum. Basinger (1931) found eggs in March, April, June, August, and September. His nests were discovered principally in orange groves. The terraria snails as mentioned above laid in January and February. In the field in Oakland snails were observed laying in September, October, November, January, and February.

The percentage of eggs laid that hatched in terraria was only recorded in nine instances, and varied from a high of seventy-three per cent to zero per cent with a mean, including the total failure of one clutch to hatch, of forty-five and seven-ninths per cent. The incomplete data indicate that the percentage of eggs hatching under the stated conditions seem to be relatively low for an animal whose eggs are so well concealed. No visual differ-

ence between terraria could account for the variation in the percentage of the number of eggs hatching.

Basinger's (1931) data indicate that on a basis of five incubation periods that the eggs of *Helix aspersa* hatch in sixteen and three-fifths days; he also states, "During ordinary summer weather, the eggs hatch in about two weeks, but this time may be shortened somewhat during the warmer part of the summer or lengthened during the cooler seasons." The writer's terraria data show a mean hatching time of fifteen days with a high incubation interval of twenty-one days and a low of ten days.

Young snails on hatching remained under the soil from a minimum of one to a maximum of seven days before working their way to the surface of the soil; on emerging from the soil they immediately began feeding on lettuce. The mean time it took for fifteen lots of snails from separate nests to reach the surface of the soil was four and one-half days.

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Table 1—EGG LAYING OF *HELIX ASPERSA* MÜLLER
IN TERRARIA

OVIPOSITION	NUMBER OF EGGS	HATCHING TIME	PERCENTAGE OF EGGS HATCHING
January 10	35	none hatched	none hatched
January 20	53	18 days	22 per cent
January 26	96	21 days	no record
January 28	65	13 days	no record
January 3	30	11 days	73 per cent
January 25	40	10 days	42 per cent
January 25	57	16 days	05 per cent
January 30	56	17 days	73 per cent
January 30	67	12 days	70 per cent
February 9	81	no record	no record
February 4	99	15 days	67 per cent
February 1	60	no record	60 per cent
February 16	67	14 days	no record
February 28	65	no record	no record
February 6	53	17 days	no record
February 9	37	19 days	no record

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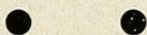
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