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CALIFORNIA MICROLEPIDOPTERA XI

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THE LAST installment of this series appeared in the Mo. Bul. Cal. Dept. Agri., Vol. 25, No. 3, p. 349, Sept. 18, 1936. The present installment in the main continues the study of Solanaceous feeding Micros in California.

Events in connection with the tomato pinworm, *Gnorimoschema lycopersicella* Busck, have been piling up with increasing speed during the last few years. I have endeavored to follow out the chronology of the species since it first became known, and the following table is the result. It has been prepared after extensive correspondence and with the acknowledged help of Dr. A. W. Morrill of Glendale. The publications of Campbell and Elmore in recent issues of the Monthly Bulletin have also been consulted in this connection. No attempt has been made to complete the localities reported in the last few years outside of California.

Chronology of *Gnorimoschema lycopersicella* Busck

1908-1911—Claremont, California (C. F. Baker).

This record is taken from T. H. Jones, 1923, (Jr. Agr. Res. 26, p. 567) who listed all of the supposedly known localities of the Eggplant Leafminer (*Gnorimoschema glochinella* Zell.) in the United States. Of course this record does not apply to *glochinella* as that moth has never been found in California so far as I know. Since C. F. Baker was in the state from 1903 to 1911, the collection was made during those years. I have attempted to qualify this record on the basis of preserved specimens but both Mr. Jones and Mr. August Busck have been unable to explain it. Perhaps it refers to the moth *elmorei* found on our native *Solanum*. (See California Microlepidoptera X.)

1921—Los Mochis, Sinaloa, Mexico; Yaqui Valley, Sonora, Mexico.

Dr. A. W. Morrill first sent specimens of *lycopersicella* to Washington from this locality. He noted that the species did not attack eggplant, became convinced that it differed from Eggplant Leafminer, and made a trip south of Los Mochis. It is of interest that he failed to find it south of that locality. Scouting in the Yaqui Valley to the northeast was productive of specimens, and that turned his attention north. However, the Salt River Valley and the Yuma Valley in Arizona yielded no material.

1923—Brawley, Imperial County, California. Orange County, California. Los Angeles County, California.

Continuing the investigations, Dr. Morrill and his assistant, A. H. Amis, found *lycopersicella* present in numbers in the above-listed areas. Imperial County was found to have infested tomatoes in May, 1923. Dr. Morrill in the Jr. Ec. Ent. 18, p. 712, 1925, gives the year of the Imperial Valley record as 1922, but writes that he now finds this an error and that 1923 is correct. It was in this article that he called attention to the behavior of *lycopersicella* as different from *glochinella*, the Eggplant Leafminer (under which name it was still listed), and made the statement, "---- its real economic importance has not been appreciated, ----" He also calls it the "Tomato Leaf-folder." Potato is given as a host.

An additional reference, yet under *glochinella*, but by the common name of Tomato Leaf-folder is: Morrill, Jr. Ec. Ent., 19, p. 695, 1926.

1925—Hawaii (see 1923).

1927—First California Shipping Point Inspection Bulletin to mention "Pinworm."

The causes of this original attention to "Pinworm" as a new factor in tomato handling are probably two-fold. The name "Pinworm" was likely first applied to young larvae of the Tomato Fruit Worm (*H. obsoleta*). These larvae may have been gaining in their mass attack on tomatoes. However, it is also partly true, if not entirely so, that *lycopersicella* was becoming more of a factor in tomato raising. We can interpret this as meaning that the pest may not have been in California such a long period of time prior to this unusual notice.

1928—Insect named *Phthorimaea lycopersicella* by Busck, Proc. Haw. Ent. Soc. 7, p. 171, and recorded from the Hawaiian Islands, the type locality.

Thus the moth came into its own as a distinct species structurally defined. O. H. Swezey in a parallel article in the same publication (page 177) described the work of the moth and its early stages. Swezey records the first finding on Molokai, 1925.

1930—Stewart Lockwood, investigating Pinworm in the Tia Juana Valley, San Diego, concludes that the damage this year was greater than formerly, an indication of the newness of the pest. Also first found in Delaware.

1931—First California Standardization Law to mention Pinworm.

This law was written on the basis of increased inspection difficulties caused by the small *lycopersicella* larvae, and represents a lowering of requirements for tomatoes, to permit more to be sold at higher grades.

1931—Coatesville, Pennsylvania; C. A. Thomas, Jr. Ec. Ent. 25, p. 137, 1932.

This infestation was in connection with a greenhouse although it had spread to the field. The greenhouse owner first noted injury by the insect in 1929-1930, about two years after receiving shipments of California tomatoes. As well as tomatoes, the moth attacked horsenettle, *Solanum carolinense*.

1931—Florida; Watson and Thompson, Fla. Ent. 16, No. 1, p. 14, July, 1932. Also in Dona Ana County, New Mexico.

1932—Bermuda; Cunningham, Rep. Dep. Agr. Bermuda, 1932, p. 50, Hamilton, 1933.

1933—This year Thomas published a significant article in the Jr. Ec. Ent., 26, p. 137, concerning the Pinworm in Pennsylvania. He here records the apparent complete eradication of *lycopersicella* from Coatesville by the cleaning out of the greenhouse alone. Heavily infested horsenettle areas of the previous year failed to show larvae of *lycopersicella* after the winter of greenhouse cleaning.

1934—Peru; Service and Regulatory Ann., July-September, 1933, U. S. Dept. of Agr. No. 116, p. 197-243, Dec. 1933. Also Haiti.

1934—Virginia (in a greenhouse); Insect Pest Sur. Bul. 13, No. 10, p. 325, Wash. U. S. Dept. Agr. Bur. Ent. (1934). See also map opposite p. 341 of this number.

1934—Cuba; Busck, Ent. Am. 13, p. 160, No. 4, March, 1933.

In this reference Mr. Busck states the moth occurs in several parts of Mexico, both east and west, in addition to the principal locality (Cuba) from which reported. Eggplant is recorded as a host.

1934—Kern County, California; tomato and potato (March).

1934—Missouri, Mississippi. Ins. Pest Surv. Bul. 14, No. 10, p. 329, U. S. Bur. Ent. Wash., D. C. Summary for 1934.

1935—Mt. Hermon, Santa Cruz County, California.

A single male was taken at light near a restaurant in this locality in the Santa Cruz Mountains by the writer. This does not likely represent an established infestation of *lycopersicella*.

1936—Studies of *lycopersicella* in critical comparison with a very similar native moth on native California *Solanums*. Mo. Bul. Cal. Dept. Agr. 25, Nos. 3, p. 349, Sept. 18, 1936.

The name *elmoresi* Kelfer is given to the native individuals in view of the different appearance and structure of the adults, and the biological differences between these two groups. Indications are that typical *lycopersicella* does not reservoir in native *Solanums* in California. In addition the native group is not a tomato pest.

1936—Thomas, C. A. Jr. Ec. Ent. 29, p. 313, April, 1936.

This reference is of importance because it qualifies the recorded hosts of *lycopersicella*, and lists additions to the range of the insect in Pennsylvania. All infestations were in association with greenhouses. Eggplant is injured when adjacent to infested tomato vines. Horsenettle, (*Solanum carolinense*) is mentioned as an occasional food plant. Potato is included as a host.

1936—Visalia District, Tulare County, California. Modesto, Stanislaus County, California.

The Modesto infestation developed during 1935 in a greenhouse. This infestation is definitely linked with Imperial County by the greenhouse owner's use of used tomato lugs sent directly from the southern area. Since this Modesto area is characterized by winter killing of tomatoes, we await with interest indications of the fate of the species during the 1936-37 winter period. This will give us an indication of what to expect in the future for tomato growing in the lower San Joaquin Valley and the Sacramento Valley. I am informed that the insect is yet a pest in this greenhouse (January, 1937).

A few scattered larvae were taken on tomatoes in Santa Clara and Alameda Counties during 1936 by A. E. Michelbacher and assistants. One of these submitted to the writer is a typical *lycopersicella* but is somewhat larger than any examples

of the species heretofore seen. We await further study before absolute commitments can be made in this case.

We face the question of the origin of *lycopersicella*. As will be noted, Morrill's original observations indicated two separate areas of infestations: (1) adjacent parts of the States of Sonora and Sinaloa, Mexico; (2) Southern California, covering most of the tomato-growing sections. Since then the insect has turned up over most of the Western Hemisphere. (Mr. Busck has recently written that he has *lycopersicella* from Brazil.) In California, while the typical insect behaves as an immigrant, we have a closely similar form on our native *Solanums*. This leads to the thought that our native *elmorei* may be what was originally an adjacent northern extension of this insect type, and therefore the true *lycopersicella* may have originated a relatively short distance to the south. On the other hand, the predilection of the moth for tomato and its apparent shunning of native *Solanaceae*, would seem to take us farther south than southern North America, in looking for its origin. It seems certain, however, that as a pest in California, it is of less than twenty years' standing.

As Snodgrass has shown in "Principles of Insect Morphology," the head structure of caterpillars heretofore called the frons is in reality the clypeus. Also, the adfrons is the frons. Therefore, the seta previously designated F becomes C, and the puncture Cp. The adfrontal setae and puncture become F₁, F₂, and F_p respectively.

Gelechiidae

Gnorimoschema altisolani Keifer, new species

PLATE I

Expanse 10-14 mm. General color gray, the scales narrowly white-tipped. Palpi cream-white on inner rear, the second joint faintly annulate or transversely banded centrally on outside, sometimes whitish at tip; terminal joint with slightly lighter annuli in middle and just below tip. Head and thorax general color, the face cream-white centrally. Forewings with ochreous scales tending to be arranged in thin inconspicuous longitudinal stripes. Stigmata moderately large slightly darker than general color, more or less surrounded ochreous; plical at about one third; first discal near, obliquely above and out from plical; second discal at about two thirds. Apex of wing somewhat more noticeably streaked ochreous. Blackish spots around apical margin. Cilia gray, indistinctly lined around apex. Hindwings and cilia light gray; male basal costal hairtuft. Abdomen light gray, lighter and more mottled below. Legs blackish, with cream-white or yellowish annuli, the hindlegs lighter. Male genitalia with slender spine-like down-curved uncus, gnathos a setiferous spoon-shaped lobe; harpes long, slender, curved a little ventrally, setiferous, enlarged and pointed apically, with sickle-shaped furcation from near apex projecting dorsocentrally and terminating about even with apex of harpe; anellus structures in form of two pairs of setiferous finger-like lobes, the lateral lobes well separated from central pair; vinculum a broad bluntly rounded lobe; aedeagus shorter than harpes, curved dorsally. Female terminalia with rather long ovipositor; ostium with semicircular hood, parallel structures for short distance anteriorly, and separated from central pair; vinculum a broad bluntly rounded lobe; aedeagus moderately long.

Type, male collected as larva just east of Ebbetts Pass at approximately 9000 feet elevation, Alpine County, on *Solanum xanthii* Gray, August 20, 1936, by the writer, the adult emerging September 7. Allotype, same data, emerging September 5. Thirty-five paratypes are designated, of which eight are males, with same collection data as above, emerging dates as late as September 24.

Pupa, length 4-4½ mm., brown, widest across abdominal segment 1, hindlegs, wings and antennae ending on ventral side of sixth segment; dorsum of abdomen rather densely and finely punctate; cremaster a minute denticle; some hooked apical setae.

Larva when full grown 8-8½ mm. Head blackish; shield dark; tubercles rather small but blackish; anal shield dark. Body flattened, tapering, varying from rather strong shade of green to bluish-purple, often with anterior half purple, the remainder green. Central proleg crochets in complete circle, partly biordinal and stronger inwardly, varying around 24; anal proleg crochets in complete series, partly biordinal, about sixteen. Tubercles small, black. Head flattened, partly retracted, epicranial halves extended farther to rear than usual, the frons little over half as long as epicranium; central clypeal seta nearer puncture than suture; frons abruptly blunt behind; line from seta O_2 to A_3 running obliquely between ocelli I and II; line from O_2 to L passing behind ocellus I; labrum with anterior setae obsolete; mandible with six teeth, all pointed. Body spinulae larger and more than twice as long as in *lycopersicella*. Remainder of body structures approximately as described for *lycopersicella* including spinulate tarsi, spacing of subdorsal setae on meso- and metathorax and setae of VII A2. The setae of group VII on the abdomen from front to rear, as follows: 2, 3, 3 (4 proleg segments), 2, 1, 1, 10.

This is another member of the group in the genus *Gnorimoschema* centering around *lycopersicella* and *glochinnella*. The new species is allied to these by the shape of the male uncus and the larval structure and habit. *G. altisolani* is somewhat larger and grayer than *lycopersicella*, easily separated on general appearance, but closely similar in this respect to *elmorei*. However, the male genital structure of the harpes, aedoeagus, and anellus, at once sets it off from these. In the larval stage the new species differs from *lycopersicella* in body color and in possessing strongly ringed central proleg crochets. The habit of *altisolani* in leaf mining differs in part from *lycopersicella* in that the larva may spend its entire life mining, without folding leaves. Some leaf tying occurs, but the leaves usually have a baggy appearance. These larval habits of *altisolani* seem to resemble closely those of *glochinnella*. The larval coloration of the two would seem to be similar as near as I can determine from the literature. However, *glochinnella*, according to Busck's figure, when describing *lycopersicella*, lacks an apical furcation on the male harpes.

Gnorimoschema plaesiosema Turner

Plate II

Turner—Proc. Roy. Soc. Queensl. 31, p. 126, 1919 (*plaesiosema*).

Meyrick—Ex. Microlep. 3, p. 276, 1926 (*melanoplintha*).

Busck—Proc. Ent. Soc. Wash. 33, p. 50, 1931 (*tuberosella*).

Barrett—Jr. Ec. Ent. 25, p. 134, 1932 (*tuberosella*).

Muggeridge—N. Z. Jr. Agr. 45, p. 329, 1932 (*plaesiosema* and synonymy).

The adult of this moth is 15-18 mm. in wing expanse. The adult head is structurally very similar to *operculella*. The wings brownish or brownish-gray with black stripe beginning at costal fifth, running obliquely to fold, thence directly toward apex, narrowing and slightly interrupted. There are no sex tufts. Male genitalia with broad rounded uncus; scobinate anal tissue transversely extended, lobed past sides of uncus; gnathos sagitate; harpes not reaching to apex of uncus, flanged apically; anellus with double lateral lobes and a midventral long black spine; vinculum narrowly extended anteriorly; aedoeagus long, slender, apically bifurcate. Female terminalia with large tube extending just past anterior apophyses from ostium; signum a spine.

Pupa 6¼-7½ mm. long, rather narrow; wings and legs ending on fifth abdominal segment; a good part of body minutely spined, these spines few or absent on the last three abdominal segments; apex of abdomen rather blunt with very small cremaster and numerous hooked hairs.

Larva 10-12 mm. long. Head brown with some slight fuscous patches; shield light brown with fuscous blotches; tubercles light brown, moderately large but not conspicuous. Body cream-white or very light green; thorax with some pink spots dorsally; abdomen with pink patches arranged in five longitudinal lines on dorsal one half, the central most conspicuous. (Less mature larvae more yellow with more or less pink.) Central proleg crochets 25-30, weakly biordinal, weaker outwardly; anal proleg crochets about 12, mostly uniordinal. Head not flattened; clypeal seta half way between suture and puncture; frons rounded posteriorly, the rear frontal seta about as far back as clypeus apex. Ocelli rather small; line through bases of setae O_2 and A_3 through ocellus I; line through O_2 and L passing considerably to rear

of ocellus I; labrum with anterior setae short, stiff; mandible with five teeth, the innermost blunt. Tarsi sparsely spinulate. Subdorsal setae on meso—and metathorax all on separate tubercles, IIa, IIb of T2 closer than IIa, IIb, T3. Seta III A9 strong and on full-sized tubercle; one or two accessory setae in lower series on anal prolegs. Abdominal setae of seventh series: 2, 3, 3 (4 segments), 2, 1, 1, 10-11. Body skin spinules much finer than *operculella* rather thickly though unevenly arranged.

This moth was first recorded from California by R. E. Barrett, 1932, as occurring in *Solanum nigrum* L. at Saticoy. Examination of the collection of the California Academy of Sciences discloses adults taken at Lagunitas dated 1925. Specimens are now on hand from various localities including San Francisco and Folsom. Where found, the larvae are common in the stems of Black Nightshade. Whether the species works in native *Solanums* is not definitely known though it seems likely. So far *plaesiosema* has bothered neither potato nor tomato in California, although it is a pest of either or both in Peru and New Zealand. Whether the insect is native to California is not known. It does one thing that other native *Solanum* moths (with one possible exception—*striatella*) do not do, attacks *Solanum nigrum* vigorously. This plant is presumably European in origin. Notes: The side bifurcation of the aedoeagus in California specimens is much slenderer than the same structure in Busck's figure of *tuberosella* from Peru. Mugeridge's figure of the color pattern of New Zealand specimens is quite different from California specimens.

Gnorimoschema striatella Murtf.

Plate II

- Murtfeldt—Can. Ent. 22, p. 163, 1900 (*Eucatoptus*).
 Busck—Proc. U. S. N. M. 25, p. 822, 1903 (*Phthorimaea*).
 Meyrick—Gen. Ins. F. 184, p. 93, 1925 (*Phthorimaea*).
 Essig—Ins. Wn. N. Am. 717, 1926 (*Phthorimaea*).

Expanse of specimens on hand from 11 to 12.5 mm. Second joint of palpi more definitely truncate apically than other species studied, terminal joint slightly roughened behind in some males. General color light brown, the forewings tan, but streaked with ochreous and more conspicuously with fuscous on dorsal and apical parts. Male hindwings with basal costal hairpencil. Male genitalia with broad pointed uncus, the scobinate anal tissue extended transversely in lobes past each side of uncus; gnathos rudimentary; harpes flanged apically and somewhat curved latero-ventrally; anellus of two pointed lobes on each side; vinculum broad, short, slightly attenuate anteriorly; aedoeagus forked, the side projection short and from middle of organ. Female terminalia with rather short ovipositor, the ostium broad with sclerotization not extending to line through tips of anterior apophyses, these apophyses quite short; signum absent.

Pupa about 5-6 mm. long, brown, legs and wings extending to fifth segment below; abdomen sparsely spinulate; cremaster a comparatively large upcurved spine.

Larva 8-9 mm. long when grown. Head and shield blackish; tubercles blackish rather small; anal plate fuscous. Pro- and mesothorax dull brownish-purple, the remainder of body dull yellow with five rather irregular reddish stripes on dorsal half, the spiracular stripe represented by spots behind each spiracle. Central proleg crochets in unordinal circle broken outwardly, 12-14; anal crochets in complete unordinal series 9-10. Head with clypeal seta nearer suture than puncture; line through bases of rear frontal setae passing somewhat anterior to apex of clypeus; frons rather bluntly pointed posteriorly; ocelli of fair size, a line through setae O₂-A₃ between ocelli I and II, through O₂-L touching rear edge of ocellus I; mandible with six teeth, the outermost small and well separated, the innermost blunt. Tarsi sparsely spinulate. Subdorsal setae on last two thoracic segments as follows: Ia, Ib, well separated; IIa, IIb, approximate on mesothorax and on almost united tubercle on metathorax. Seta III-A₉ slender and on small tubercle. Abdominal setae of seventh series: 2, 3, 3 (4 segments), 2, 1, 1, 10. Skin spinules slightly larger than *operculella*, but rather unevenly set.

The larva of *striatella* is a leaf-folder on *Solanum nigrum* entirely, as far as my experience goes. This is at variance to the midwestern records where it feeds in the berries (Murtfeldt). The leaf is neatly

folded together on the upper surface, and the larva skeletonizes therein, depositing the frass in one place after the manner of some gall-formers. The male genitalia would ally this moth with *plaesiosema*, though not closely. Like *plaesiosema* the scobinate anal tissue is transversely extended, the harpes are flanged, the anellus is of two pointed lobes, the aedoeagus is forked, the larva has five longitudinal pink stripes, uniordinal anal crochets. Unlike *plaesiosema*, *striatella* has a pointed uncus, lacks female signum, possesses a male hairpencil on costal hind-wings; large pupal cremaster; brownish purple pro- and mesothorax on larva, six-toothed larval mandible, larger larval ocelli; setae IIa, IIb closer set, seta III-A9 on small tubercle; uniordinal, broken, central crochet circles. *Solanum nigrum* is not a native plant and since *striatella* apparently feeds on nothing else it would seem to be an immigrant moth. Mr. Busck kindly confirmed the determination.

Gnorimoschema obsoletella Roesl.

Plate III

von Roeslerstamm—Abbild. Schmett. p. 225, 1840.

Meyrick—Gen. Ins. F. 184, p. 93, 1925 (*Phthorimaea*).

Meyrick—Rev. Hand. Brit. Lep. p. 632, 1927 (*Phthorimaea*).

Pierce and Metcalf—Gen. of Tineina p. 16, 1935 (*Phthorimaea* B.)

Expanse of adults on hand 12½-16 mm. The head much as in *operculella* but with slender and smoother terminal palpal joint. Forewings whitish, irrorated black giving light gray or tan effect; ochreous and white streaked; stigmata rather small, black, having tendency to be double. No male hairpencil. Male genitalia with uncus narrow, hood-shaped; scobinate anal tissue extended somewhat longitudinally; gnathos a short spine; harpes simple, somewhat clavate, extending just past uncus; annellus of two curved finger-like setiferous lobes on each side; anterior extension of vinculum narrow, acute. Female terminalia with moderately long ovipositor; anterior apophyses rather long; bursa copulatrix elongate; signum a spine with teeth inside at base.

Pupa 6-6½ mm. long; wings and hindlegs extending to near rear margin of fifth segment; proleg scars especially on sixth segment quite prominent and produced; cremaster a small denticle.

Larva 11-12½ mm. long. Head yellow-brown, slightly variegated; shield yellow, the halves subtriangular. Body yellowish, more or less overlaid pink. Tubercles body color: Central proleg crochets 29-32 in complete biordinal circle weaker outwardly; anal crochets 19-27 in complete biordinal series. Head well rounded out; clypeal seta nearer suture than puncture; line through rear frontal setae anterior to clypeus apex; line through O₂-A₃ through ocellus I; through O₂-I to the rear of ocellus I; labrum with anterior setae quite small; mandible with six teeth, the outermost small and drawn toward base. Tarsi with few spinules. Setae Ia, Ib on T₂ and T₃ well separated; setae IIa, IIb approximate; anterior tibiae slightly spinulate, the outer rear apical seta narrow and not exceeding claw. Setae VII-A₂ on compound tubercle; seta VI to rear of VII on all segments before A₈, even with VII on A₈ and A₉; seta III-A₉ as strong as other setae, on moderate-sized tubercle. Setae VII on abdomen as follows: 2, 3, 3 (4 segments), 2, 1, 1, 10. Skin spinules rather small, evenly set, apex well produced.

This species was determined by means of Pierce & Metcalf supplemented with Meyrick's handbook. The larva is a stem-borer in *Chenopodium murale* L., a European plant. *G. obsoletella* has made its way to California on its native host, as well as has *Micosetia hermanella* Fabr. The injury done by *obsoletella* to its host consists of killing the flower heads, though the plant still persists vigorously. The moth is now known from both the Sacramento and San Jose areas.

Gnorimoschema chenopodiella Busck

Plate III

Busck—Proc. Ent. Soc. Wash. 18, p. 143, 1916 (*Gnorimoschema*).

Meyrick—Gen. Ins. F. 184, p. 90, 1925 (*Gnorimoschema*).

Keifer—Pan. Pac. Ent. 3, p. 138, 1927 (*Gnorimoschema*).

Clarke—Can. Ent. 57, p. 247, 1935 (*Gnorimoschema*).

Expanse of adults on hand 11-13 mm. The white ground color is rather heavily overlaid fuscous giving a gray to dark gray general effect. The forewings are thinly streaked ochreous with the stigmata inconspicuous. Male genitalia similar to *obsoletella* but harpes not clavate and considerably surpassing uncus; also the vinculum broader in the anterior extension and the aedeagus a little less thick. The female terminalia differ in detail from *obsoletella*, principally in the signum lacking denticles and the bursa being round.

Pupa 5½-6 mm. Brown. Wings and legs to rear margin of fifth abdominal segment; proleg scars but slightly produced; cremaster a small hook; circumapical setae very short and inconspicuous.

Larva up to 10½ mm. Head, shield, thoracic legs, and tubercles varying from yellow-brown to fuscous. Body green or dull whitish-green with five longitudinal pinkish stripes on dorsal half, the lower stripe on each side much broken and inconspicuous. Central proleg crochets 28-30 in biordinal circle weak outwardly; anal crochets 18-21 in complete biordinal series. The tarsi are rather strongly spinulate. Larval structure very similar to *obsoletella*, especially setae VII-A2 on compound tubercle. Setae VII on abdomen from front to rear; 2, 3, 3 (4 segments), 2, 1, 1, 10-11.

This moth now has a wide range in North America. Originally described from Massachusetts, it is now known from the Toronto region, from Washington State and from California. My experience with the species is that it is common in San Francisco where the larvae work in the flower heads of *Chenopodium murale*, an imported plant, partly destroying the flowers and producing conspicuous injury thereto. *G. chenopodiella* is uncommon in Sacramento, although present. On the other hand, *obsoletella*, which is common in Sacramento, appears to be absent from San Francisco. The species may preserve an ecological balance; at least *chenopodiella* does not thrive in what is the optimum territory for *obsoletella*. *G. chenopodiella* is only found in California on an immigrant plant, and sparingly on any other *Chenopodium*, which would strongly indicate it to be an immigrant. Its host elsewhere should give a clue as to its origin. Notes: While *chenopodiella* is structurally and biologically similar and closely related to *obsoletella*, Meyrick places *chenopodiella* in *Gnorimoschema* in the Genera Insectorum, and *obsoletella* in *Phthorimaea*. The female signum of *chenopodiella* lacks denticles, which is different from *obsoletella* and several of its European congeners.

Keys to *Solanum* and *Chenopodium*-feeding *Gnorimoschema* species so far treated as they occur in California:

Adults

1. Male uncus spine-like and down-curved; no scobinate anal tissue; harpes considerably surpassing uncus (forked in these cases); small tan or gray species.....2.
1. Male uncus broad, shorter; scobinate anal tissue present; harpes not, or but slightly surpassing uncus; larger or streaked-winged species.....4.
2. Harpes with subequal sickle-shaped apical side projection; anellus lobes well separated; vinculum broadly rounded anteriorly; aedeagus shorter than harpes; female ductus bursae with separate sclerotization anterior to ostium; gray, 11-13 mm.....*altisolani* n. sp.
2. Side fork of harpes short, either parallel to apex or set at an angle to apex; anellus lobes approximated; vinculum with a long narrow anterior extension; aedeagus longer than harpes; female ductus with anterior sclerotized extension from ostium all in one attached piece.....3.
3. Smaller (8-11 mm.) tan moth; harpes with fork narrow at base and parallel to harpe apex; central anellus lobe shorter than laterals; sclerotized extension of ductus bursae from ostium ending well before a line drawn through apices of anterior apophyses.....*lycopersicella* Busck.
3. Expanse 7-13 mm.; gray; fork of harpes at angle to apex and broadly based; central anellus lobe longer than laterals; ductus bursae sclerotized extension about as long as anterior apophyses.....*elmori* Keifer.
4. Gnathos spoon-shaped; harpes enlarged and incurved apically, surpassing uncus; tegumen long and narrow; aedeagus a little longer than harpes, slender, slightly up-curved; tan moth with rather conspicuously spotted wings, the male terminalia

- bright tan or orange-tan above with lateral tufts; male costal hairpencil-----
operculella Zell.
4. Gnathos either sagitate, rudimentary or a spine; harpes not suddenly incurved apically; tegumen broader basally; aedoeagus either forked or short and thick--5.
5. Scobinate anal tissue projecting beyond each side of uncus; harpes flanged; aedoeagus more or less slender and forked; sclerotized extension anteriorly from ostium-----6.
5. Scobinate anal tissue longitudinal; harpes slightly clavate or narrow; aedoeagus rather short and thick; little or no sclerotized extension anterior to ostium--7.
6. Uncus rounded; gnathos sagitate; long black central anellus spine; aedoeagus long with fork ending at apex of aedoeagus proper; broad tube for moderate distance anterior to ostium; signum present; larger species with prominent black stripe on wing; no male hairpencil-----*plaesiosema* Turner.
6. Uncus pointed; gnathos rudimentary; anellus lacking central spine; aedoeagus shorter with fork short, from middle; tube from ostium short; no signum; smaller orange-brownish moth with less noticeably streaked wings; male hairpencil-----
striatella Murft.
7. Harpes somewhat clavate, but little surpassing uncus; female signum denticulate inwardly at base; tan moth-----*obsoletella* Roesl.
7. Harpes linear, distinctly surpassing uncus; female signum simple spine; dark gray moth-----*chenopodiella* Busck.

Larvae (as observed in California)

1. Head flattened, epicranial halves extending considerable distance beyond apex of frons, that is, frons not extending much over half length of epicrania; head considerably retracted; body flattened, usually with some type of purple markings only-----2.
1. Head rounded out, frons much over half length of epicrania; head but little retracted; body round, usually with pinkish markings-----4.
2. Body green, sometimes not at all purple but usually part or all of body evenly overlaid deep bluish-purple; central proleg crochets in complete biordinal circle 22 to 25; producing a baggy mine in leaves of *S. xanthii*-----*altisolani* n. sp.
2. Body gray-green, with pattern of bright bluish-purple spots throughout; central proleg crochets usually discontinuous outwardly, 12-18; mining leaf-tiers-----3.
3. Hypostome of last stage larva mostly light brown or yellow (in all those so far seen); central proleg crochets 12-16 broadly discontinuous outwardly; length up to 7 mm.; found in tomato and potato leaves, also in stems and fruits-----
lycopersicella Busck.
3. Hypostome always black; central proleg crochets 14-18, sometimes in nearly complete circle; length up to 8 mm., on *Solanum xanthii* and *umbelliferum*, never in stems or fruit so far as observed-----*elmoret* Keifer.
4. Setae VII-A2 not all on same tubercle, VIIc drawn midventrally-----5.
4. Setae VIIA2 on compound tubercle-----7.
5. Frontal setae nearer each other than F₂ is to apex of clypeus, sixth or last mandibular tooth projecting and pointed; setae IIa, IIb on meso- and metathorax equally approximate; no pink stripes; stem- or root-borer in potato and tomato-----
operculella Zell.
5. Second frontal seta nearer clypeal apex than first is to second; last (inner) mandibular tooth broad and blunt; setae IIa, IIb on meso- and metathorax not, or not equally approximate; pink stripes-----6.
6. Line through setae F₂ very close to clypeus apex; mandible with five teeth (first rudimentary); crochets of central prolegs 25-30 in complete biordinal circle; only body markings pink spots and stripes; stem-borer in *Solanum nigrum*-----
plaesiosema Turner.
6. Line through F₂ somewhat anterior to clypeus apex; mandible with six teeth; central crochets in uniordinal circle, broken outwardly, 12-14; pro- and mesothorax dull brownish-purple; leaf-folder on *Solanum nigrum*-----*striatella* Murft.
7. Seta IIIA9 strong and on usual size tubercle; body yellowish with pink spots or entirely pink; borer in *Chenopodium murale* stems-----*obsoletella* Roesl.
7. Seta IIIA9 weak, on small tubercle; body greenish with pink stripes, in flower heads of *Chenopodium murale*-----*chenopodiella* Busck.

"*Gelechia*" *saliciphaga* Keifer, new species

Plate IV

Expanse 18-21 mm. Second palpal joint with broad scales in brush, the brush being basally longest, the joint whitish with fuscous, tan, and black irroration on outside and in brush; terminal joint whitish irrorated fuscous. Antennae whitish tan, irrorate and annulate fuscous. Head and thorax whitish tan, lightly irrorate fuscous or brown, the face lighter. Forewings tan to whitish tan, the scales tipped ochreous brown to fuscous, producing a light irroration; wing with ill-defined markings; usually a black mark along dorsal base; remnants of a dark streak through center of wing; plical stigma not distinguishable; first discal stigma a black dot at beyond one third, second discal at nearly two thirds; sometimes an oblique dark area toward tornus; other slight dark spots; outer radial veins sometimes lined

darker; dark spots around apex; the cilia irrorate. Hindwings white, lightly infuscated, the cilia yellow-white; male hindwings below with downward directed scales from basal half of radius, also obliquely directed scales along cubital and anal vein stems. Abdomen yellowish-white, more or less infuscated above on rear two thirds, the male terminalia a yellow-white hair-tuft; abdomen below dark-irrorated especially on sides. Legs white, dark-irrorated, the hind tibia darker or blackish with strong yellow hair-tuft above. Male genitalia with narrow laterally pilose hoodlike uncus; gnathos a hook, apically toothed. Harpes in two divisions, asymmetrical; the costa narrow, incurved, reaching to center point of uncus; the sacculus basally broad, projecting back in a fingerlike lobe, the left lobe with some heavy spines. Anellus apparently entirely membranous; vinculum a broad anteriorly rounded asymmetrical lobe; aedeagus an involved rather heavy structure with a large spine from middle and two or three spines apically. Female terminalia with long ovipositor; ostium an involved series of sclerites; no indication of anterior apophyses; ductus bursae and bursa heavily scobinate; signum a trapezoidal plate with two parallel denticulate spines from near each end.

Type, male, collected as larva by the writer on *Salix sessilifolia* at Sacramento, July 31, 1936, the adult emerging September 7, 1936. Allotype, same data, collected August 18, adult September 19. Thirty designated paratypes collected on either date and emerging throughout September.

Pupa, 6-7 mm. long, brown. Compact, broadest across thorax, tapering considerably to apex of abdomen; hindlegs extending across center of A5. Hair fringe of rear seventh margin broadly discontinuous dorsally and ventrally; abdomen inarticulate; last three segments compact, short, blunt; cremaster absent.

Larval length 14-15 mm. Head orange-brown. Body whitish over light green; shield as head or lighter; six longitudinal brown to pink narrow stripes on dorsal half, the addorsals close. Tubercles moderate in size but body color; suranal plate yellow-brown. Central proleg crochets in complete biordinal circle, weaker outwardly, 35-42; anal crochets in complete biordinal series 28-31. Head fully rounded out, not much retracted; frons acute posteriorly; frontal setae much farther apart than F_2 is from clypeal apex; seta A_2 small and almost directly to rear of A; line through setae O_2 and A_3 through ocellus I; line O_2 -L somewhat to rear of ocellus I; ocelli rather small; mandible with five teeth (2-6) the first rudimentary and represented only by a hump on the outer side; antenna not spinulate; spinnerette rather long with maxillary palpi extending as far forward as spinnerette. Shield large, subquadrate; prespiracular tubercle large; setae Ia, Ib, on T2 and 3, separate; setae IIa, IIb on thorax on compound tubercle; tarsi smooth; outer rear apical seta shorter than claw and somewhat sickle-shaped; seta VI behind VII on all segments anterior to A8; even with VII on A8 and 9; seta IIIA8 in front of spiracle; seta IIIA9 weak, on small tubercle near IV and V; seta VIA9 separate from tubercle IV-V; VIIA8 bisetose; three or four accessory setae in b series on anal proleg; setae VII of abdomen: 2, 3, 3 (4 segments); 2, 2, 1, 12-13; no anal fork.

This species is another member of the "curtain-fringe" group of Gelechiids now referred to the genus *Gelechia*. Comparison of the genitalia of these moths with typical *Gelechia* spp. at once discloses striking differences such as the shape of the uncus, harpes, aedeagus, lack of scobinate anal tissue, and lack of anterior apophyses. Of interest also in this connection are the larval and pupal characters, which are essentially the same as *demissae* Keifer, another "curtain-fringe" species. The salient pupal features are the broad tapering shortened body, the inarticulate abdomen, seta fringe of the rear A7 discontinuous dorsally and ventrally, and lack of cremaster. These pupal characters are more nearly matched by such species as *trichostola*, *chrysopyla*, *vanduzeei*, *acrina*, and others forming another genitalic group (*Chionodes*). The larval features of *saliciphaga* and *demissae*: large subquadrate shield, lack of spinules on tarsi, biordinal crochets (occasional triordinal hook present), two setae on VIIA8 (the most distinctive feature), seta VIA9 separate, three or four accessory setae on the anal proleg, and lack of anal fork, are partly distinctive according to which genitalic group this larva is compared. Thus (*Chionodes*) *trichostola* Meyr. has spinulate tarsi, biordinal crochets, unisetose VIIA8, VIA9 on same tubercle with IV and V, and an anal fork. (*Pseudochelaria*) *manzanitae* Keifer: spinulate tarsi; triordinal crochets; unisetose VIIA8; IV, V, and VIA9 on same tubercle; anal fork. (—)

eldorada Keifer: spinulate tarsi; triordinal crochets; unisetose VIIA8; VIA9 separate from IV-V; no anal fork. *Gelechia panella* Busck, *monella* Busck, *desiliens* Meyr: spinulate tarsi; triordinal crochets; unisetose VIIA8; VIA9 separate; anal fork present. *Telphusa sedulitella* Busck: spinulate tarsi; partly triordinal crochets (centrals broken inwardly, anals discontinuous centrally); unisetose VIIA8; IV-V-VIA9 on same tubercle; anal fork present. *Xenolechia querciphaga* Keifer: tarsi spinulate; crochets in complete biordinal circle; unisetose VIIA8; IV-V-VIA9 together; anal fork present; this *Xenolechia* may be separated from species referred to *Gelechia* by the proximity of III to the spiracle (in *Xenolechia*). The species of *Recurvaria* are very similar to *Xenolechia* but usually lack an anal fork. (*Lita*) *diversella* Busck (see Calif. Micro. IX, Mo. Bul. Cal. Dep. Agr. 25, p. 241, 1936) looks like *saliciphaga*, has smooth tarsi, biordinal crochets, two setae on VIIA8, VIA9 separate, lacks an anal fork, but seta 02 is behind ocellus I, the labrium projects considerably past the maxillae, the prothoracic shield differs from all the above in the halves being subtriangular, and has only one accessory seta on the anal proleg. *Gnorimoschema* spp. so far treated may be separated from the above by part or all of the following features depending on the species: frons blunt or bluntly rounded to rear; seta C drawn centrally from clypeal suture; maxillary palpi not extending as far as spinnerette apex; halves of shield subtriangular; setae IIa, IIb of thorax on separate tubercles; seta VIIc-A2 drawn centrally from VIIa-VIIb; smaller biordinal or uniordinal crochet rings and series; by usually having one accessory seta on anal proleg (occasionally two). The caterpillars of the *Gelechia* complex have from two to four accessory setae on the anal prolegs, as a rule.

Scythrididae

Scythris altisierrae Keifer, new species

Plate V

Expanse 14-15 mm. General color dark fuscous or dark fuscous brown heavily laid over dull white. Second palpal joint white on basal half and along rear inner margin; terminal joint imperfectly lined white on inner side to rear, or irrorate white. Tongue heavily scaled basally, brown fuscous irrorated white. Antennae dark, basal joint with three or four pectinae. Head and thorax dark, some brownish mottling; face lighter just above tongue; patagia lighter. Forewings dull white below, heavily overlaid dark fuscous giving a very dark effect; a light dull brown streak from basal center, fading out in middle of wing, usually with white scales or spots associated with it in the disc and above tornal area; cilia fuscous. Hindwings and cilia dark fuscous. Abdomen above dark fuscous, sometimes mottled, but below principally whitish; legs dark, overlaid or irrorated white. Male genitalia with deeply divided uncus-structure, the halves converging apically, spined along lower edges, and pilose on upper tubercle; tegumen rounded out, shorter than broad; harpes over half as long as abdomen, broadened into a semicylindrical structure centrally and down-curved apically; aedoeagus proper apparently absent, replaced by backward pointing arch; apophyses one third length of abdomen, cross connected in front of anterior base of genitalia. Female terminalia with moderately long ovipositor; segment held by anterior apophyses and containing ostium considerably extensible; ostium whit with a short anteriorly directed process; seventh segment heavily sclerotized. Anterior sternal plate short, broad, bounded by longitudinal costulae, with antepophyses moderately long, slender.

Type, male, collected as larva by the writer from *Solanum xanthii*, just east of Ebbetts Pass, Alpine County, August 20, 1936, the adult emerging September 10. Allotype, same data, the adult emerging September 8. Seventeen paratypes with approximately the same data have been designated.

Pupa, 7 mm. long, brown, tapering. Head roughened by numerous small wrinkles, labial palpi visible; maxillae reaching to point past middle of A₆ and separating antennae which do not extend past A₅; wings meeting midventrally past maxillae and ending at middle of A₇. Abdominal segments inarticulate. Abdominal spiracles shortly produced; apex of abdomen very bluntly rounded with no cremaster and a few short hooked hairs.

Larval length 10-12 mm. slender, tapering both ways from middle. Color a dull greenish tan or tan, the dorsal three fourths almost densely reticulated and lined with a gray brown, giving the larva a grayish effect. Head dull yellow blotched with black; shield the same blackened laterally; tubercles black; thoracic legs brown to black; suranal plate small, with black spots. Central proleg crochets in complete circle, triordinal, weakened outwardly, 46-50; anal crochets in uninterrupted triordinal semicircle, 38-42. Head with frontal sutures wide, the frons narrowly extending almost to foramen; setae F₂ beyond clypeal apex; setae P₂, P₁, and F₂ in line directly across head; setae A₁, A₂, A₃ moved centrad from ocelli with seta O₂ behind ocellus I, therefore line through O₂-A₃ or O₂-L passing to rear of ocellus I; mandible with five teeth; postmental pit present just to rear of postmental setae; spinnerette short. Prothoracic shield with a number of accessory setae; prespiracular wart with usual three setae; VI T₁ trisetose; all other tubercles of thorax with accessory setae (including coxae, except III and VIII; coxae close, the anterior pair almost touching; legs and coxae spinulate; outer rear tarsal seta about two-thirds length of claw, the anterior seta shorter. Abdomen with a small accessory seta in positions I and II on most segments, seta IX dropping out toward rear; rather large "hollow" or ring-tubercle in position III over spiracles on segments A₁ to A₇ inclusive; tubercle IV-V lacking accessory setae; tubercle VI divided on first seven segments into an anterior unisetose tubercle and a posterior tubercle with four to six setae; position VII on abdomen from front to rear: 4-5, 4-6, 8-11 (4 proleg segments), 4, 3, 3, 10-11 (anal proleg); accessory setae in position VIII on first seven segments. Setae I A₉ anterior to but more widely separated than seta II; setae IIIA₉ slender and on small tubercle; setae IV-V on compound tubercle; seta VI separate. No accessory setae on suranal plate; no accessory setae in series "a" on anal prolegs; two or three accessory setae in series "b" on anal prolegs.

The larval work of this *Scythris* consists of skeletonizing the upper leaf surface under a web. This is similar to certain *Aristotelias*.

The described species is similar to *Scythris ochristriata* Wlsm. in general color, color pattern, type of genitalia and larval appearance. However, *ochristriata* is smaller, lighter, and is found at lower elevations. The male harpes of *ochristriata* are much shorter and more slender, being trifurcate apically. *S. ochristriata* has been somewhat noticed as an alfalfa pest.

The *Scythris* under discussion is remarkable in several respects:

1. Enormous harpes.
2. Setae for catching frenulum between bases of radius and cubitus, also extra wing coupling setae on dorsal margin of forewing and adjacent costal margin of hindwing.
3. Postmental pit.
4. Accessory body setae.
- 5 "Hollow" tubercle over abdominal spiracles.
6. Divided tubercle VI. It should be noted in the first place that the male genitalia of this species only resemble the genotype in having these organs symmetrical: There are discussions on the affinities of the genus *Scythris* which will not be reviewed here. It is of interest that Mosher placed the pupa in the Gelechioidea. As a further contribution to the taxonomy of this genus I offer the following partly striking points of similarity which the figured *Scythris* larva bears to *Holococera* sp. (*iceryaella?*): 1. Shortened clypeus with frons narrowly extended nearly or entirely to foramen. 2. Setae F₂ situated beyond apex of clypeus. 3. Seta O₂ behind ocellus I. 4. Postmental pit. 5. Approximation of prothoracic coxae and reduction of VIII T₁. 6. Ring tubercles above spiracle on first seven abdominal segments. 7. Seta I A₉ obliquely below and anterior to seta II. 8. Crochets triordinal (in this *Scythris*). 9. Accessory setae in "b" series of anal proleg. The accessory setae on the anal proleg of *Scythris* are placed in the same location as those of many Gelechiids. The *Holococera* pupa will be seen to differ considerably from the *Scythris* pupa, giving the idea that the similarities found in the larvae are convergences rather than actually indicating true relationship. Nevertheless, the postmental pit and "hollow" supraspiracular

tubercles are unusual features which are found on few larvae. It would be more curious, therefore, to have these characters merely indicate duplication rather than actual relationship.

The *Holcocera* which is figured as larva and pupa (see Plate VI), will be concluded in a later issue. It is characterized, in addition to the above, as follows: Pupa short, labial palpi not showing, but anterior femora visible (as in *Autosticha*); abdomen compressed, slightly curved ventrally. The larva: membranous lobe on inner side of profemur; both setae Ia-Ib and IIa-IIb on compound tubercles respectively; seta VI A9 well separated from IV-V; setae VII of abdomen: 3, 3, 3 (4 proleg segments); 3, 2, 1, 12.

Pyralidae-Pyraustinae

Lineodes integra Zell.

Plate VII

Expanse 18-23 mm. Basal joint of labial palpi large, terminal joint porrected, tongue heavily scaled for some distance, eyes large, face narrow, antenna finely ciliate on lower half. Forewings principally gray on white, the pattern involved; a wavy band from dorsal third to costal two thirds, back toward tornus, then narrowing and ending at apex; some longitudinal black dashes between, and parallel lines along outer margin. Hindwings light gray, the outer edge and cilia base lined dark, cilia white. Frenulum spine single in both sexes, and as well as the subcostal hairs a series of frenulum holding setae between bases of radius and cubitus. Male genitalia with narrow hoodlike uncus heavily setose above; gnathos not apparent; tegumen short, rather broad; harpes considerably surpassing uncus, flattened, curved-oblong, moderately wide, pilose; aedeagus a short tube with apical convolutions. Female terminalia with short ovipositor and posterior apophyses; moderately long anterior apophyses; long ductus bursae with bursa and adjacent ductus heavily scobinate. Basal segments of abdomen with pockets for chordotonal organs, modifying the anterior sternal plate.

Pupa approximately 11 mm. long, yellow to brown, elongate, narrow. Fore-trochanters and femora showing; forewings and forelegs ending on segment five; antennae, maxillae, mid- and hindlegs leaving body on segment five and curving somewhat dorsally to just past cremaster, the antennae and hindlegs slightly longer. Abdomen tapering, curved a little dorsally; large cremaster with apical hooked setae.

Larva 12-14 mm. long, rather robust, with a "sticky" green appearance. A black spot on each side of the shield, the lateral edges fuscous, and with the remainder of the tubercles on the prothorax fuscous. Tubercles on other thoracic segments and abdomen, prominent but body color. Central proleg crochets in small biordinal circle broken outwardly, 17-18; anal proleg crochets in complete biordinal series 21-22. Head slightly flattened; frons ending before reaching foramen, the setae F₂ set to rear of clypeal apex; ocelli large with line from O₂ to A₃ between or cutting both ocelli I and II. Mandible with six teeth, the outermost smallest but extending to base of second. Spinnerette short, the maxillary palpi projecting well beyond labrum; inner stipital seta moved caudad, rather large and strongly curved laterally. Prespiracular wart bisetose; setae Ia-Ib and IIa-IIb on compound tubercles respectfully; thoracic legs lacking spinules, the outer rear apical tarsal seta a little longer than claw with the anterior seta short. Setae VII on abdomen: 2, 2-3, 3 (4 segments), 2, 1, 1, 9; setae II on A9 on compound mid-dorsal tubercle; seta I A9 on compound tubercle with III; one seta in position IV-V-VI A9.

The larvae of this moth have several broods a year on both *Solanum xanthii* and *S. umbelliferum*. The young larvae begin by producing a characteristic skeletonization but later become leafrollers. Tomato is occasionally attacked. A colony of these larvae was found near Cloverdale in 1926, on *Nicotiana glauca*, tree tobacco. I have not observed the larva on *Solanum nigrum*.

The adult superficially resembles Pterophorids both in general appearance and flight. It rests in a characteristic pose with head and apex of abdomen elevated. The moth occurs throughout the valleys and in the coastal section of California, but seems commoner to the south. I am indebted to Carl Heinrich for confirming the identity of this Pyralid. Notes: The peculiar stipital seta of the larva is possessed by other Pyraustine larvae, but the extent and modifications of this

throughout the Pyralidae remain to be worked out. The adult chordotonal organs which are possessed by many or all Pyralids seem an unusual feature worthy of taxonomic consideration.

With the exception of the *Holcocera* sp., all material was collected by the writer. The types of the new species are deposited in the Museum of the California Academy of Sciences.

Synonymy. Through the kindness of Mr. August Busck, I have the following information on synonyms: *Gelechia langei* Keifer (Bul. So. Cal. Acad. Sci. 35, p. 20, May, 1936) equals *Gelechia retiniella* Busck (Contrib. Lep. N. Am. 4, p. 228, 1918). *Gelechia marinensis* Keifer (Mo. Bul. Cal. Dept. Agr. 24, p. 300, June, 1935) equals *Gelechia ceanothiella* Busck (Proc. U. S. N. M. 27, p. 760, 1904).

Errata: California Microlepidoptera VI, Mo. Bul. Cal. Dept. Agr. 22, 1933 (Jan. 1934), on page 359, fourth paragraph, third line—instead of "the new genus," read "*Xenolechia*." Calif. Microlep. VII, Mo. Bul. Cal. Dept. Agr. 24 June, 1935, on page 196, fifth line from top, the species of *Setiostoma* should be *fernaldella* Riley. Calif. Microlep. VIII, Bul. So. Cal. Acad. Sci. 35, p. 9, May, 1936, the abdominal segments are designated with A and a subnumber whereas the number should have been on the line. Calif. Microlep. IX, Mo. Bul. Cal. Dept. Agr. 25, June, 1936, on page 240 third line above bottom, for "*monotaeniella* Chamb." read "*monumentella* Chamb.;" p. 241, below description of *diversella* Busck, for "related from *Lotus*" read "reared from *Lotus*;" p. 242, second paragraph, third line, for "*loticola*" (which name has no status) read "*diversella*;" p. 242, read "*Gelechia dammersi* Keifer, new species." In the drawings of *Deocona yuccasella* Busck, installment XI, plate VII, the clypeal (formerly frontal) punctures were omitted from Fig. 12a. These punctures are in the usual position. I am unable to substantiate the idea in Fig. 1 of this plate that the male terminal palpal joint of *Deocona* is porrected.

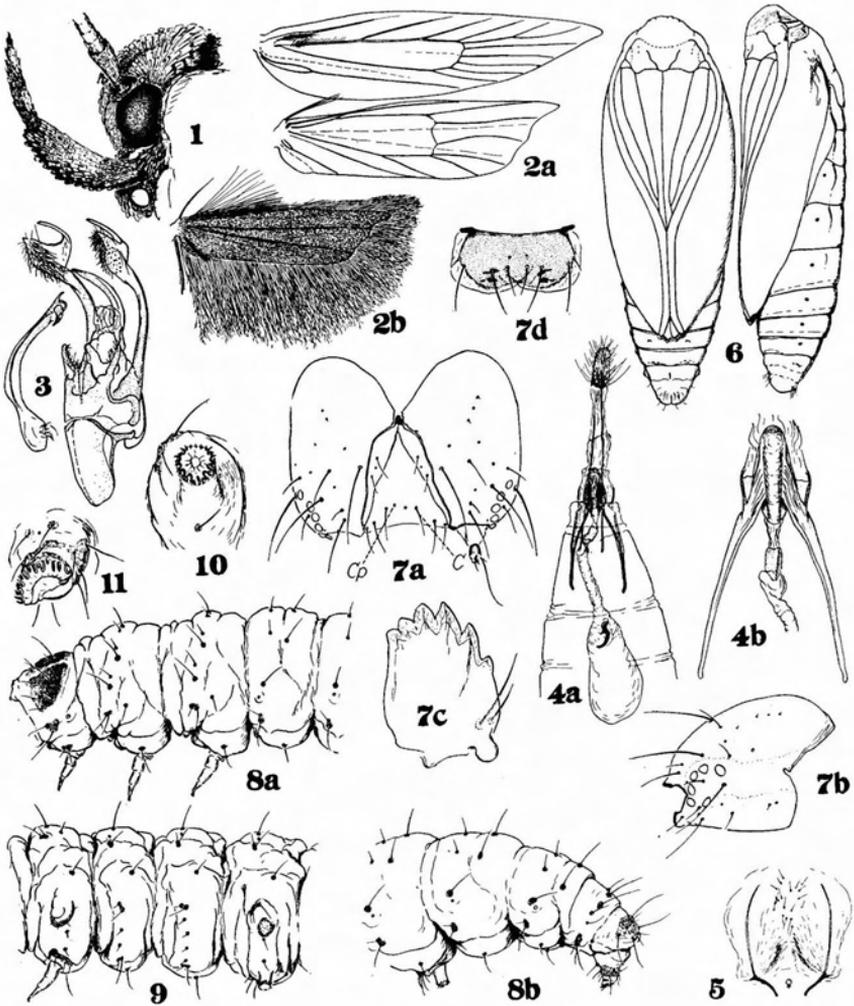


PLATE I

PLATE I

Gnorimoschema allisolani Keifer, new species

Fig. 1, Adult, left side of head. Fig. 2a, Wings, showing venation. Fig. 2b, Hindwing of male showing basal costal hairpencil. Fig. 3, Male genitalia, aedoeagus to left. Fig. 4a, Female terminalia. Fig. 4b, Female terminalia, detail of ostium, anterior apophyses, and part of ductus bursae tube. Fig. 5, Female anterior sternal plate. Fig. 6, Pupa, ventral and side. Fig. 7a, Larval head from in front. (C, clypeal seta; Cp, clypeal puncture). Fig. 7b, Larval head, left side of epicranium. Fig. 7c, Larval mandible. Fig. 7d, Larval labrum. Fig. 8a, Larva, thorax and first abdominal, left subdorsal view. Fig. 8b, Larva, last four abdominal segments, left subdorsal view. Fig. 9, Larva, metathorax and first three abdominals, left sub-lateral view. Fig. 10, Larva, one of the left central prolegs. Fig. 11, Larva, left anal proleg.

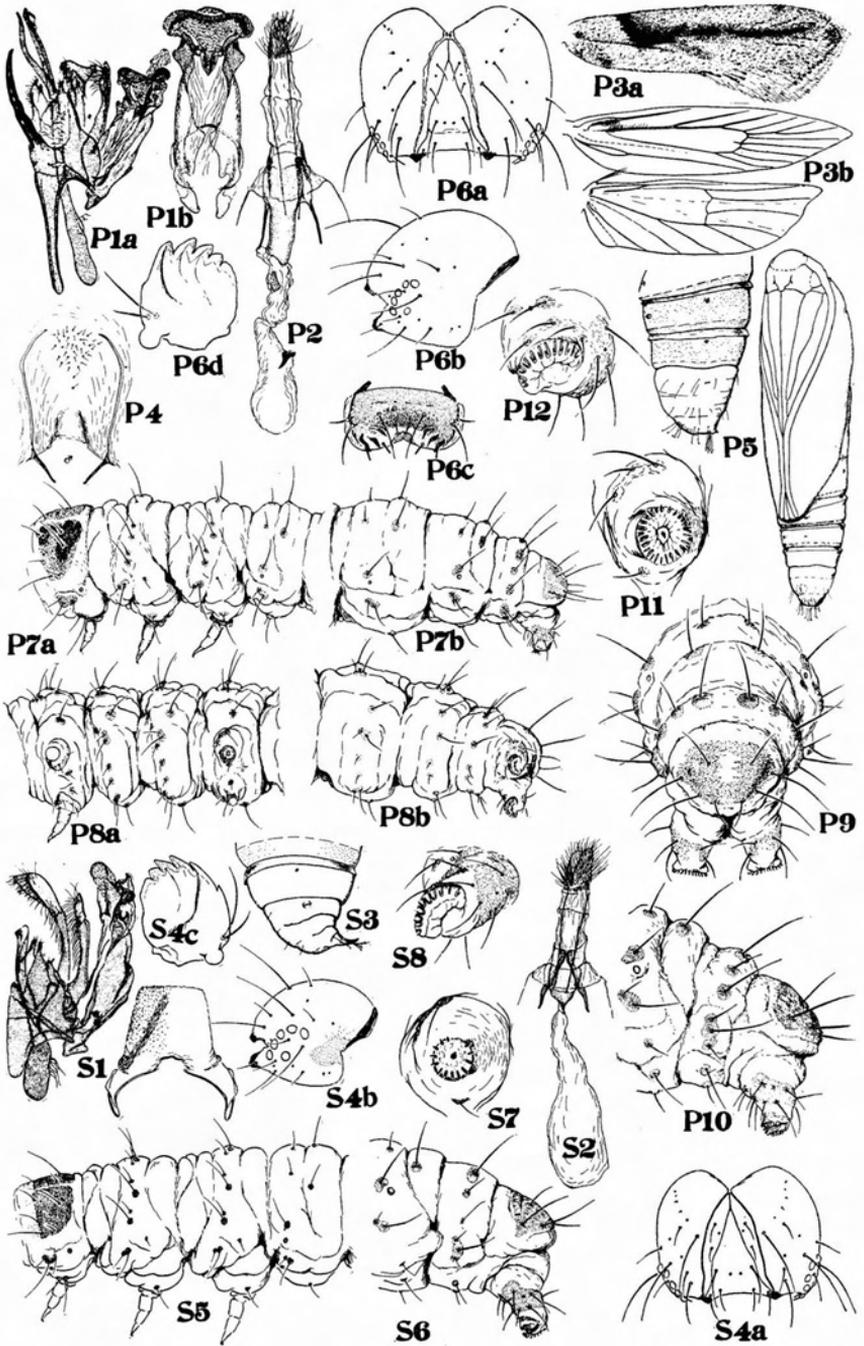


PLATE II

PLATE II

Gnorimoschema plaesiosema Turner

Fig. P1a, Male genitalia, aedoeagus to right. Fig. P1b, Male genitalia, uncus, gnathos and tegumen. Fig. P2, Female terminalia. Fig. P3a, Forewing, showing color pattern. Fig. P3b, Wing venation. Fig. P4, Male anterior sternal plate. Fig. P5, Pupa, detail of left side of abdomen to left. Fig. P6a, Larval head from front. Fig. P6b, Larval head, left side. Fig. P6c, Larval labrum. Fig. P6d, Larval mandible. Fig. P7a, Larva, thorax and first abdominal, left subdorsal view. Fig. P7b, Larva, last four abdominals, left subdorsal view. Fig. P8a, Larva, metathorax and first three abdominals, left sublateral view. Fig. P8b, Larva, last four abdominals, left sublateral view. Fig. P9, Larva, last three segments from rear. Fig. P10, Larva, last three segments, left side. Fig. P11, Larva, one of left central prolegs. Fig. P12, Larva, left anal proleg.

Gnorimoschema striatella Murf.

Fig. S1, Male genitalia, dorsal covering to right. Fig. S2, Female terminalia. Fig. S3, Pupa, left side of terminal abdominal segments. Fig. S4a, Larva, front view of head. Fig. S4b, Larva, left side of head. Fig. S4c, Larval mandible. Fig. S5, Larva, thorax and first abdominal, left subdorsal view. Fig. S6, Larva, left side of last three segments. Fig. S7, Larva, one of left central prolegs. Fig. S8, Larva, left anal proleg.

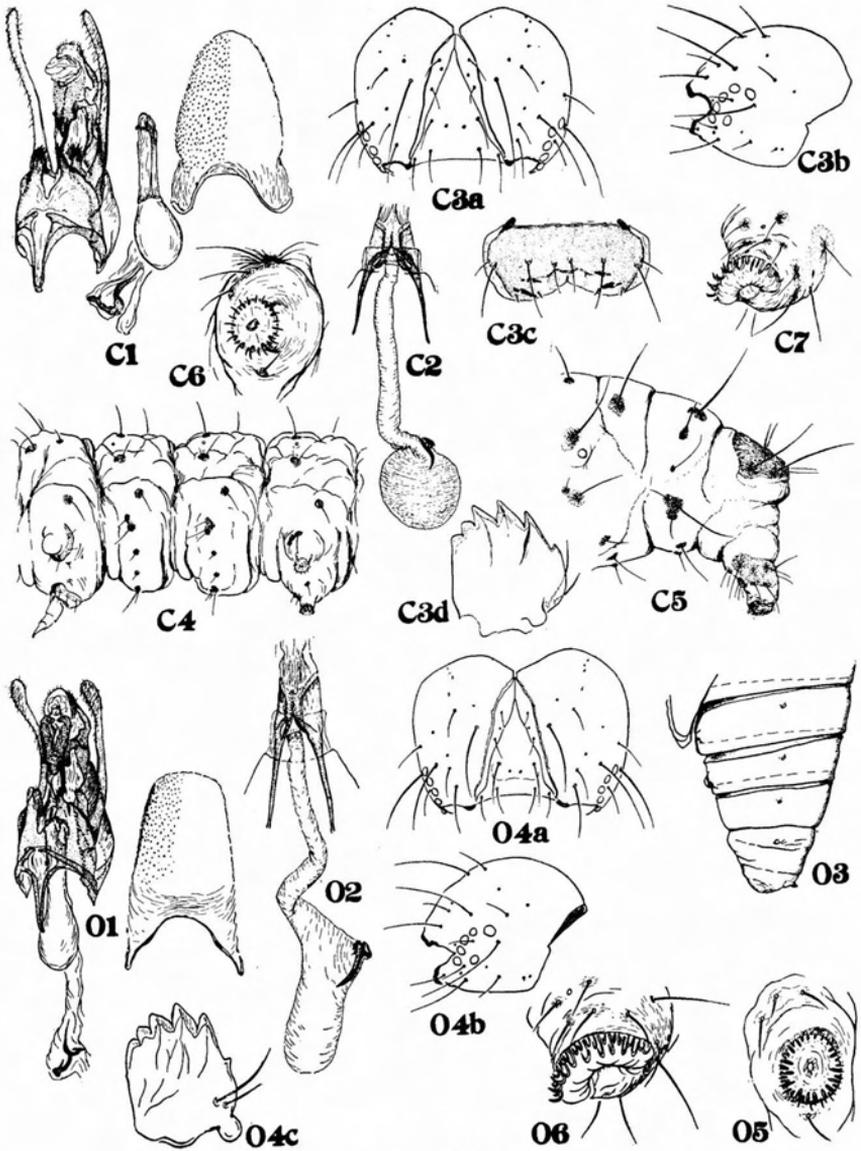


PLATE III

PLATE III

Gnorimoschema chenopodiellu Busck

Fig. C1, Male genitalia, aedeagus to right, also dorsal covering. Fig. Cs, Female terminalia minus ovipositor. Fig. C3a, Larval head, front view. Fig. C3b, Larval head, left side. Fig. C3c, Larval labrum. Fig. C3d, Larval mandible. Fig. C4, Larva, metathorax and first three abdominals, sublateral view. Fig. C5, Larva left side of last three abdominal segments. Fig. C6, Larval proleg, left central. Fig. C7, Larval proleg, left anal.

Gnorimoschema obsoletella Roesl.

Fig. O1, Male genitalia, dorsal covering to right. Fig. O2, Female terminalia minus ovipositor. Fig. O3, Pupa, left side of abdomen. Fig. O4a, Larval head, front view. Fig. O4b, Larval head, left side. Fig. O4c, Larval mandible. Fig. O5, Larval proleg, one of the left centrals. Fig. O6, Larval proleg, left anal.

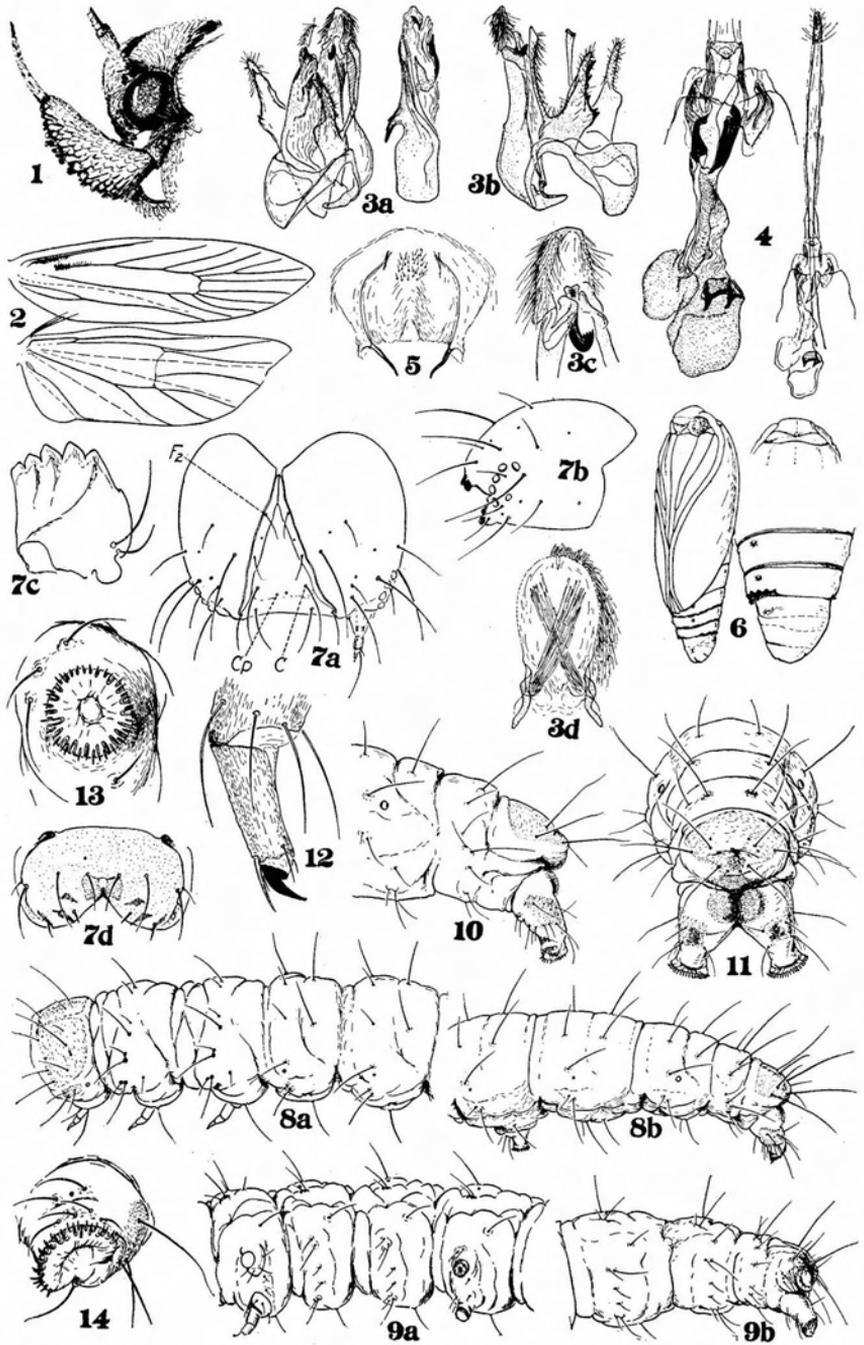


PLATE IV

PLATE IV

"Gelechia" saliciphaga Keifer, new species

Fig. 1, Adult, left side of head. Fig. 2, Wings. Fig. 3a, Male genitalia from right sublateral side, aedoeagus to right. Fig. 3b, Male genitalia minus aedoeagus, left side. Fig. 3c, Male genitalia, uncus and gnathos. Fig. 3d, Male terminalia, dorsal plate. Fig. 4, Female terminalia, detail of ostium and bursa to left. Fig. 5, Anterior sternal plate. Fig. 6, Pupa, left sublateral, details of dorsum of head and of left subdorsal view of abdomen, to right. Fig. 7a, Larval head from front. (C, clypeal seta; Cp, clypeal puncture; F₂, second or rear frontal seta.) Fig. 7b, Larval epicrania, left side. Fig. 7c, Larval mandible. Fig. 7d, Larval labrum. Fig. 8a, Larval thorax and first two abdominals, left subdorsal view. Fig. 8b, Last five larval abdominal segments, left subdorsal. Fig. 9a, Larval metathorax and first three abdominal segments, left sublateral view. Fig. 9b, Last four abdominal segments, left sublateral view. Fig. 10, Last three abdominal segments, left side. Fig. 11, Last three abdominal segments from rear. Fig. 12, Left larval metapod, detail of tibia and claw. Fig. 13, Left central proleg from below. Fig. 14, Left anal proleg from below.

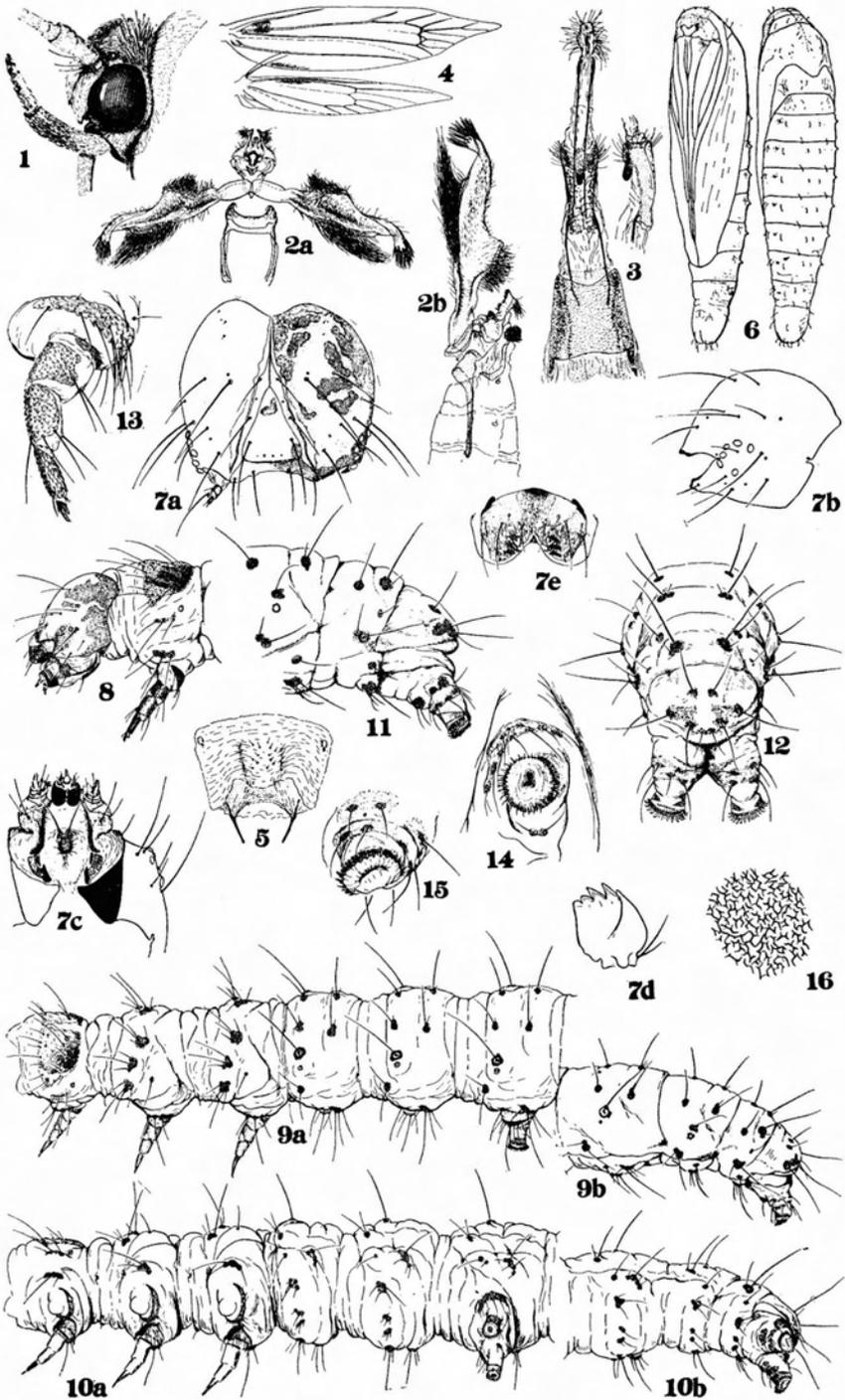


PLATE V

PLATE V

Scythris altisierrae Keifer, new species

Fig. 1, Adult head, left side. Fig. 2a, Male genitalia, harpes spread. Fig. 2b, Male genitalia, right side. Fig. 3, Female terminalia. Fig. 4, Wing venation. Fig. 5, Anterior sternal plate. Fig. 6, Pupa, sublateral and subdorsal views respectively. Fig. 7a, Larval head from front. Fig. 7b, Larval head, left side. Fig. 7c, Larval suboral structures. Fig. 7d, Larval mandible. Fig. 7e, Larval labrum. Fig. 8, Larval head and prothorax, left side. Fig. 9a, Larva, thorax and first three abdominal segments, subdorsal view. Fig. 9b, Last four larval segments, subdorsal view. Fig. 10a, Same as 9a, sublateral view. Fig. 10b, Same as 9b, sublateral view. Fig. 11, Last three larval segments, left side. Fig. 12, Last three larval segments, from rear. Fig. 13, Left larval metapod, from rear. Fig. 14, Left central larval proleg. Fig. 15, Left anal proleg. Fig. 16, Detail of larval skin structure as seen under very high magnification.

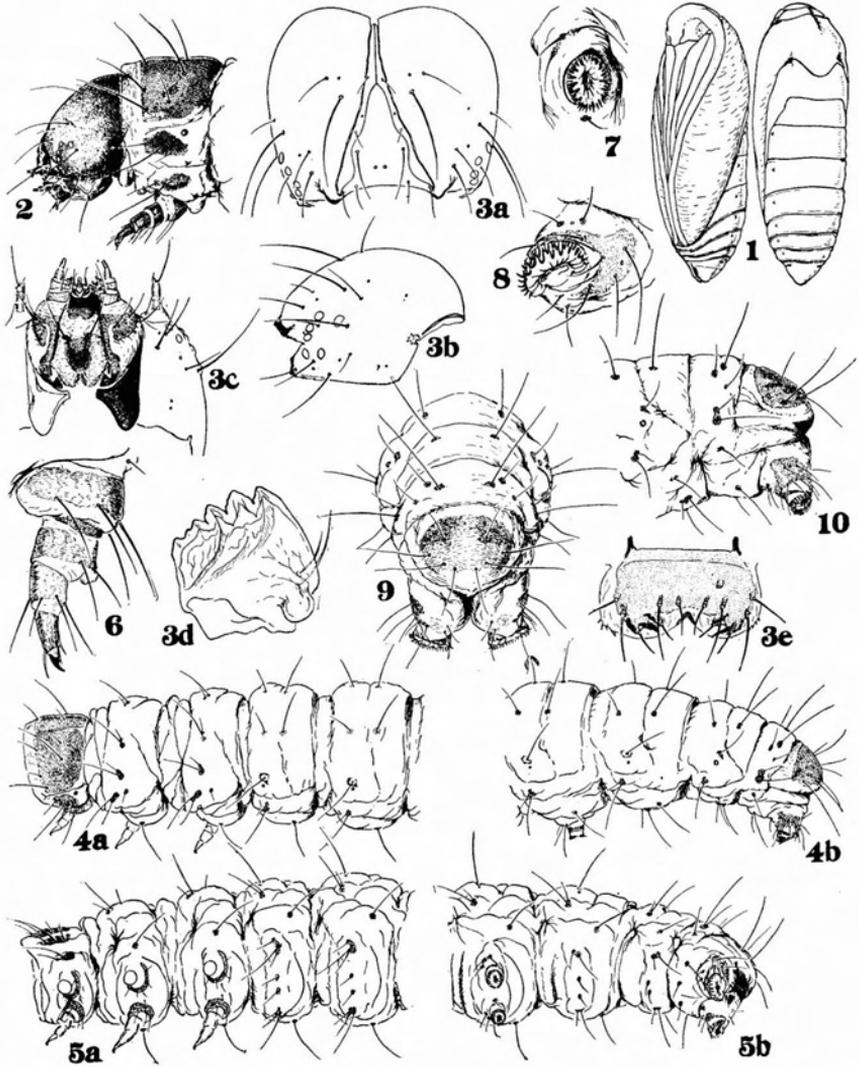


PLATE VI

PLATE VI

Holcocera sp.

Fig. 1, Pupa, sublateral and subdorsal views, respectively. Fig. 2, Larval head prothorax, left side. Fig. 3a, Larval head, front view. Fig. 3b, Larval head, left side. Fig. 3c, Larval suboral structures. Fig. 3d, Larval mandible. Fig. 3e, Larval labrum. Fig. 4a, Larval thorax and first two abdominals, subdorsal view. Fig. 4b, Last five larval segments, subdorsal view. Fig. 5a, same as 4a, sublateral view. Fig. 5b, Same as 4b, sublateral view. Fig. 6, Left larval propod from rear. Fig. 7, One of left central larval prolegs. Fig. 8, Left anal proleg. Fig. 9, Last three abdominal segments from rear. Fig. 10, Last three abdominal segments from left.

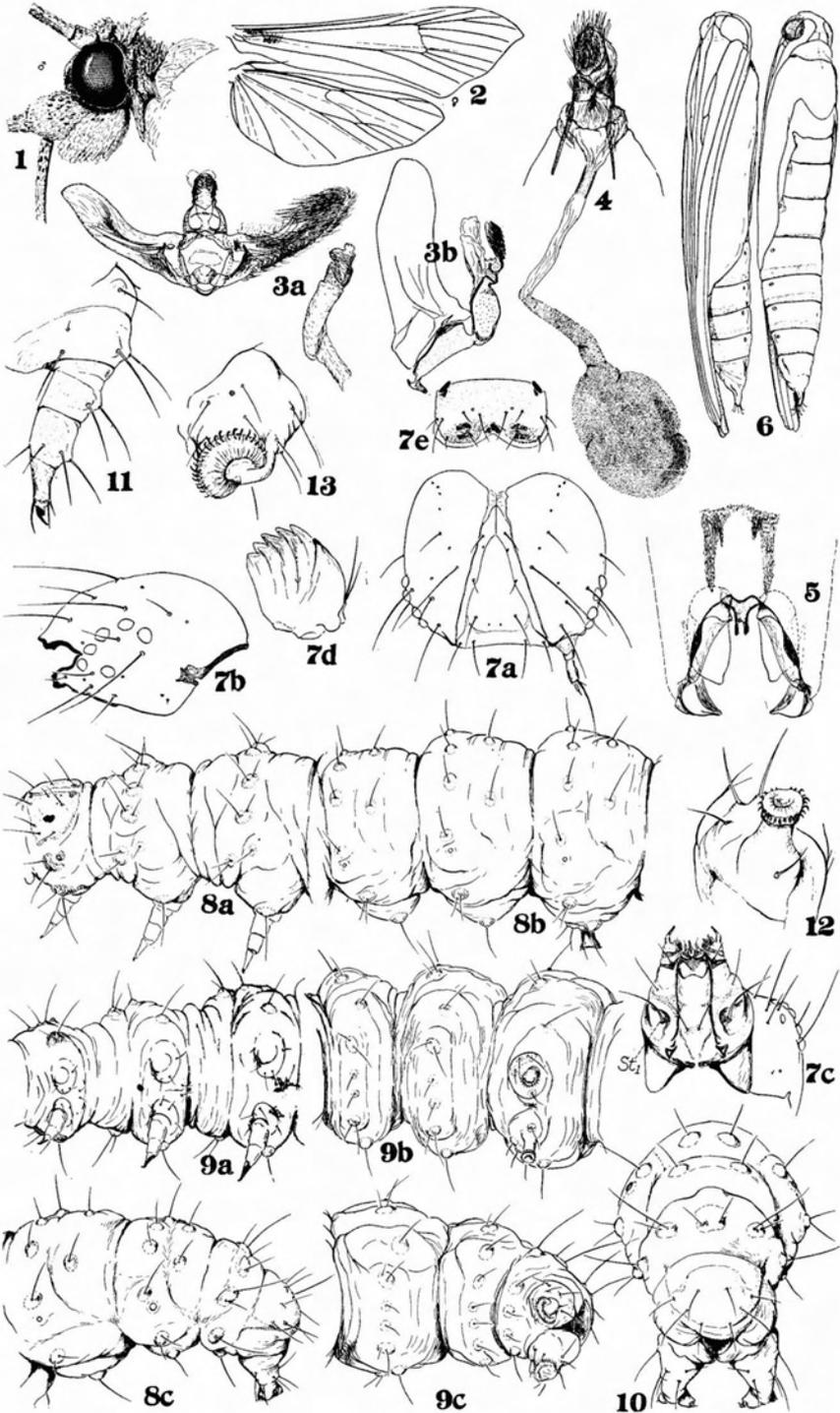


PLATE VII

PLATE VII

Lineodes integra Zell.

Fig. 1, Adult head. Fig. 2, Wing venation. Fig. 3a, Male genitalia, aedeagus to right. Fig. 3b, Male genitalia, right side. Fig. 4, Female terminalia. Fig. 5, Adult, basal abdominal structures. Fig. 6, Pupa, sublateral and subdorsal diagrams, respectively. Fig. 7a, Larval head, front view. Fig. 7b, Larval head, left side. Fig. 7c, Larval suboral structures. (Sti, inner stipital seta) Fig. 7d, Larval mandible. Fig. 7e, Larval labrum. Fig. 8a, Larval thorax, subdorsal view. Fig. 8b, Larval abdomen, first three segments, subdorsal view. Fig. 8c, Larval abdomen, last four segments, subdorsal view. Fig. 9a, Same as 8a, sublateral view. Fig. 9b, Same as 8b, sublateral view. Fig. 9c, Same as 8c, sublateral view. Fig. 10, Last three abdominal segments from rear. Fig. 11, Left larval metapod from behind. Fig. 12, One of left central prolegs. Fig. 13, Left anal proleg.

