

A REVISION OF THE MOTH GENERA  
*HULSTINA* AND *PTEROTAEA*  
(LEPIDOPTERA, GEOMETRIDAE)

FREDERICK H. RINDGE

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## INTRODUCTION

THE PRESENT PAPER is the eighth in a continuing series of revisionary studies on the genera of the New World Cleorini (McDunnough, 1920), or Boarmiini (Forbes, 1948), of the subfamily Ennominae. Both these names refer to a large tribe of "inch worm" moths that are commonly represented in both the Old and New worlds. The adults often rest on tree trunks, with their wings outspread and appressed to the bark. The wings are usually gray or brown, with a pattern that makes the moths almost invisible.

The purpose of the present paper is to revise taxonomically the genera *Hulstina* and *Pterotaea* for their entire range, and to attempt to answer some of the questions pertaining to the phylogeny and distribution of their species, tasks that have been long overdue. The two generic names were proposed in 1903 and 1896, respectively. Only one review of the two genera has been published; McDunnough (1920) listed the included species and presented illustrations of the male genitalia and of some adults. Since then, four new species (one in *Hulstina*, three in *Pterotaea*) have been described.

Although at first glance the taxonomy of these genera seems rather simple, the actual application of names is far from easy. Both groups have apparently undergone rapid development in relatively recent time, resulting in a number of species that are still morphologically quite similar to one another. In this paper, 19 species and nine subspecies are described as new. All members of these two genera are found in the southwestern United States and Baja California; 28 of the 31 included species occur in California.

*Hulstina* contains eight species, two of which are polytypic. The presence or absence of the tongue is used as the criterion for dividing the genus into two species groups. Those species without a tongue are found primarily in the semiarid Great Basin area of the southwestern United States, whereas the moths having a tongue are found along the coastal regions of California and northwestern Baja California.

*Pterotaea* encompasses 23 species, four of which are polytypic. This genus is separated into three species groups. One of these contains species having a raised front on the head; the female genitalia have a heavily sclerotized, median

projecting ridge on each papilla analis, and the very elongate apophyses are stout and heavily sclerotized. The included species are found in the desert areas of southern California. Both of the other groups have a normal front and normal female genitalia. Of these groups, the males of one lack the hind tibial hair pencil and groove, and the medioventral row of bristles on the third abdominal segment is absent. The included species are also primarily desert species from southern California and along the coast of the Gulf of California in Baja California; the females have slender and very long apophyses posteriores. The males of the third group possess a prominent tibial hair pencil and groove, and the row of bristles on the third abdominal segment may (10 species) or may not (six species) be present. Most of the species occur in the coastal regions of southern Oregon, California, and northwestern Baja California, with some extending as far inland as Nevada and western Utah. The females have apophyses posteriores of normal length.

More than 3300 specimens have been studied during the preparation of this paper; nearly one-half of them are in the collection of the American Museum of Natural History. It is interesting to note the different ratios of males to females in these two closely allied genera. In *Hulstina*, 1220 males and 575 females were examined, a ratio of slightly more than two males to every female. However, the figures for *Pterotaea* were 730 males and 810 females, which is approximately a one-to-one ratio.

### MATERIALS AND METHODS

The present revision is based on a study of the collections of the American Museum of Natural History, the California Academy of Sciences, the California Department of Agriculture, the California Insect Survey collection at the University of California, Berkeley, the Canadian National Collection, the Los Angeles County Museum of Natural History, the Museum of Comparative Zoology at Harvard College, the San Diego Natural History Museum, the United States National Museum of the Smithsonian Institution, and the University of California, Davis. Material from the private collections of



several individuals has also been examined; these are referred to specifically in the section on Acknowledgments.

All specimens studied by the author at the American Museum of Natural History during the preparation of this paper have had identification or type labels affixed. All too often such labeling has not been done in the past, so that the question always arises as to whether or not certain specimens were examined by a reviser.

The specimens photographed for this revision bear a typewritten "photo" label. In general, the adults and genitalia that are figured have been taken from the collection of the American Museum of Natural History. When such a procedure was not practical, the fact is specifically noted.

The following abbreviations have been used:

A.M.N.H., the American Museum of Natural History  
C.A.S., the California Academy of Sciences

L.A.M., Los Angeles County Museum of Natural History

U.S.N.M., United States National Museum, Smithsonian Institution

A large number of genitalic preparations were made by the author, who also had at his disposal the slides made by J. H. Sperry at the American Museum of Natural History, by J. H. McDunnough at the Canadian National Collection, by H. W. Capps, J. F. G. Clarke, and E. L. Todd at the United States National Museum, by S. E. Cassino and L. W. Swett at the Museum of Comparative Zoology at Harvard University, and by C. W. Kirkwood and W. R. Bauer. In all, 284 male and 153 female dissections were studied.

The photographs of the genitalic structures of each sex are reproduced at different scales.

This magnification is constant within each sex, with the exceptions of figures 79, 88, and 91.

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## SYSTEMATIC DESCRIPTIONS

### GENUS *HULSTINA* DYAR

*Hulstina* DYAR, 1903, p. 178. SMITH, 1903, p. 77. BARNES AND McDUNNOUGH, 1917, p. 117. McDUNNOUGH, 1920, p. 33; 1938a, p. 164.

Monroa WARREN, 1904, p. 555. McDUNNOUGH, 1920, p. 22 (synonym of *Glena*). RINDGE, 1965, p. 269. New synonymy.

Head with front flat, smooth scaled; eyes large, wider than front, smaller in female than in male; antennae of male bipectinate, with pectinations arising from apex of segment, each pectination with numerous setae, and with terminal few segments without pectinations; antennae of female simple or with short terminal pectinations, scaled, with terminal pair of setae; tongue absent or present; labial palpi varying in length from short to very long, porrect. Thorax without tufts; fore tibia of male with process about one-half as long as tibia, extending to or just beyond end of segment, in female shorter; hind tibia with two pairs of spurs, without either groove or hair pencil in male. Abdomen without tufts; male with third segment without medioventral row of bristles, and remainder of abdomen without additional modifications.

Forewings broad, with 11 veins, most specimens without areole;  $R_{1+2}$  anastomosed, some specimens with weak cross vein to  $R_{3+4}$ ,  $R_5$  arising distal to cross vein;  $M_1$  from upper angle,  $M_2$  from near middle of dc,  $M_3$  from lower angle;  $Cu_1$  from near angle,  $Cu_2$  from two-thirds of distance to angle; without fovea. Hind wings broad, rounded; outer margin weakly concave between veins; frenulum strong in both sexes; with seven veins; Sc with weakly swollen base, approximate to radial vein for about one-half of length of cell;  $R_1$  separating from  $M_1$  before upper angle,  $M_3$  from lower angle;  $Cu_1$  from near angle,  $Cu_2$  from beyond middle of cell;  $m+ldc$  angulate.

The upper surface of the forewings of the species of *Hulstina* is gray, with black t. a. and t. p. lines more or less represented, the latter line tending to be strongly inwardly oblique and to meet the inner margin of the wing basad of the middle. Discal dots are usually present on the forewings; they may or may not be represented on the hind wings. The latter are a slightly paler

gray than the forewings and have reduced maculation.

MALE GENITALIA: Uncus curved ventrally, constricted medially, apical region enlarged, flattened, heavily sclerotized, and with posterior margin rounded or bluntly pointed medially; socius absent; gnathos heavily sclerotized, broad with median enlargement flattened, finely spiculate or punctate; valves large, symmetrical; costa heavily sclerotized, broad, occupying one-third to one-half of inner surface of valve, not extending to apex, with or without one or more prominent spines from posterodistal angle; sacculus swollen, sclerotized, and with weakly sclerotized piece in center of valve connecting with costa; transtilla membranous; cristae small and inconspicuous; furca absent; anellus with juxta large, sclerotized, widest anteriorly; tegumen large, thick dorsoventrally, well sclerotized; saccus with sides fairly slender, tapering to blunt point anteriorly; aedeagus longer than combined lengths of tegumen and saccus, varying from relatively short, broad, and straight to elongate, slender, and with posterior portion curving ventrally; sescia armed with one or more groups of spines.

FEMALE GENITALIA: Papillae anales simple, membranous, scarcely distinguishable from adjacent membranous area, with apophyses posteriores about twice as long as apophyses anteriores; sterigma membranous or lightly sclerotized; ductus bursae sclerotized, variable in shape, ranging from short, square, and well differentiated to being coalesced with posterior portion of corpus bursae; ductus seminalis arising either from posterior portion of corpus bursae or from united ductus bursae and corpus bursae; corpus bursae varying from elongate and slender, with narrow, posterior end having longitudinal striations, to short and globular; signum either absent or present, when present small and usually with stellate margins.

EARLY STAGES: The complete life history of one species has been described and illustrated (Comstock, 1963b).

FOOD PLANTS: The two known food plants are evergreen shrubs belonging to the Rosaceae.

TYPE SPECIES: Of *Hulstina*, *terlineata* Dyar (= *formosata* Hulst); sole included species. Of

*Monroa*, *Cymatophora 5-linearia* Packard (= *Glena quinquelinearia*); by original designation. However, Warren misidentified his type species for the new genus; a study of the actual specimen shows that it is *Hulstina formosata* (Hulst).

RANGE: Western North America, in the Great Basin area, and in northern Baja California and coastal California as far north as Monterey County.

The dates of capture for the moths indicate that there is but a single generation per year for each of the species of *Hulstina*.

### KEY TO SPECIES

#### BASED ON MACULATION, MORPHOLOGY, AND DISTRIBUTION

1. Tongue absent . . . . . 2  
Tongue present . . . . . 8
- 2(1). Upper surface of forewings with t. p. line represented between costal margin and vein  $M_1$  . . . . . 3  
Upper surface of forewings with t. p. line represented by venular dots between costal margin and vein  $M_2$  . . . . . 7
- 3(2). Upper surface of forewings with median area usually gray or grayish brown; southeastern Great Basin . . . . . *formosata*  
Upper surface of forewings with median area pale brown; California and western and northern Great Basin . . . . . 4
- 4(3). From southern California and southern Sierra Nevada mountains . . . . . 5  
From eastern California and Nevada north to Idaho . . . . . 6
- 5(4). Upper surface of wings with median area broadly suffused with light brown; length of forewing, 16 to 18 mm.; mountains of southern California . . . . . *tanyraeros tanyraeros*  
Upper surface of wings with median area scarcely suffused with pale brown; length of forewing, 15 to 16 mm.; Panamint Mountains, eastern California . . . . . *tanyraeros deserta*
- 6(4). Upper surface of wings dark gray, with median area lightly suffused with pale brown; eastern Nevada to Idaho . . . . . *imitatrix imitatrix*  
Upper surface of wings pale gray, with median area broadly suffused with pale brown; eastern California and adjacent Nevada . . . . . *imitatrix fulva*
- 7(2). Southern, occurring in the southern Rocky Mountain states and southern California . . . . . *aridata*  
Northern, occurring in the northern Great Basin and northeastern California . . . . . *xera*

- 8(1). Small, with length of forewing 10 to 13 mm. . . . . *wrightiaria*  
Larger, with length of forewing 12 to 17 mm. 9
- 9(8). Upper surface of forewing with t. p. line represented by venular dots between costal margin and veins  $M_3$  or  $Cu_1$  . . . . . *grossbecki*  
Upper surface of forewings with t. p. line commencing at or anterior of vein  $M_1$  . . . . . *exhumata*

#### BASED ON MALE GENITALIA

1. Costa with one or more spines from posterodistal angle<sup>1</sup> . . . . . 3  
Costa without spines from posterodistal angle 2
- 2(1). Aedeagus 1.0 to 1.2 mm. in length; vesica with from five to eight short spines in right-hand row, with spines only two-thirds as long as width of aedeagus . . . . . *aridata*  
Aedeagus 1.3 to 1.5 mm. in length; vesica with two or three long spines in right-hand row, with spines as long as width of aedeagus . . . . . *xera*
- 3(1). Costal spine almost as long as entire valve, and parallel with costa . . . . . *wrightiaria*  
Costal spine not as above . . . . . 4
- 4(3). Costal spine not longer than maximum width of aedeagus . . . . . 5  
Costal spine three times longer than width of aedeagus . . . . . *exhumata*
- 5(4). Aedeagus longer than combined lengths of uncus, tegumen, and saccus; spines of vesica small, numerous, and in one compact group in center of aedeagus . . . . . 6  
Aedeagus shorter than combined lengths of uncus, tegumen, and saccus; spines of vesica larger, fewer in number, and occupying most of width of aedeagus . . . . . *grossbecki*
- 6(5). Aedeagus 1.5 mm. in length; spines of vesica occupying one-third to one-half of length of aedeagus . . . . . 7  
Aedeagus 1.9 to 2.1 mm. in length; spines of vesica occupying about one-fifth of length of aedeagus . . . . . *tanyraeros*
- 7(6). Costa with posterodistal angle slender, about one-fifth of maximum width of uncus, and bearing one (rarely two) slender spines . . . . . *formosata*  
Costa with posterodistal angle broad, from two-fifths to one-half of maximum width of uncus, and bearing two (rarely three) heavy spines . . . . . *imitatrix*

#### BASED ON FEMALE GENITALIA

1. Corpus bursae with signum . . . . . 3  
Corpus bursae without signum . . . . . 2
- 2(1). Ductus bursae short, distinct, with parallel sides . . . . . *aridata*  
Ductus bursae not differentiated . . . . . *xera*

<sup>1</sup> The costal spines are sometimes missing in *grossbecki*.



- 3(1). Corpus bursae with posterior portion elongate, at least four times as long as ductus bursae, slender, and with sclerotized longitudinal striations . . . . . 4  
Corpus bursae without above characters . . . 8
- 4(3). Ductus seminalis arising on right side . . . 5  
Ductus seminalis arising ventrally . . . . 6
- 5(4). Combined lengths of ductus bursae and corpus bursae about 1.7 mm. . . . . *grossbecki*  
Combined lengths of ductus bursae and corpus bursae about 3.0 mm. . . . . *tanyraeros*
- 6(4). Corpus bursae with posterior sclerotized portion 1.7 to 2.1 mm. in length . . . . *formosata*  
Corpus bursae with posterior sclerotized portion not exceeding 1.5 mm. in length . . . . . 7
- 7(6). Corpus bursae with posterior sclerotized portion 1.40 to 1.50 mm. in length . . . *imitatrix imitatrix*  
Corpus bursae with posterior sclerotized portion 1.15 to 1.35 mm. in length . . . *imitatrix fulva*
- 8(3). Ductus bursae broad, slightly longer than wide . . . . . *exhumata*  
Ductus bursae narrow, elongate, three to four times longer than wide. . . . . *wrightiaria*

#### GROUP I

The moths belonging to this group are easily recognized, as they lack a tongue. They are large and have at least some brown scaling on the upper surface of the wings; two of the species have extensive areas of pale brown scales. The included species are primarily found in the Great Basin area of the southwestern United States. They occur also on the eastern slope of the Sierra Nevada Range, and two species have extended their distribution along the Transverse Ranges into the coast ranges of California.

This group includes five species: *formosata*, *imitatrix*, *tanyraeros*, *aridata*, and *xera*.

#### *Hulstina formosata* (Hulst)

Figures 1, 10, 49, 79, 80

*Cleora formosata* HULST, 1896, p.357. DYAR, "1902" [1903], p. 326. SMITH, 1903, p. 77. BARNES AND McDUNNOUGH, 1917, p. 117. RINDGE, 1955, p. 143.

*Hulstina formosata*: McDUNNOUGH, 1920, p. 33, pl. 6, fig. 8 (male genitalia), pl. 8, fig. 6 (adult male); 1938a, p. 164.

*Hulstina terlineata* DYAR, 1903, p. 178. SMITH, 1903, p. 77.

*Cleora terlineata*: BARNES AND McDUNNOUGH, 1917, p. 117 (synonym of *formosata*).

*Monroa quinquelinearia* auct.: WARREN, 1904, p. 555.

This large species has the well-defined t. p. line of the forewings beginning on vein  $M_1$ , and

the median area is usually gray. It occurs in the Great Basin area.

MALE: Head with vertex grayish white to dark gray, and with black scales between bases of antennae; front black or blackish brown, some specimens with whitish gray scaling; palpi extending shortly beyond front, covered with mixed pale gray, grayish brown, and black scales; tongue absent. Thorax pale gray above, many scales with light brown to blackish brown apices, with dark bands across end of collar and across patagia; below gray, with variable number of brown and black scales; legs gray, with terminal portions pale brown. Abdomen dull gray or grayish brown above, each segment tending to become darker brown posteriorly and to have narrow grayish white posterior band; beneath gray, with scattered brown and blackish brown scales.

UPPER SURFACE OF WINGS: Forewings whitish gray or dull gray, with variable number of brown, dark grayish brown, and grayish black scales; cross lines black, absent from costal portion of wing; basal line absent; t. a. line extending from upper portion of cell to near base of wing, straight, broad, geminate, interior portion filled with dark brown scales; median area light gray, in a few specimens lightly suffused with pale brown; discal spot black or brownish black, large in most specimens, in some cases reduced or absent; median line weakly indicated in lower portion of wing, tending to be near t. p. line; t. p. line extending from vein  $M_1$  to middle of inner margin, with weak basal bend below cell, broadly shaded along outer margin with brown band; subterminal area tending to be white above inner margin, and to have grayish brown or grayish black nebulous band on inner side of s. t. line; latter white or whitish gray, evenly paralleling outer margin, of variable strength; terminal area more or less suffused with dark scales; terminal line black, narrow, interrupted by veins, tending to be weakly enlarged in cells; fringe concolorous with edge of wing and having narrow whitish gray base. Hind wings concolorous with forewings, tending to be more or less heavily suffused with brown and grayish black scales; intradiscal line and discal spot weakly represented or absent; outer portion of wing with two grayish black lines and with brown line in between, all being separated by

pale gray scaling; terminal line and fringe similar to those of forewings.

UNDER SURFACE OF WINGS: Pale gray, with forewings varying from having scattered grayish brown and grayish black scales to being evenly suffused with grayish brown, and with hind wings appearing slightly paler, with scattered brownish black scales; maculation absent except for weakly represented t. p. and extradiscal lines, appearing primarily as brown venular dots; discal spots weakly represented on all wings on most specimens; terminal line and fringe similar to those of upper surface.

LENGTH OF FOREWING: 14 to 17 mm.

FEMALE: Similar to male.

LENGTH OF FOREWING: 14 to 16 mm.

MALE GENITALIA: Uncus with apical portion broadly swollen, with ventral surface slightly concave, and with posterior margin flattened medially; gnathos slightly increasing in width anterolaterally, median enlargement finely spiculate; valves with costa broadly sclerotized, extending slightly over one-half of length of costal margin, posterodistal portion triangular, extending to middle of valve, with one or two slender spines at narrow apex of triangle; sacculus large, with sclerotized area extending to just beyond costal spines, and with large, rounded or semicircular piece in center of valve; juxta broad, evenly tapering posteriorly; aedeagus 1.5 mm. in length, with anterior end swollen on right side, and with posterior end weakly enlarged, rounded apically, and slightly curving ventrally; vesica with dense median group of numerous slender spines, occupying about one-half of length of aedeagus.

FEMALE GENITALIA: Sterigma membranous; ductus bursae distinct, small, with length equal to width, rounded anteriorly and increasing in width posteriorly, posterior end heavily sclerotized and with lateral edges protruding, rear margin varying from rounded to bilobed, and having membranous triangular piece posteromedially; ductus seminalis arising ventrally, posterior of sclerotized area of corpus bursae; latter long and slender, posterior portion slender, 1.7 to 2.1 mm. in length, slightly increasing in width anteriorly, sclerotized and with longitudinal striations not attaining membranous portion, and with anterior portion globular, elongate, 0.9 to 1.6 mm. in length, membranous, and set off from posterior portion by constric-

tion; signum in ventral wall of corpus bursae, more or less rounded, outer margin with variable number of short points, and with central area recessed.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE: Hulst gave no indication of the sex of the type of *formosata* or whether he had more than one specimen before him when describing this species. The specimen from the Hulst collection bearing Hulst's type label is a female and is now in the collection of the American Museum of Natural History (Rindge, 1955, p. 143). This specimen is considered to be the type; its genitalia are mounted on slide F.H.R. No. 15055.

Dyar described *terlineata* from five specimens, without indicating their sex. The lectotype, hereby designated, is a male, and its genitalia are mounted on slide H.W.C. No. 231; this is U.S.N.M. No. 6735.

TYPE LOCALITIES: Colorado (*formosata*); Stockton, Tooele County, Utah (*terlineata*).

DISTRIBUTION: Northern Arizona, Colorado, Utah, and eastern Nevada (see fig. 1).

TIME OF FLIGHT: The adults have been captured in June, July, and August.

REMARKS: A total of 113 specimens (65 males and 48 females) and 18 genitalic dissections (10 males and eight females) have been studied, including both primary types and their genitalia.

#### ***Hulstina imitatrix*, new species**

This species is similar to *formosata*, but it tends to have thinner cross lines and to have the median area of the forewing more suffused with pale brown. The safest way to separate the two species is by means of the genitalic differences. The present species occurs from eastern California, Nevada, and western Utah north into Idaho in two subspecific populations.

MALE: Head, thorax, and abdomen similar to those of *formosata*.

UPPER SURFACE OF WINGS: Similar to that of *formosata*; forewings with cross lines tending to be narrower and to have median area slightly wider and more or less broadly suffused with pale brown. Hind wings with band distad of extradiscal line pale brown.

UNDER SURFACE OF WINGS: Similar to that of *formosata*, but with maculation obsolescent or absent.



LENGTH OF FOREWING: 14 to 17 mm.

FEMALE: Similar to male, but with greater pale brown suffusion on both forewings and hind wings above.

LENGTH OF FOREWING: 14 to 16 mm.

MALE GENITALIA: Similar to those of *formosata*, but differing mainly as follows: slightly larger; valves with costa more heavily sclerotized, posterodistal portion triangular, with two (rarely one or three) heavy spines at broad apex of triangle; aedeagus 1.5 to 1.6 mm. in length, with posterior end bluntly pointed; vesica with spines occupying slightly less than one-half of length of aedeagus.

FEMALE GENITALIA: Similar to those of *formosata*, but differing mainly as follows: ductus bursae with sclerotized area wider than long, and with posterior margin tending to be rounded; corpus bursae with posterior portion gradually increasing in width anteriorly, with heavily sclerotized longitudinal striations becoming irregular and transverse, extending to anterior membranous portion of corpus bursae.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

DISTRIBUTION: The western portion of the Great Basin, from eastern California to Idaho.

***Hulstina imitatrix imitatrix***, new subspecies

Figures 1, 11

The nominate population occurs in the western and northern portions of the Great Basin, and the moths tend to have the upper surface of the wings dark gray, with relatively little pale brown scaling.

MALE: Head, thorax, and abdomen with contrastingly colored scales of black, blackish gray, and white, with dark brown scales on abdomen.

UPPER SURFACE OF WINGS: Forewings dark gray, with median area slightly paler, weakly suffused with pale brown; t. p. line tending to have basal bend below cubital vein; hind wings with relatively narrow grayish brown band distad of extradiscal band.

UNDER SURFACE OF WINGS: Hind wings paler than forewings, with maculation weakly represented on all wings.

LENGTH OF FOREWING: 14 to 16 mm.; holotype, 16 mm.

FEMALE: Similar to male but with more pale brown suffusion on all wings above.

LENGTH OF FOREWING: 15 to 16 mm.; allotype, 16 mm.

MALE GENITALIA: As described for the species.

FEMALE GENITALIA: As described for the species; ductus bursae with posterior margin weakly bilobed or straight; corpus bursae with posterior portion well sclerotized and with longitudinal striations more or less distinct; length of posterior portion of corpus bursae, 1.4 to 1.5 mm., of anterior membranous portion, 1.35 to 1.40 mm.

TYPES: Holotype, male, Kingston Camp, 30 miles south of Austin, Toiyabe Range, Lander County, Nevada, elevation 7300 feet, July 15, 1966 (F., P., and M. Rindge); allotype, female, same data, July 13, 1966. The genitalia of the holotype are mounted on slide F.H.R. No. 15260; those of the allotype, on F.H.R. No. 15025. Paratypes: *Nevada*: Same data as types, July 14, 16, 17, 1966, one male, three females; Lee Canyon, 38 and 39 miles northwest of Las Vegas, Clark County, elevation 6900–7400 feet, July 24, 25, 1966 (F., P., and M. Rindge), two males; 50 miles north of Eureka, Eureka County, June 21, 1934 (J. A. Comstock), two males; Austin, Lander County, July 22, 1964, one female; 19 miles south of McDermitt, Humboldt County, June 23, 1960 (W. E. Ferguson), one female. *Oregon*: Five miles east of Bend, Deschutes County, August 11, 1964 (K. Goeden), two males; Cove Palisades State Park, south of Madras, Jefferson County, elevation 2500 feet, July 25, 1962 (R. H. Leuschner), two males. *Idaho*: Glenns Ferry, Elmore County, June 22, 1935 (G. H. and J. L. Sperry), one male; Twin Falls, Twin Falls County, July 10, 1957 (J. R. Douglass), one male; Buhl, Twin Falls County, elevation 3500 feet, July 4, 1958 (R. E. Miller), one male; Parma, Canyon County, elevation 2224 feet, June 29, 1951 (A. J. Walz), one male. In addition, three males have been examined from western Utah (Juab and Washington counties).

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the California Insect Survey, of the Los Angeles County Museum of Natural History, of the Department of Agriculture, Salem, Oregon, and of R. H. Leuschner.

DISTRIBUTION: Nevada, western Utah, eastern Oregon, and Idaho (see fig. 1).

TIME OF FLIGHT: June, July, and August. One

specimen from Utah was labeled March; this needs verification.

REMARKS: A total of 22 specimens (16 males and six females) and nine genitalic dissections (seven males and two females) have been studied.

**Hulstina imitatrix fulva**, new subspecies

Figures 1, 12, 50, 81

This population occurs in eastern California and adjacent Nevada, and the moths have wings that are light gray, broadly suffused with pale brown above.

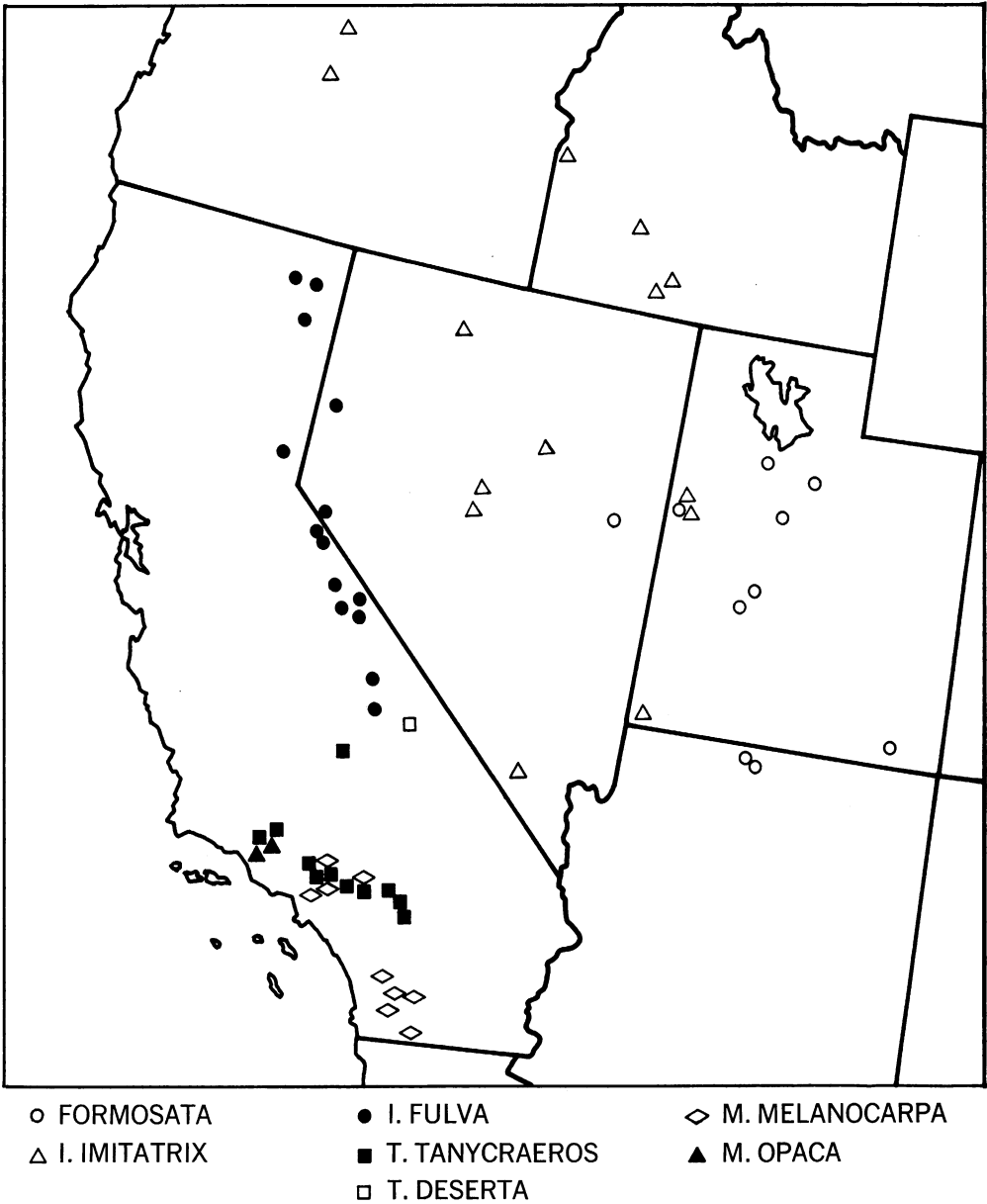


FIG. 1. Distribution of *Hulstina formosata* (Hulst.), *H. imitatrix*, new species, *H. tanyraeros*, new species, and *Pterotaea melanocarpa* (Swett). *H. formosata* is also known from Colorado but without specific data.

MALE: Head, thorax, and abdomen with less contrastingly colored scales, and with pale brown scales on abdomen.

UPPER SURFACE OF WINGS: Forewings light gray, with median area slightly paler, strongly suffused with pale brown; t. p. line tending to be only weakly curved; hind wings with broad pale brown band distad of extradiscal line.

UNDER SURFACE OF WINGS: Hind wings slightly paler than forewings, with maculation obsolescent.

LENGTH OF FOREWING: 15 to 17 mm.; holotype, 17 mm.

FEMALE: Similar to male but with more pale brown suffusion on all wings above.

LENGTH OF FOREWING: 14 to 16 mm.; allotype, 16 mm.

MALE GENITALIA: As described for the species.

FEMALE GENITALIA: As described for the species; ductus bursae with posterior margin rounded; corpus bursae with posterior portion tending to be only partially sclerotized and to have longitudinal striations indistinct; length of posterior portion of corpus bursae, 1.15 to 1.35 mm., of anterior membranous portion, 1.35 to 1.65 mm.

TYPES: Holotype, male, Coleville, Mono County, California, July 16, 1948 (R. Coleman), and from the author's collection; allotype, female, Holbrook, Douglas County, Nevada, August 4, 1938 (G. H. and J. L. Sperry). The genitalia of the holotype are mounted on slide F.H.R. No. 14954; those of the allotype, on F.H.R. No. 15109. Paratypes: California: *Mono County*: Same data as holotype, July 2, 12, 15, 27, 31, 1948, six males; Coleville, July 23, 1954 (W. A. Rees), one male; near Topaz, July 15, 1937, nine males and three females; Rock Creek, August 10, 11, 1955 (W. A. Rees), elevation 8000 feet, August 10, 1958 (M. Lundgren), four males and three females; Mono Lake, July 11, 1937, one male; Mammoth, July 23-24, 1933 (L. Martin), August 3, 4, 6, 1937 (C. W. Kirkwood), six males and one female; Lundy Creek, Mono Lake, July 22, 1935, July 26, 1936, July 11, 1937 (L. Martin), seven males; McGee Creek, August 11, 1955 (R. H. Reid), one female; Tom's Place, elevation 7200 feet, July 10, 1966 (R. H. Leuschner), two males; 1 mile west of Tom's Place, August 13, 1957 (J. Powell), one male and one female; Benton, July 22, 1965, June 8, 1966, June 16 to July 14, 1967 (J. H.

Patterson), July 3, 1938, 10 males; Leevining, July 19, 1938 (E. C. Johnston), one male. *Inyo County*: Independence, April 14, 1936, June 13, 1936, June 8, 1938 (J. A. Comstock, L. Martin), two males and three females; Gray's Meadow, above Independence, elevation 6000 feet, July 4-5, 1958 (R. H. Leuschner), six males and five females; 9 miles west of Lone Pine, July 19, 1961 (P. D. Hurd and J. Powell), three females. *Lassen County*: Madeline, August 9, 1956 (W. R. Bauer and J. S. Buckett), one male. *Modoc County*: Quarantine station north of Alturas, August 8, 1956 (W. R. Bauer and J. S. Buckett), two males; Canby, July 16, 1936 (E. C. Johnston), one male. *Nevada County*: Sagehen, near Hobart Mills, July 16, 1954 (J. Powell), one female. Nevada: *Washoe County*: Pyramid Lake, 5 miles northwest of Sutcliffe, June 22, 1960 (W. E. Ferguson), one male.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the California Department of Agriculture, of the California Insect Survey, of the Canadian National Collection, of the Los Angeles County Museum of Natural History, of the University of California, Davis, of C. W. Kirkwood, and of R. H. Leuschner.

DISTRIBUTION: Eastern California and adjacent Nevada, apparently occurring in the Great Basin Biotic Province (see fig. 1).

TIME OF FLIGHT: April, June, July, and August.

REMARKS: A total of 88 specimens (65 males and 23 females) and 13 genitalic dissections (seven males and six females) have been studied.

The degree of difference between the female genitalia of *fulva* and those of nominate *imitatrix* is of about the same magnitude as between those of the nominate subspecies and those of *formosata*. There is some variation between the genitalia of the allotype (Holbrook, Nevada) and those of the paratypes from Mono and Inyo counties, California. The former is more like the genitalia of nominate *imitatrix* (elongate, slender, sclerotized posterior portion of the corpus bursae with longitudinal striations), whereas the California examples (four dissections) tend to have the posterior part of the corpus bursae shorter, broader, more weakly sclerotized, and with indistinct striations. This population is placed as a subspecies of *imitatrix* because of the



similarity in pattern, color, and size of the adults and of the male genitalia to these characters of nominate *imitatrix*. Probably a thorough knowledge of the early stages of both subspecies will be required before the status of this population can be determined.

***Hulstina tanyraeros*, new species**

This species is similar to *imitatrix fulva*, but it tends to be slightly larger and to have the median area of the upper surface of the forewings suffused with darker brown. Good genitalic differences occur between this species and the preceding one. The present species occurs in California.

**MALE:** Head, thorax, and abdomen similar to those of *imitatrix fulva*, but with more dark scaling and with more brown scales on front.

**UPPER SURFACE OF WINGS:** Similar to that of *imitatrix fulva*, but with median area a slightly darker brown, and with darker brown shade bands next to t. a. and t. p. lines; subterminal area with more prominent whitish gray area posteriorly; hind wings tending to be more heavily suffused with dark gray and brown scales, and with discal dot present in most specimens.

**UNDER SURFACE OF WINGS:** Similar to that of *imitatrix*, but browner, with discal dots weakly represented; t. p. and extradiscal lines present in most specimens.

**LENGTH OF FOREWING:** 15 to 18 mm.

**FEMALE:** Similar to male.

**LENGTH OF FOREWING:** 17 to 18 mm.

**MALE GENITALIA:** Uncus with apical portion swollen and with ventral surface concave, posterior margin rounded; gnathos broadened anterolaterally, median enlargement shortly spiculate; valves with costa heavily sclerotized, extending one-half of length of costal margin, posterodistal portion angled into middle of valve, roughly L-shaped, with blunt point on posterior margin, apex broad and with three heavy spines arising therefrom; sacculus large, with sclerotized area extending up to costal spines, with ventral ridge and with large hemispherical piece in center of valve; juxta broad, weakly tapering posteriorly; aedeagus 1.9 to 2.1 mm. in length, slender, posterior end curving ventrally, with anterior end narrowly swollen, and with dorsal surface of posterior end spiculate; vesica with

slender, median group of fine spines or sclerotized piece, occupying about one-fifth of length of aedeagus.

**FEMALE GENITALIA:** Similar to those of *formosata*, but differing mainly as follows: ductus bursae larger, posterior end heavily sclerotized and with rear margin flatly rounded; ductus seminalis arising from small membranous protuberance on right side, anterior of ductus bursae; corpus bursae with posterior portion short and broad, weakly sclerotized, with a few indistinct, longitudinal striations, and with longer, swollen, anterior portion, not set off from posterior portion by constriction; signum small, transverse, with variable number of short points.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**DISTRIBUTION:** California.

This species is divisible into two subspecies.

***Hulstina tanyraeros tanyraeros*,**

new subspecies

Figures 1, 13, 51, 82

The moths of the nominate population are large and brightly colored, with an extensive brown suffusion in the median area of the forewings above. They occur in the mountainous regions of southern California.

**MALE:** Head, thorax, and abdomen with contrastingly colored scales of black, blackish gray, brown, and white, with dark brown scales on abdomen.

**UPPER SURFACE OF WINGS:** Forewings with median area broadly suffused with light brown, with prominent brown to dark brown shade bands next to t. a. and t. p. lines; subterminal area broadly whitish gray; hind wings tending to be suffused with dark gray and brown scales.

**UNDER SURFACE OF WINGS:** Broadly suffused with brown scaling.

**LENGTH OF FOREWING:** 16 to 18 mm.; holotype, 18 mm.

**FEMALE:** Similar to male.

**LENGTH OF FOREWING:** 17 to 18 mm.; allotype, 17 mm.

**MALE GENITALIA:** As described for the species.

**FEMALE GENITALIA:** As described for the species.

**TYPES:** Holotype, male, Smoky Valley, Tulare County, California, June 22, 1947 (C. Ingham), *ex* collection Grace H. and John L.

Sperry; allotype, female, same data, June 20, 1954 (C. Ingham and C. Henne). The genitalia of the holotype are mounted on slide F.H.R. No. 14938; those of the allotype, on F.H.R. No. 15263. Paratypes, all from California, and listed by counties: *Tulare County*: Same data as types, June 22, 1947, June 29, 1951, June 29, 1952, June 19, 20, 26, 1954 (C. Ingham and C. Henne), July 3, 1952 (C. Hill), 12 males. *Los Angeles County*: Mint Canyon, May 23, 1954 (W. A. Rees), June 10, 1951 (C. Hill), two males; 2.5 miles south-southwest of Valyermo, elevation 4800 feet, June 14–28, 1957–1964 (N. McFarland), five males; Pacifico Mountain, San Gabriel Mountains, elevation 6500 feet, July 31, 1965, one male; Wrightwood, July 12, 1964 (C. Hill), one male. *San Bernardino County*: Upper Santa Ana River, July 11 to August 27, 1946–1948 (G. H. and J. L. Sperry), eight males; Big Pine Flat campground, August 13–14, 1955 (A. Menke, Jr.), four males; Baldy Mesa, near Cajon Pass, June 13, 1937 (L. M. Martin), one male; Big Bear Lake, July 14, 1966, August 17, 1967 (J. Wilcox), two males; Forest Home, July 14, 1966 (J. Wilcox), one male. *Ventura County*: Camp Ozena, upper Cuyama Valley, June 26 to July 11, 1964–1967 (C. W. Kirkwood), four males and two females; Mt. Pinos, elevation 5500 feet, July 6, 1964 (R. Leuschner), one male.

The holotype is in the collection of the American Museum of Natural History, and the allotype is in the Los Angeles County Museum of Natural History. Paratypes are in the collections of those two institutions, of the University of California, Davis, of C. W. Kirkwood, and of R. H. Leuschner.

**DISTRIBUTION:** Southern California, being found in the mountainous regions of southern Tulare County, Los Angeles County, San Bernardino County, and westward into Ventura County (see fig. 1). Those few locality labels with elevations indicate a range of from 4800 to 6500 feet.

**TIME OF FLIGHT:** Late May, June, July, and August.

**REMARKS:** A total of 45 specimens (42 males and three females) and eight genitalic dissections (six males and two females) have been studied.

This is the largest and most brightly colored member of the genus.

***Hulstina tanyraeros deserta*,**  
new subspecies  
Figures 1, 14

The moths of this population are small and pale in color, resembling those of *imitatrix fulva*. They are known only from the Panamint Mountains of southeastern California.

**MALE:** Head, thorax, and abdomen with paler, less contrastingly colored scales, and with pale brown scaling on abdomen.

**UPPER SURFACE OF WINGS:** Forewings with median area varying from very faint pale brown to grayish white, with narrow to obsolescent brown or grayish brown shade bands next to t. a. and t. p. lines; subterminal area narrowly whitish gray; hind wings gray.

**UNDER SURFACE OF WINGS:** Pale grayish brown.

**LENGTH OF FOREWING:** 15 to 16 mm.; holotype, 16 mm.

**FEMALE:** Unknown.

**MALE GENITALIA:** As described for the species; slightly smaller than those of nominate subspecies.

**FEMALE GENITALIA:** Unknown.

**TYPES:** Holotype, male, and four male paratypes, Bailey Peak, Panamint Mountains, Inyo County, California, July 4, 1940 (C. Henne). The genitalia of the type are mounted on slide F.H.R. No. 15254.

The holotype is in the collection of the Los Angeles County Museum of Natural History; paratypes are in the collections of that institution and of the American Museum of Natural History.

**DISTRIBUTION:** This subspecies is known only from the Panamint Mountains in eastern California (see fig. 1).

**TIME OF FLIGHT:** July.

**REMARKS:** A total of five male specimens and two genitalic dissections have been studied.

The moths of this population are smaller and paler than those of nominate *tanyraeros* and are likely to be confused with specimens of *imitatrix fulva*. The best way to separate the two is by a study of the genitalic structures.

***Hulstina aridata* Barnes and Benjamin**  
Figures 2, 15, 52, 83

*Hulstina aridata* BARNES AND BENJAMIN, 1929, p. 186. McDUNNOUGH, 1938a, p. 164.

This species is similar to *formosata* in size, color, and the general details of the pattern. The genitalia of the two are different, as are the t. p.

lines; in *aridata* the latter tends to be more S-shaped, and to be represented by venular dots between the costa and vein  $M_2$ . *Hulstina aridata* occurs in the southern Rocky Mountain states, southern California, and northwestern Baja California.

**MALE:** Head similar to that of *formosata*; palpi extending beyond anterior margin of eye by less than diameter of eye. Thorax and abdomen similar to those of *formosata*; legs with more dark scaling.

**UPPER SURFACE OF WINGS:** Similar to that of *formosata*, but differing mainly as follows: forewing with less brown scaling; t. p. line represented by venular dots from costa to vein  $M_2$ , with solid line extending from there to inner margin, and with upper portion of line tending to be more outwardly bowed than in *formosata*; hind wings with extradiscal line tending to be more strongly represented and to be more curved, paralleling outer margin.

**UNDER SURFACE OF WINGS:** Similar to that of *formosata*, but tending to have both t. p. and extradiscal lines more strongly represented, being indicated by venular dashes.

**LENGTH OF FOREWING:** 15 to 18 mm.

**FEMALE:** Similar to male, with some specimens tending to be more heavily suffused above and below with dark gray scales.

**LENGTH OF FOREWING:** 13 to 16 mm.

**MALE GENITALIA:** Uncus with apical portion broadly swollen and with ventral surface slightly concave, posterodorsal surface weakly bilobed; gnathos with median enlargement broad, punctate, and with large, more lightly sclerotized anterior area; valves with costa broadly sclerotized, extending about two-thirds of length of costal margin, inner margin rounded, without spines; sacculus swollen along outer margin of valve, lightly sclerotized, and with extension going across center of valve; juxta large, broad, evenly tapering posteriorly; aedeagus short and thick, 1.0 to 1.3 mm. in length and 0.25 to 0.40 mm. in width, with posterior end rounded; vesica with two groups of spines side by side in posterior portion of aedeagus, those on left in curved row, with posterior spines (vesica not evaginated) becoming progressively shorter and with elongate, slender, sclerotized plate anterior of spines, and those on right in straight row and tending to become larger posteriorly, with from five to eight spines in each row.

**FEMALE GENITALIA:** Sterigma weakly sclerotized, with a few faint ridges; ductus bursae short, almost twice as wide as long, lateral margins parallel, appearing more heavily sclerotized and curving sharply outward at posterior end, and with small, triangular, sclerotized piece posteromedially; ductus seminalis arising dorsad of right side of sclerotized ductus bursae and corpus bursae area; latter large, with length equal to width, asymmetrical, and narrowed anteriorly, left side more or less evenly rounded, right side swollen posteriorly; corpus bursae membranous, globular; signum absent.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**TYPE:** Holotype, male, in the collection of the United States National Museum. The genitalia of this specimen are mounted on slide E.L.T. No. 2372.

**TYPE LOCALITY:** Mohave County, Arizona.

**DISTRIBUTION:** New Mexico, Arizona, Utah, Nevada, California, and northwestern Baja California (see fig. 2).

**TIME OF FLIGHT:** From late April into August.

**REMARKS:** A total of 247 specimens (195 males and 52 females) and 31 genitalic dissections (23 males and eight females) have been studied, including the type and its genitalia.

Some specimens from California, particularly those from Tulare, San Luis Obispo, and Ventura counties, tend to be somewhat larger and grayer than examples from the remainder of the range of the species.

### ***Hulstina xera*, new species**

Figures 2, 16, 53, 84

This species is similar to *aridata*; good genitalic differences are present for separating the two. The new species is more northerly in its distribution than is the preceding one, as it ranges from northeastern California to Wyoming and Idaho.

**MALE:** Head, thorax, and abdomen similar to those of *aridata*, but tending to be darker gray; palpi extending beyond anterior margin of eye by distance equal to diameter of eye.

**UPPER SURFACE OF WINGS:** Similar to that of *aridata*, but tending to be a darker and more uniform gray.

**UNDER SURFACE OF WINGS:** Similar to that of *aridata*, but tending to be darker gray.



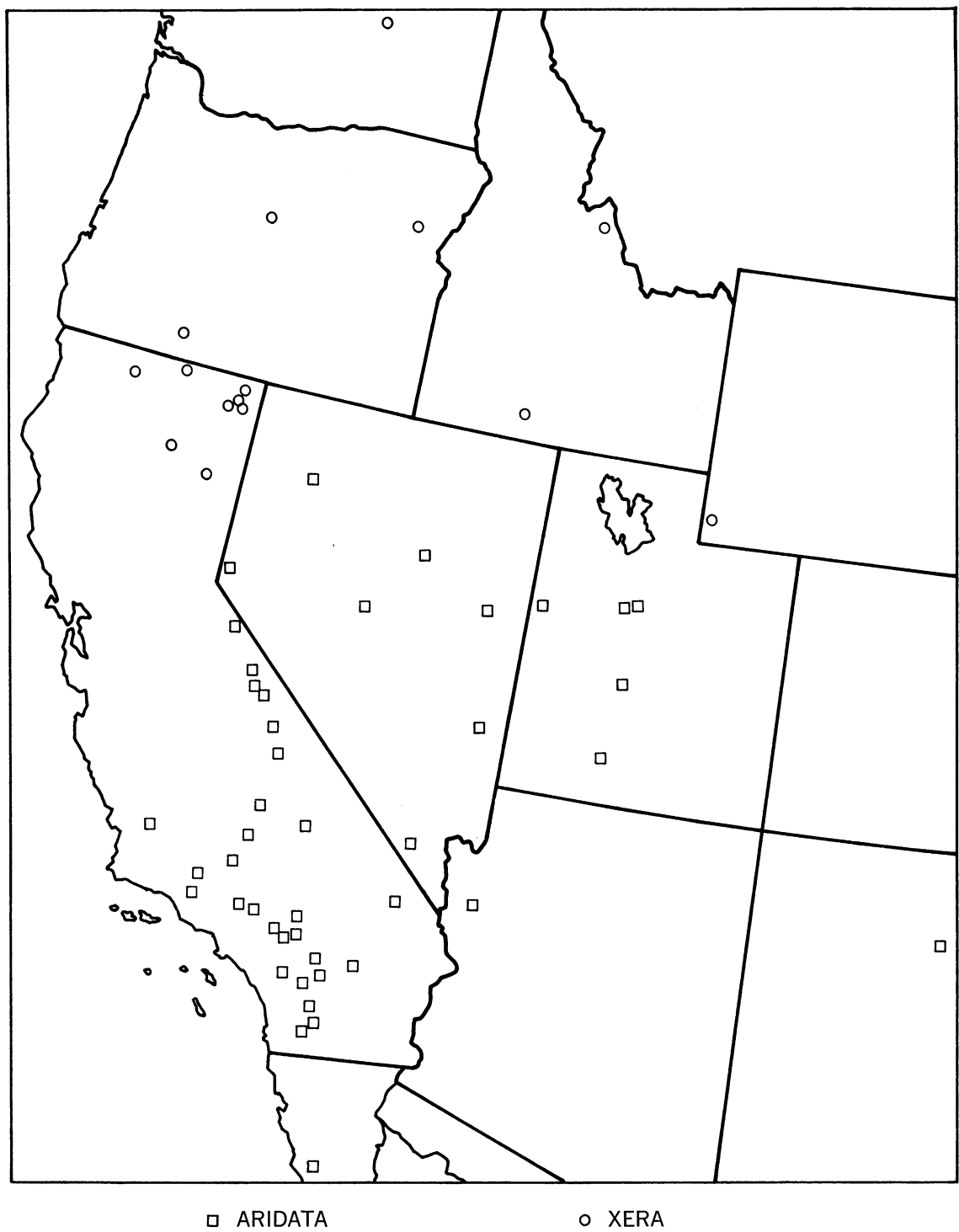


FIG. 2. Distribution of *Hulstina aridata* Barnes and Benjamin and *H. xera*, new species.

LENGTH OF FOREWING: 15 to 18 mm.; holotype, 15 mm.

FEMALE: Similar to male.

LENGTH OF FOREWING: 14 to 15 mm.; allotype, 15 mm.

MALE GENITALIA: Similar to those of *aridata*, but differing mainly as follows: uncus with median portion slightly narrower, apical portion larger, lateral areas more sharply pointed and with posterodorsal surface not indented medially; gnathos tending to have median enlargement slightly wider; valves with costa concave and heavily sclerotized near base, becoming more weakly sclerotized medially, narrower than in *aridata*, with poorly defined inner margin; juxta with median constriction; aedeagus 1.3 to 1.5 mm. in length and 0.3 mm. in width, with posterior end attenuate and bluntly pointed; vesica with two groups of spines side by side in posterior portion of aedeagus, with two or three heavy spines in each row, plus one or two slender spines in some cases.

FEMALE GENITALIA: Sterigma weakly sclerotized, with a few faint ridges; ductus bursae not differentiated from large, sclerotized ductus bursae and corpus bursae area; latter with posterior margin having two converging, more heavily sclerotized strips curving sharply outward just posteriad of rear margin of area, and with small, triangular, sclerotized piece between ends of strips; ductus seminalis arising dorsad of right margin of ductus bursae and corpus bursae; latter heavily sclerotized, large, longer than wide, asymmetrical and narrowed anteriorly, left side more or less rounded, right side swollen posteriorly; corpus bursae membranous, globular; signum absent.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, Alturas, Modoc County, California, August 3, 1948 (R. Coleman); allotype, female, same data, July 30, 1948; both specimens from the author's collection. The genitalia of the holotype are mounted on slide F.H.R. No. 14962; those of the allotype, on F.H.R. No. 15031. Paratypes: *California*: Same data as types, July 21 to August 11, 1948, 10 males; same locality, July 10, 1965, one male; quarantine station, north of Alturas, Modoc County, August 8, 1956 (W. R. Bauer and J. S. Buckett), July 14, 1960 (F. L. Blanc and A. Forbes), three males; Lassen Creek, north of

Davis Creek, Modoc County, August 6, 8, 1956, July 28, 1957 (W. R. Bauer and J. S. Buckett), three males; Cedar Pass, Modoc County, July 12, 1967 (R. P. Allen), one male and one female; Hat Creek Ranger Station, Shasta County, July 19, 1947 (F. H. Rindge), one male; Tule Lake, Siskiyou County, August 11, 1948 (R. Coleman), two males; Yreka, Siskiyou County, July 14, 1961 (T. C. Allen), one male; 3 miles west of Susanville, Lassen County, July 2, 1960 (W. E. Ferguson), one male. *Oregon*: Klamath Falls, Klamath County, July 16, 1955 (J. H. Baker), one male; Spring Creek, Baker, Baker County, July 28, 1962 (J. H. Baker), one male and two females; 10 miles northwest of Prineville, Crook County, July 21, 1962 (W. C. Cook), two males and two females. *Washington*: Sun Lakes State Park, Douglas County, June 29–30, 1963 (W. C. Cook), 11 males. *Idaho*: Buhl, Twin Falls County, elevation 3500 feet, June 15, 1958 (R. E. Miller), one male; Fourth of July Creek, north of Salmon, Lemhi County, July 26, 1961, August 6, 1962, August 10, 1964 (M. May), three males. *Wyoming*: Evanston, Uinta County, June 30, 1936 (G. H. and J. L. Sperry), one male.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the California Department of Agriculture, of the California Insect Survey, of the Los Angeles County Museum of Natural History, of the University of California, Davis, and of C. W. Kirkwood.

DISTRIBUTION: Northeastern California, north through eastern Oregon and Washington to Idaho and Wyoming (see fig. 2).

TIME OF FLIGHT: June, July, and August.

REMARKS: A total of 57 specimens (51 males and six females) and 19 genitalic dissections (13 males and six females) have been studied.

## GROUP II

The adults of this group possess a fully developed tongue. They range in size from small to moderately large, and have not much, if any, brown scaling on the upper surface of the wings. The included species are found along the coastal regions of central and southern California and northern Baja California.

This group includes three species: *grossbecki*, *exhumata*, and *wrightiaria*.

***Hulstina grossbecki*, new species<sup>1</sup>**

Figures 3, 17, 54, 85

*Selidosema wrightiaria* auct.: GROSSBECK, 1912, p. 290 (*partim*; male genitalia illustrated).

*Cleora wrightiaria* auct.: BARNES AND McDUNNOUGH, 1917, p. 117.

*Hulstina wrightiaria* auct.: McDUNNOUGH, 1920, p. 34, pl. 6, fig. 1 (male genitalia); 1938a, p. 165.

This species is similar to *aridata*, but it has a tongue. It is found in the coastal regions of California and northwestern Baja California.

**MALE:** Head with vertex gray or grayish black, with black scales between bases of antennae; front gray or grayish black, with elongate tuft of horizontal scales ventrally; palpi elongate, extending horizontally beyond front of eye by distance equal to width of eye, covered by blackish gray scales. Thorax gray above, many scales with light grayish brown to blackish brown apices, with broad dark band across end of collar; below light gray, with variable number of brownish gray scales; legs gray, with variable number of dark brown scales, and with all tarsi brownish gray. Abdomen gray above, with scattered brown and blackish brown scales, and with paired dark brown spots posteriorly on each segment; below paler.

**UPPER SURFACE OF WINGS:** Forewings dull gray, with variable number of dark gray and brownish gray scales; cross lines black, as in *aridata*; basal area whitish gray; t. a. line tending to be geminate; median area variable in width, dark gray; discal spot prominent; median line weakly represented, approximating t. p. line in posterior portion of wing; t. p. line represented by outwardly pointed spots on veins in anterior part of wing, beginning as line on vein Cu<sub>1</sub>; t.p. line shaded outward by narrow pale gray or grayish brown stripe and by wider brownish gray band; subterminal area narrowly whitish gray above inner margin, with anterior portion and all of terminal area dark gray or grayish brown, and with narrow whitish gray stripe extending diagonally from apex to t. p. line; s. t. line whitish gray, obsolescent in upper portion of wing; terminal line black; fringe concolorous with edge of wing and having narrow whitish gray base. Hind wings concolorous with forewings, tending to be more or less heavily

suffused with brown and grayish brown scales; intradiscal line represented at anal margin; discal spot black, prominent; extradiscal line brownish black, paralleling outer margin, tending to be outwardly pointed on veins, fading out before reaching costal margin, and shaded distally by whitish gray band and then by wider, faint brownish gray band; terminal line and fringe similar to those of forewings.

**UNDER SURFACE OF WINGS:** Forewings brownish gray; hind wings pale gray, with scattered brownish black scales; maculation absent except for t. p. and extradiscal lines, represented by venular spots, and by discal dots; terminal line and fringe similar to those of upper surface.

**LENGTH OF FOREWING:** 12 to 15 mm.; holotype, 15 mm.

**FEMALE:** Similar to male.

**LENGTH OF FOREWING:** 12 to 15 mm.; allotype, 12 mm.

**MALE GENITALIA:** Uncus with apical portion swollen and with ventral surface weakly concave, posterior margin rounded but tending to be straight medially; gnathos without noticeable median enlargement, median area finely spiculate; valves with costa well sclerotized, extending one-half of length of costal margin, broad, rectangular in outline, with strip along middle of valve more lightly sclerotized and bearing from tubercle at outer end one elongate spine extending across face of valve almost to outer margin; sacculus swollen, weakly sclerotized; juxta broad, tapering posteriorly; aedeagus 0.95 to 1.05 mm. in length and 0.2 mm. in width, slightly S-shaped dorsoventrally, with posterior end bluntly pointed; vesica with two adjacent groups of spines in posterior one-half of aedeagus, their posterior margin V-shaped, spines on right side tending to be thicker, to have swollen bases, and to be fewer in number than those of left side.

**FEMALE GENITALIA:** Sterigma weakly sclerotized, with length about one-half of width, posterior margin more or less straight and with anterior margin rounded; ductus bursae small, sclerotized, roughly square in outline, with more lightly sclerotized triangular piece projecting posteriorly; ductus seminalis arising on right side posteriad of sclerotized portion of corpus bursae; latter with posterior portion wider than ductus bursae, tapering anteriorly, lightly sclerotized, having longitudinal striations, and with

<sup>1</sup>This species is named in honor of John A. Grossbeck, who did so much pioneer work on the systematics of the North American geometrids, including the two genera covered in this paper.

anterior portion globular, membranous, and wider than posterior portion; signum variable in position and configuration, small, with outer margin having variable number of points.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, Rancho La Sierra, Arlington, Riverside County, California, May 21, 1949 (A. H. Rindge); allotype, female, same data, June 5, 1947; both specimens are from the author's collection. The genitalia of the holotype are mounted on slide F. H. R. No. 3523; those of the allotype, on F.H.R. No. 3632. Paratypes: California, listed by counties: *San Diego County*: San Diego, various dates in April, May, June, and July, 1909–1921 (L. E. Ricksecker, W. S. Wright, K. R. Coolidge), 45 males and one female; Jacumba, June 25, 1924, one male; Live Oak Park, June 13, 1947 (Melander), one male; La Posta, June 11, 1937 (E. C. Johnston), one male; La Jolla, June 10 to July 22, 1963 (J. Powell, H. L. Griffith, R. L. Langstrom), eight males; 4 miles south of Oak Grove, July 3, 1956 (H. Ruckes, Jr., and B. J. Adelson), one male. *Riverside County*: Same data as types, various dates in April, May, June, and July, 1941–1953 (A. H. Rindge, F. H. Rindge), 40 males and 4 females; Riverside, April 29, 1940, May 5, 1937, May 6, 1940 (Buckwalter), May 30, 1949 (G. H. and J. L. Sperry), July 10, 1967 (M. W. Stone), six males; Box Spring, April 15, 1934 (G. H. and J. L. Sperry), one female; Soboba Hot Springs, June 14, 1947 (C. W. Kirkwood), two males; Perris, June 21, 1954 (T. M. Blackman), one male. *Orange County*: Olive, various dates in May, June, and July, 1964–1967 (J. Wilcox), 17 males and eight females. *Los Angeles County*: Malibu, May 10, 1944 (F. H. Rindge), one male; Santa Monica, May–June, one female; Topanga, elevation 1500 feet, various dates in March, May, June, and July, 1957–1961 (H. Notman), 31 males and eight females; Los Angeles, June 6–20, 1928, one male; Bouquet Canyon, May 31, 1937, June 5–6, 14, 1937 (L. M. Martin), May 19, 1959 (J. Powell), three males and two females; Glendale, June 9, 1926 (E. D. Jones), one male; Whittier, elevation 600 feet, June 20, 1959 (R. H. Leuschner), one male; San Francisquito Canyon, June 7, 1937 (E. C. Johnston), three males. *Ventura County*: Ventura, June 29, 1936, June 11, 1940, May 26, 1950, July 3, 1953 (C. W. Kirkwood),

five males; Ozena Forestry Camp, upper Cuyama Valley, July 6, 1964, July 12, 1966 (C. W. Kirkwood), three males; Craven's Ranch, Casitas Pass, May 5, 1951, July 29, 1960 (C. W. Kirkwood), two males. *Santa Barbara County*: Summerland, July 1, 1948 (C. W. Kirkwood), one female; 1 mile south of Buellton, May 11, 1965 (J. Powell), one male; 3 miles north of Refugio Beach, June 21, 1965 (J. Powell), one male. *San Luis Obispo County*: Morro Bay, June 15, 1947 (Melander), two males; San Luis Obispo, June 3, 1937 (E. C. Johnston), one female. *San Benito County*: Pinnacles, May 16, 1939 (W. R. Bauer), June 11, 1936 (E. C. Johnston), four males and two females. Mexico: *Baja California*: Dam site, Arroyo Santo Domingo, 5.7 miles east of Hamilton Ranch, April 23, 1963 (H. B. Leech and P. H. Arnaud, Jr.), four males.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the California Academy of Sciences, of the California Insect Survey, of the Canadian National Collection, of the Los Angeles County Museum of Natural History, of C. W. Kirkwood, and of R. H. Leuschner.

DISTRIBUTION: The coastal plains of California, from San Benito County south to San Diego County, and extending into northwestern Baja California (see fig. 3). This is the San Diegan District of the Californian Biotic Province.

TIME OF FLIGHT: The adults have been taken from March into July.

REMARKS: A total of 244 specimens (212 males and 32 females) and 29 genitalic dissections (24 males and five females) have been studied.

One male, labeled "1 mi. W. Tom's Place, Mono County, California, VIII-13-57/J. Powell Collector," in the California Insect Survey Collection, has been examined. This record should be checked before it is accepted.

#### *Hulstina exhumata* (Swett)

Figures 4, 18, 55, 86

*Cleora exhumata* SWETT, 1918, p. 82.

*Hulstina exhumata*: McDUNNOUGH, 1920, p. 34; 1938a, p. 165.

This species tends to be larger, is a paler gray, and has much fainter maculation than *grossbecki*. It occurs along coastal California.



**MALE:** Head with vertex pale gray or grayish brown, with brownish gray scales between bases of antennae; front with mixture of pale gray and brownish gray scales and without tuft of horizontal scales; palpi short, extending horizontally beyond front of eye by distance equal to one-half of width of eye, covered by brownish black scales. Thorax pale gray above, many scales with light grayish brown apices, with collar broadly brownish black posteriorly; below grayish white; legs pale gray, with all tarsi pale brownish gray. Abdomen pale gray above, with scattered brownish gray scales, and with nebu-

lous paired brownish gray spots or weak transverse band posteriorly on most segments; below paler.

**UPPER SURFACE OF WINGS:** Forewings pale gray, with scattered brownish gray scales; cross lines dark brown, very weakly represented, apparently as in *aridata*; t. a. line single; median area concolorous with remainder of wing; discal spot blackish brown, large, prominent; median line visible only in posterior portion of wing; t. p. line extending from vein  $M_1$ , in some specimens represented only by spots on veins in central portion of wing; s. t. line grayish white,

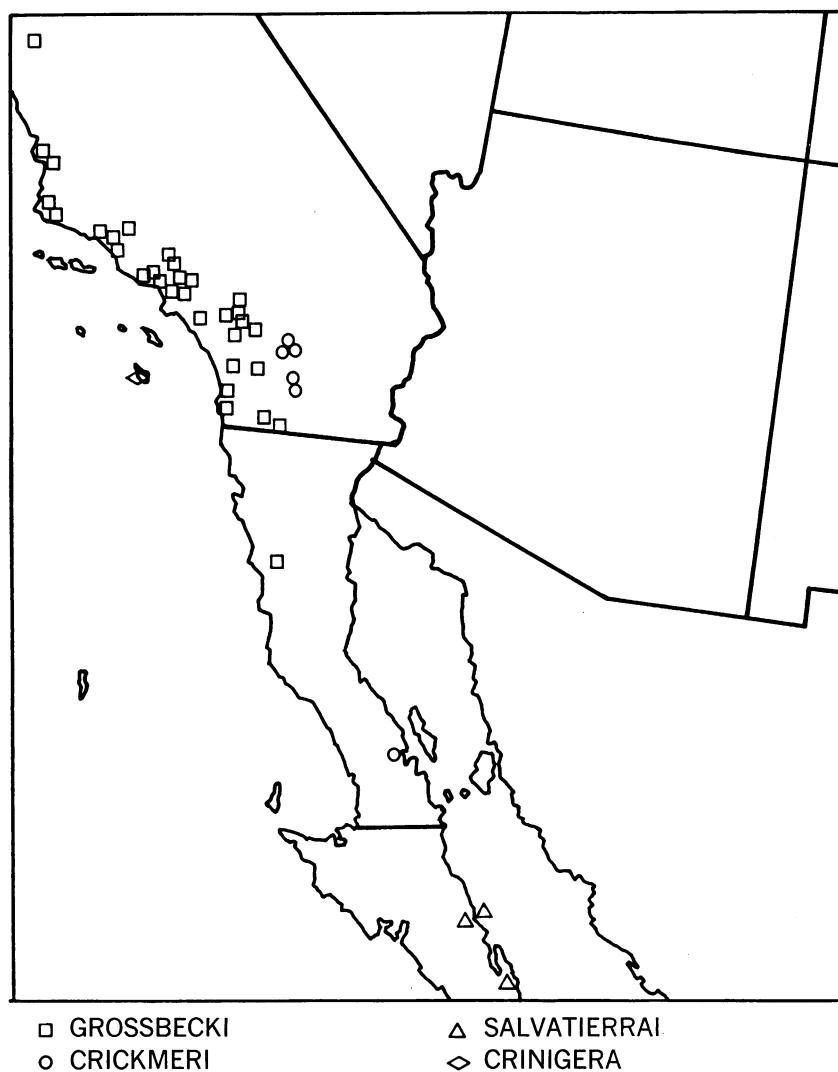


FIG. 3. Distribution of *Hulstina grossbecki*, new species, *Pterotaea crickmeri* (Sperry), *P. salvatierrai*, new species, and *P. crinigera*, new species.

present in some specimens; terminal line blackish brown, with small intravenular spots; fringe concolorous with wing. Hind wings concolorous with forewings; intradiscal line represented at anal margin; discal spot blackish brown, smaller than that of forewings; extradiscal line gently curving across wing, fading out anteriorly, and shaded outwardly by pale gray and brownish gray nebulous bands; s. t. line present, shaded basally by nebulous brownish gray band; terminal line and fringe similar to those of forewings.

**UNDER SURFACE OF WINGS:** Forewings brownish gray; hind wings pale gray, with scattered brownish gray scales; maculation absent except for all discal dots, and very faint trace of t. p. line in some specimens; terminal line brownish gray; fringe similar to that of upper surface.

**LENGTH OF FOREWING:** 14 to 17 mm.

**FEMALE:** Similar to male.

**LENGTH OF FOREWING:** 13 to 15 mm.

**MALE GENITALIA:** Uncus elongate, apical portion swollen, ventral surface concave, and posterior margin with median protuberance; gnathos with sides wide, and with slender, ventrally projecting, median enlargement; valves with costa curved, heavily sclerotized to just beyond one-half of length of costal margin, relatively slender, with median rounded lobe projecting into middle of valve, and with apical section curving inward and bearing single, thick, heavily sclerotized, elongate spine at end, extending beyond outer margin of valve; sacculus large, swollen, sclerotized, with more lightly sclerotized area extending to costal lobe and across inner face of base of valve; juxta broad, roughly hexagonal in outline, with posterior margin extended medially; aedeagus 1.6 to 1.7 mm. in length and with maximum width about 0.3 mm., slightly S-shaped dorsoventrally, anterior end lobate and with posterior end gradually increasing in width; vesica armed with two

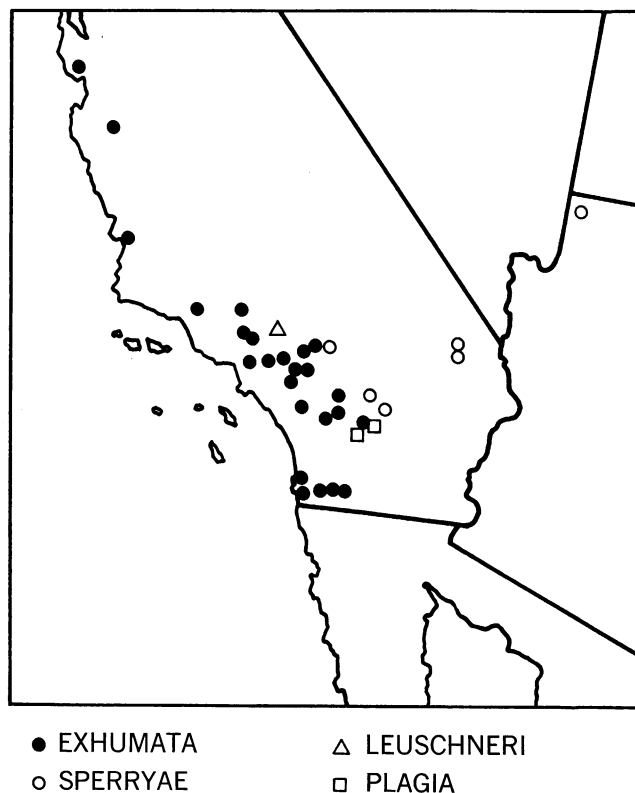


FIG. 4. Distribution of *Hulstina exhumata* Swett, *Pterotaea sperryae* McDunnough, *P. leuschneri*, new species, and *P. plagia*, new species

elongate, somewhat irregular and poorly defined rows of small spines in posterior one-half of aedeagus, with row on right side almost twice as long as row on left side.

**FEMALE GENITALIA:** Sterigma membranous; ductus bursae large, heavily sclerotized, with width approximately equal to length, anterior margin truncate, lateral margins rounded, and posterior margin having short, median, digitate protuberance; ductus seminalis arising on right side anteriorly of ductus bursae; corpus bursae membranous, elongate, tending to be slightly twisted, posterior portion weakly striate longitudinally; signum somewhat variable in position and shape, usually in ventral wall of corpus bursae, small, outer margin shortly stellate, median area with several small points, and with raised rim.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** *Adenostema* sp.

**TYPE:** Holotype, male, in the collection of the Museum of Comparative Zoology at Harvard College (M.C.Z. No. 16905).

**TYPE LOCALITY:** San Diego, San Diego County, California.

**DISTRIBUTION:** The foothills and mountains of coastal California extending from San Diego County north to Santa Cruz County (see fig. 4).

One specimen has been examined that is labeled Wickenburg, Maricopa County, Arizona, May 11, 1938 (L. M. Martin). This locality should be verified before it is accepted.

**TIME OF FLIGHT:** The adults have been captured from April into July.

**REMARKS:** A total of 250 specimens (132 males and 118 females) and 16 genitalic dissections (10 males and six females) have been studied, including the holotype.

### ***Hulstina wrightiaria* (Hulst)**

Figures 5, 19, 56, 87

*Boarmia wrightiaria* HULST, 1888, p. 215. SMITH, 1891, p. 72. RINDGE, 1955, p. 156.

*Selidosema wrightiarum*: HULST, 1896, p. 355. DYAR, "1902" [1903], p. 324. SMITH, 1903, p. 77.

*Selidosema wrightiaria*: PEARSALL, 1908, p. 344. GROSSBECK, 1909, p. 194; 1912, p. 290 (*partim*).

*Chlorocleptis inconspicua* HULST, 1896, p. 264. DYAR, "1902" [1903], p. 269. SMITH, 1903, p. 66. RINDGE, 1955, p. 145. New synonymy.

*Selidosema inconspicua*: PEARSALL, 1908, p. 344 (synonym of *wrightiaria*). GROSSBECK, 1912, p. 290 (male genitalia illustrated).

*Cleora inconspicua*: BARNES AND McDUNNOUGH, 1917, p. 117.

*Hulstina inconspicua*: McDUNNOUGH, 1920, p. 34, pl. 6, fig. 2 (male genitalia), pl. 7, fig. 1 (adult female); 1938a, p. 165. COMSTOCK, 1963b, p. 28, figs. A-E (early stages).

*Selidosema aethalodaria* DYAR, 1908, p. 57. GROSSBECK, 1912, p. 291 (synonym of *inconspicua*).

*Cleora aethalodaria*: BARNES AND McDUNNOUGH, 1916b, p. 184.

This species is the smallest of the genus. In maculation it is similar to specimens of *grossbecki*, but the extradiscal line of the hind wings is straighter and more in the center of the wings in *wrightiaria*. The present species occurs in coastal California.

**MALE:** Head with vertex light gray, with brownish black scales between bases of antennae; front with mixed light gray and brownish black scales, and elongate tuft of horizontal scales ventrally; palpi elongate, extending horizontally beyond front of eye by distance slightly less than width of eye, covered by gray and brownish black scales. Thorax gray above, some scales with grayish brown apices, with broad dark band across end of collar; below light gray; legs gray, with variable number of brownish gray and dark brown scales, and with all tarsi brownish gray. Abdomen gray above, with scattered grayish brown and blackish brown scales, and narrow blackish brown bands posteriorly on central segments in some specimens; below paler.

**UPPER SURFACE OF WINGS:** Forewings dull gray, with variable number of dark gray and brownish black scales; cross lines dark brown or brownish black, as in *aridata*; basal area narrowly whitish gray; t. a. line geminate; median area variable in width, concolorous with adjacent areas; discal spot black, prominent; median line weakly represented, approximating t. p. line in posterior portion of wing; t. p. line obsolescent below costa, beginning on or near vein  $M_1$ ; t. p. line shaded outward by narrow pale gray or grayish brown stripe and by wider brownish gray band; subterminal area narrowly whitish gray above inner margin, with anterior portion and all of terminal area dark gray or grayish brown, overlain with variable number of scattered grayish white scales; s. t. line grayish white, variable in width, outwardly pointed in cells in some specimens; terminal line black, reduced

or interrupted by veins, and with slight intravenular swellings; fringe concolorous with edge of wing, and having narrow whitish gray base. Hind wings concolorous with forewings, tending to be slightly more suffused with brownish gray scales; intradiscal line represented at anal margin; discal spot small in most specimens, absent from some; extradiscal line brownish black, rather weakly represented, extending more or less straight across wing and fading out before reaching costal margin, and shaded distally by pale gray band and then by wider, geminate, faint brownish gray band; terminal line and fringe similar to those of forewings.

UNDER SURFACE OF WINGS: Forewings brownish gray; hind wings pale gray, with scattered brownish gray scales; maculation absent except for discal spots on all wings; terminal line dark brownish gray.

LENGTH OF FOREWING: 10 to 13 mm.

FEMALE: Similar to male but with smaller eyes, the palpi thus appearing longer.

LENGTH OF FOREWING: 10 to 13 mm.

MALE GENITALIA: Uncus elongate, with apical portion sharply swollen to produce lateral points, posterior margin bluntly wedge-shaped; gnathos wide dorsally, narrowing ventrally, and without noticeable median enlargement; valves with costa well sclerotized almost to end of valve, basal portion raised, extending medially and with small anterior projection, swollen medially and extending almost one-half of width of valve, and then narrowed apically and bearing single, very long, slender spine near apex of valve, with spine extending down inner face of valve almost to base of valve; sacculus very weakly sclerotized, with sclerotized area extending to medial swelling of costa; juxta elongate, constricted medially; aedeagus long and slender, 1.3 to 1.5 mm. in length and 0.15 mm. in width, S-shaped dorsoventrally; vesica with narrow, elongate, sclerotized piece posteriad of middle of aedeagus, and with small group of short spines near posterior end of first piece.

FEMALE GENITALIA: Sterigma very weakly sclerotized or membranous; ductus bursae smoothly sclerotized, long and slender, slightly widened and with several incomplete longitudinal striations near posterior end; ductus seminalis arising ventrally just anterior of ductus bursae; corpus bursae curving anterior of

junction with ductus bursae, membranous, swollen anteriorly, and with a few longitudinal striations anteriorly; signum small, weakly sclerotized, somewhat variable in position and shape, situated in ventral wall of corpus bursae, outer margin without stellate margin.

EARLY STAGES: All the early stages have been described and illustrated by Comstock (1963b, p. 28, figs. A-E).

FOOD PLANT: *Adenostoma fasciculatum* Hooker and Arnott, and *Cercocarpus* sp.

TYPES: The lectotype, male, of *wrightiaria* is in the collection of the American Museum of Natural History (Rindge, 1955, p. 156); this specimen was so designated by Grossbeck (1909, p. 194). The genitalia of the lectotype are on slide F.H.R. No. 15066.

Hulst described *inconspicua* from a single female; this specimen is in the collection of the American Museum of Natural History (Rindge, 1955, p. 145). The genitalia are mounted on slide F.H.R. No. 15111.

Dyar had four males and two females before him when he described *aethalodaria*. The lectotype, hereby designated, is U.S.N.M. No. 11701; it is a male, with the genitalia mounted on slide J.F.G.C. No. 1407.

TYPE LOCALITIES: Of *wrightiaria*, San Bernardino, San Bernardino County, California; the lectotype is labeled "S. Cal."

Hulst merely gave California as the type locality for *inconspicua*, saying nothing further about the specimen. There is a small round label bearing the number 1380 on the type that is just like the original Henry Edwards labels. A check of this number in the Henry Edwards catalogue shows that it has no genus or species name and that the specimen was taken in the forests of Santa Clara County, California, in June, by Henry Edwards "beating bushes." The type locality is hereby restricted to the above locality.

The lectotype of *aethalodaria* is from Pine Valley, San Diego County, California.

DISTRIBUTION: From central California south along the coast into the Mexican state of Baja California (see fig. 5). The northernmost records are from the San Francisco Bay area (Contra Costa County), with the distribution extending up the Sacramento River Valley into western El Dorado County. In southern California this species has been taken in the foothills and mountainous regions, and it occurs on



at least one of the offshore islands (Santa Cruz Island).

**TIME OF FLIGHT:** Nearly all specimens have been taken from late April into August, with one October and one December record.

**REMARKS:** A total of 724 specimens (437 males and 287 females) and 35 genitalic dissections (26 males and nine females) have been studied, including the types of all three names and their genitalia.

Specimens from the northern part of the range tend to be a bit darker and slightly larger than examples from southern California.

Pearsall, in 1908, correctly indicated the synonymy for this species, but no one followed his work. An examination of the types and genitalia during this revisionary study proved him to be correct.

#### GENUS *PTEROTAEA* HULST

*Pterotaea* HULST, 1896, p. 349. DYAR, "1902" [1903], p. 322. SMITH, 1903, p. 76. BARNES AND

McDUNNOUGH, 1917, p. 116. McDUNNOUGH, 1920, p. 34; 1938a, p. 165.

Similar to adults of *Hulstina*, but differing mainly as follows: head with front flat or raised; tongue present; hind tibia with or without groove and prominent hair pencil in male; abdomen of male with or without medioventral row of bristles on third segment; forewings with or without areole, and with or without small fovea near base of forewings in males.

The upper surface of the forewings of the species of *Pterotaea* varies from cream colored to dark gray and grayish brown, with black t. a. and t. p. lines more or less represented. Discal dots are usually weakly represented on the forewings, and may or may not be present on the hind wings. The latter are either concolorous with, or slightly paler than, the forewings, and they have somewhat reduced maculation.

**MALE GENITALIA:** Uncus straight, elongate, slender, triangular, with narrow, truncate apex;

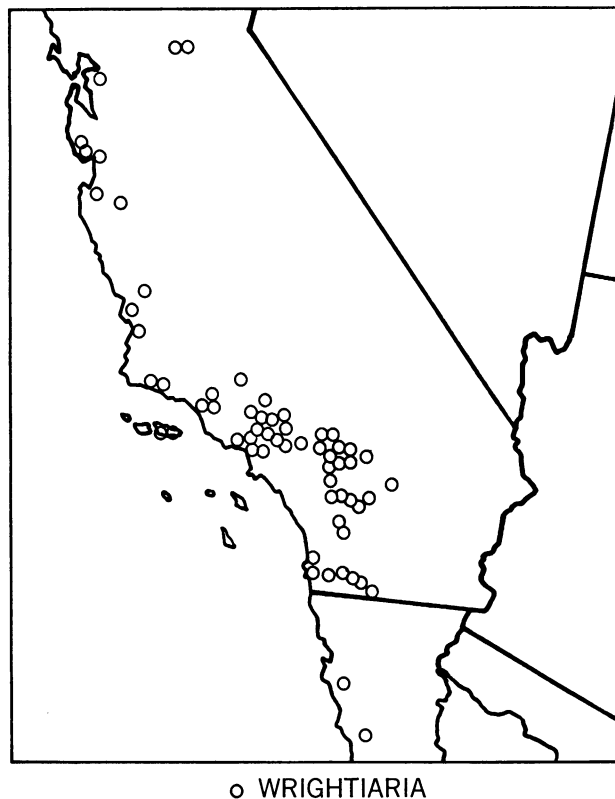


FIG. 5. Distribution of *Hulstina wrightiaria* (Hulst).

saccus absent; gnathos heavily sclerotized, elongate, as long as uncus, with scarcely swollen median enlargement; valves large, broad, symmetrical; costa heavily sclerotized, broad, occupying one-third to two-thirds of inner surface of valve, not extending to apex, and with several short heavy spines from inner margin, symmetrical or asymmetrical in arrangement; sacculus swollen, sclerotized, connected with costa; transtilla membranous; cristae either small and inconspicuous or elongate and prominent; furca absent; anellus with juxta large, sclerotized, widest anteriorly; tegumen large, tending to be produced posteriorly, well sclerotized; saccus broad, rounded or bluntly pointed anteriorly; aedeagus slender, variable in length, ranging from slightly shorter to slightly longer than combined lengths of uncus, tegumen, and saccus; vesica armed with one or two groups of spines.

**FEMALE GENITALIA:** Papillae anales either simple, membranous, and scarcely distinguishable from adjacent membranous area, or with heavily sclerotized median projecting ridge on each papilla; apophyses posteriores variable in length, ranging from very long to short, slender in most species, but very thick and heavily sclerotized in one group; sterigma with median area membranous and with lateral and anterior margins smoothly sclerotized; ductus bursae short, slender, lightly sclerotized or membranous; ductus seminalis arising posteriorly on corpus bursae near ductus bursae; corpus bursae with posterior portion slender, elongate, membranous or weakly sclerotized, with longitudinal striations in some species, and with swollen, membranous anterior end; signum present, varying from small and rounded to large and stellate.

**EARLY STAGES:** The egg of one species and the caterpillar and pupa of a second have been described and illustrated (Comstock, 1937, 1963a).

**FOOD PLANTS:** The food plants of five species are known; four are oak and the fifth is *Adenostema* (Rosaceae).

**TYPE SPECIES:** *Pterotaea cariosa* Hulst, by original designation.

**RANGE:** Western North America, with most of the species being represented in California, and extending from there into Baja California, western Arizona, Nevada, Utah, and Oregon.

*Cymatophora* (*Boarmia*) *depromaria* Grote (1883, p. 87), heretofore included in *Pterotaea* (Mc-

Dunnough, 1938a, p. 165), is not retained in that genus. The type specimen is apparently lost, as it has not been found in the collections of either the British Museum (Natural History) or the United States National Museum. The original description is such that it is virtually impossible to apply it to any given species with certainty; without the type, we shall probably never know exactly what Grote had before him. The type locality for *depromaria* was given as Arizona; on the basis of geographic distribution alone, it seems highly improbable that *depromaria* belongs in *Pterotaea*, as the species of this genus do not normally occur in that state. Accordingly, it is excluded.

### KEY TO SPECIES

#### BASED ON MACULATION, STRUCTURES, AND DISTRIBUTION

1. Upper surface of wings creamy buff, flesh colored, or brownish buff and without definite, solid cross lines . . . . . 2
  - Upper surface of wings brown or gray, with definite cross lines . . . . . 4
- 2(1). Upper surface of wings with complete, prominent s. t. line broadly shaded basally by dark brown on all wings. . . . . 3
  - Upper surface of wings with s. t. line weakly represented or obsolescent . . . *salvatierrai*
- 3(2). Upper surface of wings pale buff; male antennae with longest pectinations 1.0 mm. in length; southern California and Baja California . . . . . *crickmeri*
  - Upper surface of wings brownish buff; male antennae with longest pectinations 1.9 mm. in length; San Clemente Island, California . . . . . *crinigera*
- 4(1). Head with front swollen . . . . . 5
  - Head with front flat . . . . . 7
- 5(4). Forewings with upper surface grayish brown or blackish gray, having weakly S-shaped t. p. line paralleling outer margin. . . 6
  - Forewings gray, with almost straight, broad t. p. line paralleling costa. . . . . *plagia*
- 6(5). Forewings with upper surface grayish black, with weakly S-shaped t. p. line. . . *sperryae*
  - Forewings with upper surface blackish gray, with biconcave t. p. line. . . . . *leuschneri*
- 7(4). Upper surface of forewings with t. p. line more or less straight, meeting inner margin at, or basad of, center . . . . . 8
  - Upper surface of forewings with t. p. line having strong basal bend above inner margin, paralleling outer margin, and meeting inner margin distad of center. 17

- 8(7). Palpi elongate, extending beyond front a distance equal to between three-fourths to entire length of eye . . . . . 9  
 Palpi shorter, extending beyond front one-third of length of eye . . . . . 11
- 9(8). Upper surface of wings heavily and evenly suffused with brown . . . . . 10  
 Upper surface of wings dark gray. . . . . *cavea*
- 10(9). Larger, with length of forewing 14 to 18 mm.; coastal California and Baja California . . . . . *lamiararia lamiararia*  
 Smaller, with length of forewing 13 to 14 mm.; eastern California. . . . . *lamiararia tythos*
- 11(9). Upper surface of wings brownish gray. . . . . 12  
 Upper surface of wings gray. . . . . 13
- 12(11). Upper surface of wings evenly colored, and with smoothly rounded t. p. line; southern California. . . . . *campestraria*  
 Upper surface of wing of males contrastingly colored, and t. p. line having strong basal bend above inner margin; central and northern California. . . . . *succurva*
- 13(11). Larger (length of forewing, 16 to 20 mm.) and clearly marked with prominent cross lines; southern California and northwestern Baja California. . . . . *glauca*  
 Smaller (length of forewing, 15 to 18 mm.), more mottled in appearance, with more weakly represented cross lines; central California, Nevada, and Utah . . . . . 14
- 14(13). Upper surface of wings of females pale gray, with s. t. line shaded outward by grayish black scales; central coastal California . . . . . *succurva*  
 Upper surface of wings with dark scaling, and s. t. line not as above; eastern California, Nevada, and Utah . . . . . 15
- 15(14). Upper surface of wings with considerable dark scaling, and males tending to have median area of forewings dark; southern Nevada and eastern California . . . . . 16  
 Upper surface of wings lightly suffused with dark scales, and males with median area of forewings not darkened; eastern Nevada and western Utah . . . . . *europa*
- 16(15). Upper surface of elongate forewings with median area slightly darkened, and with weakly S-shaped t. p. line; southern Nevada and eastern California. . . . . *miscella*  
 Upper surface of broad forewings with median area much darkened and contrasting, with sharp bend in t. p. line above inner angle; southern Sierra Nevada, California . . . . . *systole*
- 17(7). Upper surface of forewings with prominent to weakly represented rectangular pale area in middle of outer margin, extending from about middle of cell  $M_2$  to middle of cell  $Cu_1$  . . . . . 23  
 Upper surface of forewings without pale area along outer margin . . . . . 18
- 18(17). Upper surface of wings with ground color white or pale gray; male antennae with longest pectinations 0.9 to 1.0 mm.; central and northern California. . . . . 19  
 Upper surface of wings with gray or brown; male antennae with longest pectinations 1.2 to 1.3 mm.; southern California. . . . . 20
- 19(18). Upper surface of wings gray; female antennae weakly serrate; central California. . . . . *powelli*  
 Upper surface of wings white or pale gray; female antennae shortly bipectinate; northern California. . . . . *albescens*
- 20(18). Upper surface of wings grayish white; palpi rising to middle of eye. . . . . *lira*  
 Upper surface of wings grayish brown to brown; palpi not extending one-third of height of eye . . . . . 21
- 21(20). Upper surface of wings unicolorous grayish brown, with obsolescent maculation. . . . . *obscura*  
 Upper surface of wings more contrastingly colored, with more prominent maculation . . . . . 22
- 22(21). Upper surface of wings brownish gray, tending to be somewhat mottled, and with distinct cross lines. . . . . *comstocki*  
 Upper surface of wings grayish brown, evenly colored, with narrow, more poorly defined cross lines. . . . . *macroceros*
- 23(17). Upper surface of forewings with prominent pale area in middle of outer margin; central California . . . . . 24  
 Upper surface of forewings with this pale area not prominent; southern California . . . . . 26
- 24(23). Upper surface of wings evenly suffused with brown or gray . . . . . 25  
 Upper surface of wings contrastingly colored, with pale gray or whitish median area; central coast ranges of California . . . . . *cariosa incompta*
- 25(24). Upper surface of wings suffused with dark brown; north coastal California and Oregon . . . . . *cariosa cariosa*  
 Upper surface of wings suffused with grayish brown; Sierra Nevada . . . . . *cariosa apotema*
- 26(23). Upper surface of wings with both t. a. and t. p. lines clearly defined, and with latter tending to have well-defined basal bend above inner margin . . . . . 27  
 Upper surface of wings with t. a. line obsolescent, and with t. p. line tending to be evenly and weakly S-shaped . . . . . 28

<sup>1</sup>The males of *recisa* and *cavea* are not known.

- median projecting ridge on each member . . . . . 3
- Papillae anales simple . . . . . 5
- 3(2). Signum small, about 0.1 mm. wide . . . . . 4
- Signum larger, about 0.3 mm. wide . . . . . *plagia*
- 4(3). Ostium with sides more or less parallel and with anterior margin truncate; apophyses posteriores 4.0 to 4.6 mm. in length . . . . . *sperryae*
- Ostium with sides tapering anteriorly to blunt point; apophyses posteriores 4.5 to 4.6 mm. in length . . . . . *leuschneri*
- 5(2). Corpus bursae with posterior tubular portion 0.45 mm. in length . . . . . *crickmeri*
- Corpus bursae with posterior tubular portion 0.50 to 0.55 mm. in length . . . . . *salvatierrai*
- 6(1). Corpus bursae with posterior tubular portion of equal diameter . . . . . 7
- Corpus bursae with posterior tubular portion enlarged dorsally . . . . . 13
- 7(6). Ductus bursae very narrow after leaving ostium, enlarging anteriorly; signum small, between 0.3 and 0.4 mm. in width . . . . . *lamiaaria*
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- 8(7). Apophyses posteriores 1.4 to 2.2 mm. in length . . . . . *succurva*
- Apophyses posteriores 1.5 to 2.3 mm. in length . . . . . 9
- 9(8). Apophyses posteriores 1.5 to 1.7 mm. in length . . . . . *europa*
- Apophyses posteriores 1.7 to 2.3 mm. in length . . . . . 10
- 10(9). Ostium with posterior margins 0.3 mm. apart . . . . . 11
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- 12(11). Signum 0.5 to 0.7 mm. across . . . . . *glauca*
- Signum 0.45 mm. in diameter . . . . . *cavea*
- 13(6). Apophyses posteriores 1.4 to 2.2 mm. in length . . . . . 14
- Apophyses posteriores 2.5 to 3.0 mm. in length . . . . . 16
- 14(13). Sterigma with anterior sclerotized margin recessed, concave in cross section . . . . . 15
- Sterigma with anterior sclerotized margin not recessed, flat in cross section . . . . . *albescens*
- 15(14). Sterigma with anterior sclerotized margin

- having finely irregular posterior border; apophyses posteriores 1.7 to 1.9 mm. in length; signum 0.6 to 0.7 mm. in diameter . . . . . *cariosa*
- Sterigma with anterior sclerotized margin having smoothly rounded posterior border; apophyses posteriores 1.4 to 1.8 mm. in length; signum 0.4 to 0.6 mm. in diameter . . . . . *newcombi*
- 16(13). Ostium broad, funnel-shaped, with prominent sides . . . . . 17
- Ostium slender, tubular, without prominent sides . . . . . *powelli*
- 17(16). Corpus bursae with posterior sclerotized portion 1.25 to 1.55 mm. in length . . . . . *macroceros*
- Corpus bursae with posterior sclerotized portion 0.70 to 1.00 mm. in length . . . . . 18
- 18(17). Corpus bursae with posterior sclerotized portion averaging 0.75 mm. in length, ranging from 0.70 to 0.85 mm. . . . . *obscura*
- Corpus bursae with posterior sclerotized portion averaging 0.85 to 0.95 mm. in length, ranging from 0.75 to 1.00 mm. . . . . 19
- 19(18). Corpus bursae with posterior sclerotized portion averaging 0.85 mm. in length, ranging from 0.75 to 0.95 mm. . . . . 20
- Corpus bursae with posterior sclerotized portion averaging 0.95 mm. in length, ranging from 0.9 to 1.0 mm. . . . . *comstocki*
- 20(19). Corpus bursae with anterior membranous portion 1.6 mm. in length; signum 0.5 mm. in diameter . . . . . *lira*
- Corpus bursae with anterior membranous portion 2.1 to 2.2 mm. in length; signum 0.4 mm. in diameter . . . . . *melanocarpa*

## GROUP I

The species of this group have the front of the head flat. The males lack both the hair pencil and the groove on the hind tibia, and the medio-ventral row of bristles on the third abdominal segment is absent. The female genitalia have simple papillae anales and slender, very long apophyses posteriores and apophyses anteriores.

The upper surface of the wings varies in color from pale buff to a dark brownish buff, and the maculation is only weakly represented. Two of the species have rather narrow and elongate forewings; they occur in the Sonoran Desert of southern California and along the coast of the Gulf of California in Baja California. The third species has broader wings and much longer antennal pectinations in the male; this moth is known only from San Clemente Island, one of



the most distant offshore channel islands off southern California.

The three species that are included in Group I are *crickmeri*, *salvatierrai*, and *crinigera*.

***Pterotaea crickmeri* (Sperry)**

Figures 3, 20, 57, 88, 89

*Stenoporpia crickmeri* SPERRY, 1946, p. 138.

*Pterotaea crickmeri*: RINDGE, 1968, p. 73.

The upper surface of the wings of *crickmeri* is pale buff in color, and the s. t. line is complete, prominent, and broadly shaded basally by grayish brown. This species is found in the semiarid regions of southern California and in northern Baja California.

**MALE:** Head with vertex creamy white; front pale buff, with variable amount of grayish brown scaling; antennae with longest pectinations 1.0 mm. in length; palpi barely projecting beyond front, grayish buff, becoming paler apically. Thorax creamy white above, with a few scattered grayish buff scales, and with rudimentary, dark brown or grayish brown row of scales across collar and patagia in most specimens; whitish below; legs pale buff, with anterior surface of forelegs and middle legs grayish brown. Abdomen creamy white, with variable number of pale buff and grayish brown scales on dorsal surface.

**UPPER SURFACE OF WINGS:** Forewings elongate; creamy buff, becoming slightly darker along inner margin and in terminal area; maculation grayish brown to brown, with cross lines weakly represented; t. a. line arising as spot on costa about three-tenths of distance from base, running outward into cell, then angled basad, meeting inner margin between one-fourth and three-tenths of distance from base, with line being more strongly represented on cubital vein and above inner margin; median area tending to be lightly suffused with grayish brown scales; median line absent from most specimens; discal spot prominent, round; t. p. line arising as spot on costa three-fourths of distance from base, represented mainly by discal spots, paralleling outer margin and with large basal bend in lower part of wing; s. t. line whitish, slender, broadly shaded basally, except in middle of wing, by grayish brown scales; terminal line weakly represented except for strong intravenular spots; fringe concolorous

with wing, broadly grayish brown opposite vein endings. Hind wings concolorous with forewings, and with same type of maculation; intradiscal line absent; median shade line present in some specimens; extradiscal and s. t. lines similar to those of forewings; wing basad of extradiscal line shaded with grayish brown scales; discal dot present, smaller than on forewing.

**UNDER SURFACE OF WINGS:** All wings shiny white or slightly creamy white; forewings with pale buff costa having brown scales; maculation absent except for faint indications of discal spots and for t. p. and s. t. lines on upper portion of forewings.

**LENGTH OF FOREWING:** 14 to 17 mm.

**FEMALE:** Similar to male, but having more brown or grayish brown scaling above; under surface with more dark scaling in outer portion wings.

**LENGTH OF FOREWING:** 13 to 17 mm.

**MALE GENITALIA:** Uncus with lateral margins slightly concave, and with apex weakly enlarged; gnathos with moderate, finely spinulate, terminally rounded median enlargement; valves with costal area evenly and broadly sclerotized, occupying about one-third of inner face of valve, posterodistal area raised, with numerous fine, hairlike setae, and with single row of symmetrically arranged, closely grouped spines, four or five in number, pointing outward, and with irregular row of setae or spines, variable in number, extending anteriorly from posterodistal spines mediad of inner margin of costa; sacculus swollen, triangular; cristae small and inconspicuous; juxta broadest anteriorly, tapering posteriorly; aedeagus shorter than combined lengths of uncus, tegumen, and sacculus, weakly S-shaped dorsoventrally; vesica with two overlapping, linearly arranged groups of short spines, anterior group with large basal, flattened piece and with from six to eight thick spines, posterior group with more numerous, more closely grouped, and thinner spines. Abdomen without ventral row of spines on third segment.

**FEMALE GENITALIA:** Sterigma membranous, lateral areas broadly V-shaped, smoothly sclerotized, posterior margin rounded; ductus bursae with posterior portion membranous, slender, anteriorly broadened, lightly sclerotized; ductus seminalis arising ventrally or somewhat on right side near ductus bursae; corpus bursae

with posterior portion tubular, about 0.45 mm. in length, more or less sclerotized dorsomedially, and with a few longitudinal ridges, and with swollen, membranous anterior region, longer than posterior portion, and tending to have angulate anterior margin; signum round, with stellate outer margin and raised circular rim ventrally. Apophyses posteriores 3.5 to 3.6 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: The holotype, male, and allotype, female, are in the collection of the American Museum of Natural History. The genitalia of the former are mounted on slide F.H.R. No. 14908; those of the latter, on F.H.R. No. 15009.

TYPE LOCALITY: Borrego, San Diego County, California.

DISTRIBUTION: Virtually all the material examined has been from the type locality or near it. A few specimens have been examined from farther north in the Coachella Valley in Riverside County, California, and a single extremely worn example has been seen from Bahia de Los Angeles, on the Gulf of California, in Baja California. These specimens are all from the western portion of the Lower Colorado Valley region of the Sonoran Desert (Shreve and Wiggins, 1964) (see fig. 3).

TIME OF FLIGHT: A few specimens fly as early as January and February, but most of the moths examined were captured in March, April, and May.

REMARKS: A total of 80 specimens (39 males and 41 females) and eight genitalic dissections (five males and three females), including the primary types, have been studied.

In appearance *crickmeri* is somewhat similar to *Stenoporpia pulchella coolidgearia* Dyar. The two can be separated on generic characters, and especially by a study of the male genitalia.

The adults are somewhat variable in the amount of grayish brown scaling that occurs on the upper surface of the wings; this ranges from being almost absent to quite heavy. The females tend to be more heavily suffused than the males.

The male genitalia can be recognized by the arrangement of the costal spining and by the configuration of the spines in the vesica.

For a discussion of the female genitalia, see the following species.

***Pterotaea salvatierrai*,<sup>1</sup> new species**

Figures 3, 21, 59, 90

This species is similar in appearance to *crickmeri*, but the wings are darker in color whereas the subterminal area is not so dark. It occurs along the east coast of the Territory of Baja California Sur.

MALE: Head with vertex pale brownish gray; front grayish black, tending to be paler ventrally; antennae with longest pectinations 1.3 mm. in length; palpi barely projecting beyond front, grayish black. Thorax pale brownish gray above, with a few scattered brownish black scales; pale buff below; legs pale brown, with anterior surface of forelegs and middle legs darker brown. Abdomen pale brownish gray, with variable number of darker brown scales on dorsal surface.

UPPER SURFACE OF WINGS: Forewings elongate; pale gray of grayish brown, with variable number of brownish gray and dark brown scales; maculation obsolescent, dark brown when present; t. a. and t. p. lines usually represented as costal spots, with latter more or less indicated by venular spots; discal spot small, round; s. t. line weakly indicated by nebulous dark shading on basal side; terminal line represented by intravenular spots; fringe concolorous with wing, weakly darkened opposite vein endings. Hind wings concolorous with forewings, and with same type of maculation; extradiscal line, small discal dot, and weak s. t. line indicated.

UNDER SURFACE OF WINGS: All wings whitish gray; forewings with costa pale buff, with brown scaling; maculation absent except for all grayish brown discal spots.

LENGTH OF FOREWING: 14 to 17 mm.; holotype, 17 mm.

FEMALE: Similar to male, but having more dark brown scaling above; under surface tending to have slightly more dark scaling along outer margin of wings.

LENGTH OF FOREWING: 14 to 16 mm.

MALE GENITALIA: Uncus with lateral margins weakly concave, and with apex truncate; gnathos with moderate, finely punctate, terminally rounded median enlargement; valves with costal area evenly and broadly sclerotized, occupying about one-half of inner face of valve,

<sup>1</sup>This species is named in honor of Father Juan Maria de Salvatierra, the pioneer Jesuit priest of Baja California.

posterodistal area raised, terminating in from one to four closely grouped, outwardly pointing, ventrally arranged spines, and with low, narrow, irregular ridge extending anteriad from spinose area; sacculus swollen, scarcely sclerotized; cristae small, inconspicuous; juxta weakly sclerotized, tapering posteriorly; aedeagus shorter than combined lengths of uncus, tegumen, and saccus, weakly S-shaped dorsoventrally, and with sclerotized, pointed posterior end; vesica with two overlapping, linearly arranged groups of short spines, anterior group with large basal, flattened piece and with about eight thick spines, posterior group with numerous, more closely grouped, and thinner spines. Abdomen without ventral row of spines on third segment.

**FEMALE GENITALIA:** Similar to those of *crickmeri* but differing mainly as follows: sterigma with lateral areas tending to be more poorly defined; ductus bursae and corpus bursae larger, with posterior portion of latter between 0.50 and 0.55 mm. in length, and having strip along dorsal surface; corpus bursae with anterior membranous sac tending to have rounded anterior margin; signum slightly larger and more strongly stellate, tending to have more spinose projections in flat central area. Apophyses posteriores 3.3 to 3.6 mm. in length.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**TYPES:** Holotype, male, 10 miles south of Santa Rosalia, Territory of Baja California Sur, Mexico, February 18, 1966 (V. Roth); the genitalia of this specimen are mounted on slide F.H.R. No. 15390. Paratypes, all from the Territory of Baja California Sur: Same data as holotype, one male; Punta Pulpita, Gulf of California, April 2, 12, 1962 (C. F. Harbison), 19 males and 11 females; Isla San Marcos, Gulf of California, March 28, 1962 (C. F. Harbison), 11 males and two females.

The holotype is in the collection of the American Museum of Natural History; paratypes are in the collections of that institution and of the San Diego Natural History Museum.

**DISTRIBUTION:** The eastern coast of the Territory of Baja California Sur. The area from which the specimens were captured is the Central Gulf Coast region of the Sonoran Desert (Shreve and Wiggins, 1964) (see fig. 3).

**TIME OF FLIGHT:** February, March, and April.

**REMARKS:** A total of 45 specimens (32 males

and 13 females) and eight genitalic preparations (five males and three females) have been studied.

As far as can be determined from the rather worn condition of most of the specimens in the type series, the maculation is somewhat variable, especially with regard to the strength of the t. p. and extradistal lines.

The male genitalia of this species are similar to those of *crickmeri* except that they have the uncus with a simple apex, and a ventral arrangement of the spines at the end of the costa.

The female genitalia of the two species are very much alike. Considerable individual variation exists in both, for example, in the degree of sclerotization in the tubular portion of the corpus bursae and in the shape of the anterior, more membranous, portion of the same organ. The size of the corpus bursae is, however, apparently fairly constant; it is larger in the present species than in *crickmeri*.

#### ***Pterotaeca crinigera*, new species**

Figures 3, 22, 58

This species somewhat resembles a dark female of *crickmeri*, but it can be recognized by its shorter, broader wings and by the very long pectinations of the male antennae. It is known only from San Clemente Island, California.

**MALE:** Head with vertex brownish gray; front brownish black, paler ventrally; antennae with longest pectinations 1.9 mm. in length; palpi projecting beyond front about one-third of length of eye, dark grayish brown, slightly paler apically. Thorax brownish gray above; pale buff below; legs pale brownish gray, with anterior surface of forelegs and middle legs darker.

**UPPER SURFACE OF WINGS:** Forewings broad; brownish buff, with evenly scattered, brownish gray and dark brown scales; maculation not prominent, similar to that of *crickmeri*, brownish black, but with smaller discal spot; terminal line of intravenular dots; fringe concolorous with wing and darkened opposite vein endings. Hind wings concolorous with forewings and with same type of maculation; median shade line, small discal spot, extradiscal line, and s. t. line indicated.

**UNDER SURFACE OF WINGS:** All wings pale gray, evenly overlain with brownish gray scales; forewings with costa brownish buff, with dark

brown scaling, maculation absent except for all brownish gray discal spots and for terminal intravenular dots.

LENGTH OF FOREWING: 17 mm. (holotype).

FEMALE: Unknown.

MALE GENITALIA: Uncus with straight lateral margins and apex rounded; gnathos with rather elongate, punctate, terminally flattened median enlargement; valves with costal area evenly and broadly sclerotized, occupying about one-half of inner face of valve, posterodistal area raised, with a few median, hairlike setae, and with from 12 to 15 closely grouped spines pointing anterodistally, those on left valve arranged in two rows, those on right valve in two rows plus several smaller spines ventrally, and with band of hairlike setae extending anteriorly from posterodistal spines medially of inner margin of costa; sacculus swollen, triangular; cristae elongate, numerous, inconspicuous; juxta subtriangular; aedeagus shorter than combined lengths of uncus, tegumen and saccus, straight, slightly swollen medially; vesica with single, median, sclerotized piece, slightly longer than maximum width of aedeagus. Abdomen without ventral row of spines on third segment.

FEMALE GENITALIA: Unknown.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE: Holotype, male, San Clemente Island, California, April 4, 1939 (Los Angeles Museum Channel Island Biology Survey). The genitalia of the type are mounted on slide F.H.R. No. 6743. The type specimen is in the collection of the Los Angeles County Museum of Natural History.

DISTRIBUTION: This species is known only from San Clemente Island, which is approximately 60 miles off the coast of southern California (see fig. 3).

TIME OF FLIGHT: April.

REMARKS: One specimen and one genitalic dissection have been studied.

It is interesting to speculate whether the broader wings and the much longer pectinations of the male antennae are adaptations for insular life. The length of the pectinations are one-half again as long as in any other known species of *Pterotaea*.

The male genitalia are similar to those of *crickmeri* but can be distinguished from those of all known species in *Pterotaea* by the reduction in the spining of the vesica.

## GROUP II

The species of this group have a raised front; the males lack both the hair pencil and groove on the hind tibia, and the medioventral row of bristles on the third abdominal segment is absent. The female genitalia, in so far as they are known, have a heavily sclerotized, median projecting ridge on each papillae anales, and the very long apophyses posteriores and apophyses anteriores are thick and heavily sclerotized.

The upper surface of the wings is grayish black, and the maculation varies from being moderately to prominently represented. The included species are found in the desert areas of southern California.

The three species included in group II are *sperryae*, *leuschneri*, and *plagia*.

### *Pterotaea sperryae* McDunnough

Figures 4, 23, 60, 91, 92

*Pterotaea sperryae* McDUNNOUGH, 1938b, p. 85.

This species can be recognized by the fact that the wings are grayish black and have distinct cross lines. It is known only from the Mojave Desert of southern California and northwestern Arizona.

MALE: Head with vertex grayish black, the scales whitish gray apically; front blackish gray; antennae with longest pectinations 0.9 mm. in length; palpi barely projecting beyond front, grayish black or blackish gray, tending to become paler apically. Thorax above with mixture of grayish brown and grayish black scales, most scales whitish gray apically, and with broad dark band across collar and narrow dark band across patagia; small posterior thoracic tufts present; slightly paler below; legs covered with mixture of light gray and brownish black scales. Abdomen grayish black, upper surface with blackish brown scaling, and with narrow dark bands of scales at ends of segments in some specimens.

UPPER SURFACE OF WINGS: Forewings with even mixture of whitish gray, grayish brown, and blackish brown scales, producing grayish black coloration; cross lines grayish black; t. a. line apparently arising near radial vein one-third of length of wing from base, running basad and gently curved, meeting inner margin one-fourth of distance from base, and with narrow white basal shade line; median line

weakly represented posteriad of weak or obsolescent discal dot; t. p. line arising below costa about five-sixths of distance from base, evenly curved, running to middle of inner margin, and with white distal shade band, wider than t. p. line; s. t. line white, outwardly curved in cells, more strongly represented in lower portion of wing, and with broad basal blackish gray shading; terminal line black, complete, with small intravenular spots; fringe white basally, with median blackish gray band and becoming dark gray terminally. Hind wings with outer portion concolorous with forewings, and basal area paler gray; with same type of maculation as on forewings; intradiscal line absent; median shade line present in lower portion of wing; extradiscal, s. t., and terminal lines, plus fringe, similar to those of forewings.

**UNDER SURFACE OF WINGS:** All wings light gray, evenly shaded with grayish brown and brownish black scales; maculation absent except for small discal dots on forewings and for nebulous pale band representing t. p. and extradiscal lines; terminal line brown; fringe white basally, grayish brown distally.

**LENGTH OF FOREWING:** 16 to 19 mm.

**FEMALE:** Similar to male, but with upper and under surfaces of wings tending to be slightly darker grayish black and to have less clearly defined maculation.

**LENGTH OF FOREWING:** 15 to 18 mm.

**MALE GENITALIA:** Uncus with lateral edges straight, and with apex slightly constricted, having parallel sides and truncate end; gnathos with elongate, slightly swollen, punctate, terminally rounded, median enlargement; valves with costal area increasing in width apically, occupying about one-half of inner face of valve, posterodistal area raised, with numerous fine, hairlike setae medially, and with from 10 to 15, symmetrically arranged, closely grouped spines, pointing anterodistally, and with partial ridge or small flange extending anteriorly from posterodistal spines mediad of inner margin of costa; sacculus broadly sclerotized; cristae small and inconspicuous; juxta broad, somewhat narrowed anteriorly, rounded posteriorly; aedeagus subequal in length to combined lengths of uncus, tegumen, and saccus, and with pointed posterior end; vesica with straight, narrow, sclerotized anterior piece, and with apparently joined posterior row of curved spines, in length shorter

than, or equal to, length of anterior piece. Abdomen without ventral row of spines on third segment.

**FEMALE GENITALIA:** Apophyses posteriores thick, 4.0 to 4.6 mm. in length, continued posteriorly to connect with large, outwardly curved, sclerotized projecting ridges on each papilla; sterigma membranous but with lateral and anterior areas broadly and smoothly sclerotized, semicircular in outline, and with ostium having more or less parallel sides; ductus bursae with posterior portion membranous, narrowly funnel-shaped, anteriorly becoming lightly sclerotized, with parallel sides; ductus seminalis arising ventrally near ductus bursae; corpus bursae with tubular, longitudinally striate posterior portion, and with weakly swollen, membranous anterior region; signum small, about 0.1 mm. wide, rounded, with irregular and weakly raised outer margin.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**TYPES:** The holotype, male, and allotype, female, are in the Canadian National Collection, Ottawa (C.N.C. No. 4374).

**TYPE LOCALITY:** Morongo Valley, San Bernardino County, California.

**DISTRIBUTION:** The Mojave Desert of southeastern California and northwestern Arizona (see fig. 4).

**TIME OF FLIGHT:** May and early June.

**REMARKS:** A total of 48 specimens (18 males and 30 females) and nine genitalic dissections (four males and five females) have been studied.

The male genitalia of *sperryae* can be distinguished from those structures of the species of group I by the much more broadly sclerotized sacculus and by the greater number of spines at the posterodistal area of the costa.

The female genitalia can be separated from those of the species of group I by the protuberances from the papillae anales and by the very thick apophyses.

***Pterotaea leuschneri*,<sup>1</sup> new species**

Figures 4, 24, 61, 93

The upper surface of the wings of *leuschneri* are blacker than that of *sperryae*, and the t. p.

<sup>1</sup>This species is named in honor of my friend Mr. Ronald H. Leuschner of Gardena, California, who collected most of the type material of both this and the following species.



line tends to be biconcave. This species occurs in southern California.

**MALE:** Head, thorax, and abdomen similar to those of *sperryae*; antennae with longest pectinations 1.0 mm. in length; thorax with narrow dark band across collar and with wider dark band across patagia.

**UPPER SURFACE OF WINGS:** Forewings with gray and blackish gray scales, producing blackish gray coloration; cross lines black, rather poorly defined, especially in anterior portion of wing; cross lines similar in course to those of *sperryae* but with t. p. line tending to be weakly biconcave; median shade line present in lower portion of wing; discal dot absent; subterminal area faintly paler, especially in lower part of wing; s. t. line represented by indistinct grayish white line; terminal line narrow, black, with small intravenular dots; fringe white basally, becoming concolorous with wing distally, and darkened opposite vein endings. Hind wings concolorous with forewings, and with same type of maculation; intradiscal line absent; median shade line present in lower portion of wing; extradiscal, s. t., and terminal lines, plus fringe, similar to those of forewings, and with subterminal area tending to be slightly paler.

**UNDER SURFACE OF WINGS:** All wings gray, with brownish gray and blackish gray scaling, the dark scaling more prominent on hind wings; without maculation except for narrow brownish gray terminal line; fringe like that of upper surface.

**LENGTH OF FOREWING:** 16 to 18 mm.; holotype, 18 mm.

**FEMALE:** Similar to male but with upper and under surfaces of wings tending to be slightly darker, and to have less clearly defined maculation.

**LENGTH OF FOREWING:** 17 to 18 mm.; allotype, 17 mm.

**MALE GENITALIA:** Similar to those of *sperryae* but differing mainly as follows: smaller; gnathos tending to have median enlargement slightly shorter and broader; valves with costal spining consisting of four (left valve) or five (right valve) larger spines in single row and with from three to five smaller spines costally; valves without median flange; vesica with anterior sclerotized piece, and with posterior group of grouped spines, in length slightly shorter than

anterior piece. Abdomen without ventral row of spines on third segment.

**FEMALE GENITALIA:** Similar to those of *sperryae* but differing mainly as follows: apophyses posteriores 4.5 to 4.6 mm. in length; sterigma less heavily sclerotized; ostium with ventral ridges meeting in point; corpus bursae shorter.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**TYPES:** Holotype, male, and allotype, female, Bob's Gap, near Pearblossom, Mojave Desert, Los Angeles County, California, May 29, 1968 (R. H. Leuschner and F. Sala); both specimens are from the Leuschner collection. The genitalia of the holotype are mounted on slide F.H.R. No. 15524, those of the allotype, on F.H.R. No. 15459. Paratypes: Same data as types, one male and two females.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collection of R. H. Leuschner.

**DISTRIBUTION:** This species is known only from the type locality in Antelope Valley, at the western edge of the Mojave Desert, near the base of the San Gabriel Mountains (see fig. 4).

**TIME OF FLIGHT:** May.

**REMARKS:** A total of five specimens (two males and three females) and three genitalic dissections (one male and two females) have been studied.

The genitalia of *leuschneri* can be separated from those of *sperryae* in the male by the single row of costal spines, and in the female structures by characters given in the description.

#### ***Pterotaea plagia*, new species**

Figures 4, 25, 62, 94

This species can be recognized by the blacker, more prominent and very strongly inwardly oblique cross lines of the forewings, with the t. p. line more basad than that of *sperryae*. It is known only from southern California.

**MALE:** Head and thorax similar to those of *sperryae*, but with palpi slightly longer and with more whitish scaling; antennae with longest pectinations 0.8 mm. in length.

**UPPER SURFACE OF WINGS:** Forewings with even mixture of whitish gray, grayish brown, and blackish brown scales, producing dark gray coloration; cross lines black, prominent; t. a.

line arising in middle of cell, paralleling costa to meet inner margin one-fifth of distance from base; discal dot absent; median area slightly paler than adjacent areas; median line weakly represented in lower portion of wing; t. p. line arising on vein  $M_1$ , proceeding more or less straight, at slight angle to costa, meeting inner margin basad of center, and with grayish brown distal shade band in lower portion of wing, followed by nebulous grayish white band; s. t. line weakly indicated in lower portion of wing; terminal line blackish brown, with faint intravenular dots; fringe pale gray at base, becoming dark brownish gray medially and grayish brown terminally. Hind wings with outer portion concolorous with forewings, and with basal area paler gray; with same type of maculation as on forewings; basal line present, appearing as continuation of t. a. line; median shade line present in lower portion of wing; extradiscal line narrower than on forewing, not extending completely across wing; s. t. line present in lower portion of wing, and having basal dark shading; terminal line and fringe similar to those of forewings.

**UNDER SURFACE OF WINGS:** All wings light gray, evenly shaded with grayish brown and brownish black scales; maculation absent except for nebulous pale band representing t. p. line on forewings; terminal line brown, interrupted by veins; fringe white basally, grayish brown distally.

**LENGTH OF FOREWING:** 15 to 18 mm.; holotype, 18 mm.

**FEMALE:** Similar to male, but with upper surface of forewings unicolorous dark gray; maculation obsolescent.

**LENGTH OF FOREWING:** 16 to 18 mm.; allotype, 17 mm.

**MALE GENITALIA:** Similar to those of *sperryae* but differing mainly as follows: uncus more slender, with shallowly concave sides; valves with five or six costal spines in single row on right side, with from five to eight spines in two rows on left valve, and with several smaller spines and setae costally; valves with weak median ridge; vesica with straight, narrow, sclerotized anterior piece, and with joined posterior row of slightly curved spines, in length almost twice as long as anterior piece. Abdomen without ventral row of spines on third segment.

**FEMALE GENITALIA:** Similar to those of

*sperryae* but differing mainly as follows: apophyses posteriores 3.9 to 4.3 mm. in length; sterigma with lateral margins of ostium outwardly oblique, producing slightly wider opening; corpus bursae with anterior region broadly swollen, much wider than posterior tubular section; signum larger, about 0.3 mm. wide, irregularly rounded, outer area broad with margin unevenly erose.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**TYPES:** Holotype, male, Pinyon Crest, Riverside County, California, elevation 4200 feet, June 10, 1967 (R. H. Leuschner); allotype, female, same data, elevation 4000 feet, June 1, 1968. The genitalia of the holotype are on slide F.H.R. No. 15562; those of the allotype, on F.H.R. No. 15497. Paratypes: Same data as types, May 30, 1965, May 30, 1969, June 1, 1968, June 10, 1967, and July 2, 1965, 22 males and five females; Palm Springs, Riverside County, California, May 22, 1949 (F. H. Rindge), one male.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution and of R. H. Leuschner.

**DISTRIBUTION:** The San Jacinto Mountains, Riverside County, California (see fig. 4). The Palm Springs specimen is undoubtedly a stray; the author and his parents ran a light trap, utilizing a dark blue light, for about 15 years at Palm Springs, and this specimen was the only one ever taken.

**TIME OF FLIGHT:** From late May to early July.

**REMARKS:** A total of 30 specimens (24 males and six females) and five genitalic dissections (three males and two females) have been studied.

The male genitalia of the present species can be distinguished from those of *sperryae* by the different shape of the uncus, by the reduced spining on the posterodistal area of the costa, and by the more elongate posterior row of spines in the vesica.

The female genitalia are very similar to those of *sperryae* but can be distinguished by the more swollen anterior portion of the corpus bursae and by the larger signum.

### GROUP III

The species of this group have the front of the head flat. The males have a prominent hair

pencil and groove in the hind tibia, and the medioventral row of bristles on the third abdominal segment may be present or absent. The female genitalia have simple papillae anales and slender apophyses posteriores and apophyses anteriores.

Determining the species of group III is not easy. Five subgroups can be recognized from the male genitalia and by the presence or absence of the bristle comb on the ventral surface of the third abdominal segment.

The first of these has the bristle comb on  $A_3$  and a single row of three or four heavy spines around the outer margin of the costal swelling of the valve. On the brown forewings, the t. p. line is prominent, more or less straight, and subparallels the costa, meeting the inner margin just basad of the middle. The palpi are elongate. One species is included here: *lamiaria*.

The second subgroup also has the bristle comb on  $A_3$ , but the posterior margin of the costa of the valve is in the form of a raised transverse ridge, with from three to 12 spines at the end. The forewings range in color from whitish gray to brown, with the t. p. line similar to that of the preceding subgroup. The palpi are short. Seven species are included: *campestraria*, *succurva*, *glauca*, *cavea*, *miscella*, *systole*, and *euroa*.

The third subgroup does not have the bristle comb on  $A_3$ , but the spining on the costa of the valves is similar to that of the first subgroup. The upper surface of the wings ranges in color from whitish gray to brown. The t. p. line has a more or less strong basal bend above the inner margin, and parallels the outer margin, meeting the inner margin distad of the middle. The palpi range in length from short to moderately long. Six species are included: *lira*, *obscura*, *comstocki*, *macroceros*, *powelli*, and *albescens*.

The fourth subgroup also lacks the bristle comb on  $A_3$ , but the spining on the costa of the valves is similar to that of the second subgroup. The upper surface of the wings is brown, and the t. p. line is similar in course to that in the preceding subgroup. The palpi are short. Only one species is included here: *tremularia*.

The fifth subgroup has the bristle comb on  $A_3$ , and the spining on the costa of the valves is noticeably asymmetrical. The upper surface of the wings is brownish gray or gray, and there is usually a large, rectangular, pale area in the middle of the terminal area of the forewings.

The t. p. line varies from having a well-defined basal bend above the inner margin to being evenly but weakly S-shaped. The palpi are relatively short. Two species, each divided into subspecies, are included here: *cariosa* and *newcombi*.

#### ***Pterotaea lamiaria* (Strecker)**

*Boarmia lamiaria* STRECKER, 1899, p. 10.

This species has elongate palpi, the upper surface of the wings is primarily brown in color, and the t. p. line is prominent, more or less straight, and subparallels the outer margin. It occurs in California and northwestern Baja California in two named populations.

**MALE:** Head with vertex brownish gray; front brownish black, with protruding scale tuft ventrally; antennae with longest pectinations 1.2 to 1.3 mm. in length; palpi elongate, projecting beyond front distance about equal to length of eye, brownish black. Thorax gray to brownish gray above, with blackish brown scales concentrated on collar, as narrow band across patagia, and posteriorly; whitish or pale buff below; legs pale buff, with dark brown scaling on forelegs, and with outer portions of mid and hind legs pale brown. Abdomen above with first segment white, with black or brownish black band across base, remaining segments grayish brown, with variable number of dark brown scales, posterior margins of all segments brownish black, with narrow pale gray marginal band; under surface whitish or pale buff.

**UPPER SURFACE OF WINGS:** Forewings brownish gray, with variable number of pale gray, grayish brown, and brownish black scales; cross lines black, prominent, t. a. and t. p. lines with wide, brownish shade bands; t. a. line obsolescent from costa into cell, sharply outwardly directed, then apparently arising in cell near small, dark, discal dot, proceeding with slightly even bend to meet inner margin about one-fifth of distance from base, and having broad, basal, brown shade band; median shade line weakly represented, complete in many specimens, tending to be more prominent in lower portion of wing; t. p. line represented by spot on vein  $R_5$ , commencing on vein  $M_1$ , then subparalleling outer margin, either more or less straight or with basal bend above inner margin, to meet inner margin basad of middle, and

having broad, brown, distal shade band; subterminal area brownish gray near upper portion of wing, extending to wing margin, and becoming mostly pale gray in lower portion of wing; s. t. line pale gray or whitish, sharply convex in cells and broadly shaded basally by grayish brown and narrowly shaded distally by brownish black; terminal line black, narrow, with small intravenular spots; fringe concolorous with, or slightly paler than, wing. Hind wings concolorous with forewings and with same type of maculation; basal line present; intradiscal line absent; median shade line present in lower portion of wing; small discal dot present; extradiscal line prominent, not reaching costal margin, varying from straight to slightly irregular, and followed by narrow pale gray band and broad, brown, distal shade band; subterminal area gray or pale gray; s. t. line similar to that of forewings but more prominent; terminal line and fringe similar to those of forewings.

UNDER SURFACE OF WINGS: Forewings grayish brown, with dark brown scaling on costa; hind wings pale grayish brown, with scattered brown scales; discal dots present on all wings; maculation absent except for weakly indicated t. p. line, and for narrow brown terminal line on all wings.

LENGTH OF FOREWING: 13 to 18 mm.

FEMALE: Similar to male, but with upper surface of wings tending to be slightly less contrastingly colored.

LENGTH OF FOREWING: 13 to 18 mm.

MALE GENITALIA: Uncus with elongate, slender apex, about two-fifths of length of entire uncus, and with posterior end truncate or gently rounded; gnathos with small, punctate, scarcely swollen median enlargement; valves with costal area occupying about one-half of inner face of valve, with median ridge extending from tegumen to slightly raised posterodistal area, and with single row of three or four heavy (some examples with one or two slender), anterodistally pointed spines, alike on both valves in most specimens; sacculus broadly sclerotized, and with elongate raised ridge; cristae numbering about 25 on each side, very slender, slightly longer than maximum width of aedeagus; juxta broad anteriorly, evenly narrowed or constricted medially, rounded or weakly concave apically; aedeagus subequal in length to combined lengths of uncus, tegumen, and saccus, very slender, weakly swollen medially, and with

pointed posterior end; vesica with two overlapping, linearly arranged groups of short spines, anterior group with from eight to 12 spines, basally long and slender, becoming short and thick posteriorly, and with more elongate posterior group having more numerous, more closely grouped, and thinner spines. Abdomen with weakly represented (perhaps partially deciduous) medioventral row of bristles on third abdominal segment.

FEMALE GENITALIA: Sterigma very weakly sclerotized medially, with several small, transverse striations posteriad of ostium, the latter with sides and anterior margin curved, recessed, and narrowly sclerotized; anterior margin of sterigma broadly sclerotized and lunate in outline; ductus bursae with posterior end slender, membranous, about equal in length to widened anterior portion, latter slightly longer than wide and having lateral margins sclerotized; ductus seminalis arising ventrally near ductus bursae; corpus bursae with narrow, tubular, longitudinally striated, heavily sclerotized posterior portion, and with longer, swollen, membranous anterior portion; signum dorsal, between 0.3 and 0.4 mm. wide, rounded, with stellate outer margin, variable as to size and number of rays, with flat median area and raised median rim. Apophyses posteriores 2.0 to 2.6 mm. in length.

EARLY STAGES: The nominate subspecies has been reared, and the egg has been illustrated.

FOOD PLANT: *Adenostoma fasciculatum* Hooker and Arnott (nominate subspecies).

DISTRIBUTION: California and northwestern Baja California.

REMARKS: This species is fairly variable in maculation, but it can usually be recognized by the brownish wings and by the brown shade bands of the t. a. and t. p. lines. The course of these two lines is somewhat variable. Both lines vary from being almost straight or gently curved to the t. p. line's being more or less S-shaped. The median area varies in width and in the amount of dark scaling.

The males of *lamia* can be distinguished from those of all the preceding species by the presence of the medioventral row of bristles on the third abdominal segment. The genitalia of this sex are similar to those of the species of the third subgroup, but can be recognized by the different spining in the vesica.

The female genitalia can be separated from

those of all the preceding species by the much shorter apophyses posteriores.

***Pterotaea lamiaria lamiaria* (Strecker)**

Figures 6, 26, 63, 95, 96

*Boarmia lamiaria* STRECKER, 1899, p. 10. McDUNNOUGH, 1920, p. 9.

*Cleora lamiaria*: BARNES AND McDUNNOUGH, 1917, p. 117.

*Pterotaea lamiaria*: McDUNNOUGH, 1938a, p. 165.

*Selidosema lamarium*: DYAR, "1902" [1903], p. 324.

*Selidosema laminarium* (sic): SMITH, 1903, p. 77.

*Cleora agrestaria* GROSSBECK, 1909, p. 193. BARNES AND McDUNNOUGH, 1912, p. 7, pl. 2, fig. 19 (male); 1917, p. 117. New synonymy.

*Pterotaea agrestaria*: McDUNNOUGH, 1938a, p. 165. COMSTOCK, 1963a, p. 206, fig. 1F (egg).

The moths of this population, occurring along the coastal regions of California and north-

western Baja California, are large and tend to have prominent maculation.

MALE: Head with longest pectinations of antennae 1.3 mm. in length; palpi projecting beyond front a distance slightly shorter than length of eye.

UPPER SURFACE OF WINGS: Forewings with cross lines tending to be prominent, and with wide brownish shade bands.

LENGTH OF FOREWING: 14 to 18 mm.

FEMALE: As described for the species.

LENGTH OF FOREWING: 13 to 18 mm.

MALE GENITALIA: As described for the species; aedeagus 1.6 mm. in length.

FEMALE GENITALIA: As described for the species.

EARLY STAGES: The egg has been illustrated by Comstock (1963a, fig. 1F).

FOOD PLANT: *Adenostoma fasciculatum* Hooker and Arnott.

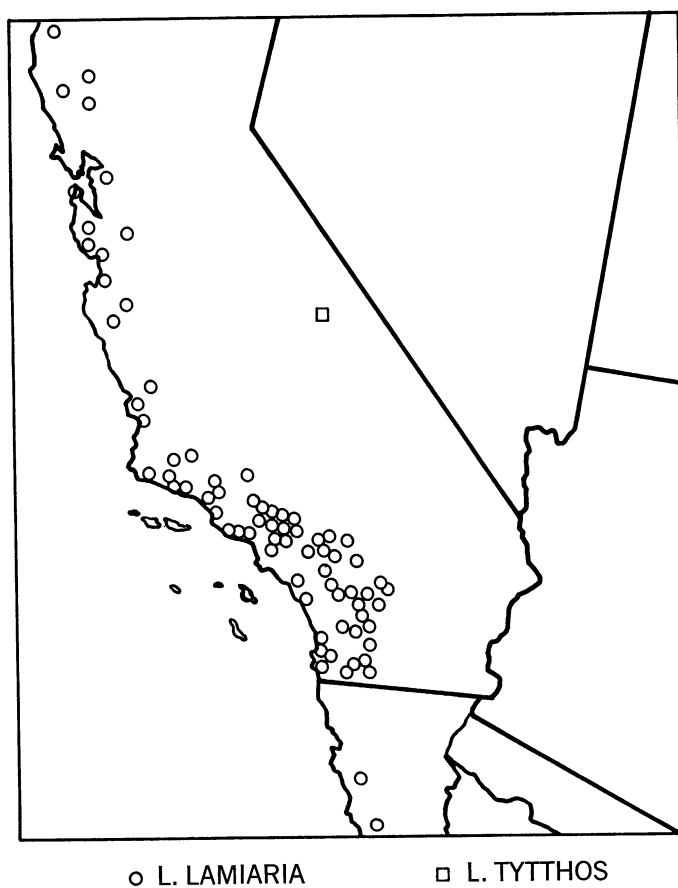


FIG. 6. Distribution of *Pterotaea lamiaria* (Strecker).

**TYPES:** Strecker described *lamiaria* from a single female; this specimen is in the Field Museum of Natural History, Chicago.

Grossbeck had a series of specimens before him when he described *agrestaria*. The one bearing his "♂ type" label is now in the United States National Museum, and is hereby designated as the lectotype; it is U.S.N.M. No. 34273. The "♀ type" is in the collection of the American Museum of Natural History.

**TYPE LOCALITIES:** Strecker gave "near San Francisco, California" as the locality where Stretch collected the unique type of *lamiaria*. The label on the specimen itself reads "S. Francisco, Calif. Stretch." The lectotype of *agrestaria* is from Monterey County, California.

**DISTRIBUTION:** The foothills and coast ranges of California, ranging from Mendocino County south into northwestern Baja California (see fig. 6).

**TIME OF FLIGHT:** From mid February into September.

**REMARKS:** A total of 744 specimens (285 males and 459 females), including both primary types, have been examined, as well as 64 genitalic dissections (35 males and 29 females).

One strongly melanistic specimen of this subspecies has been examined; it is the only melanistic individual seen in all the moths studied for this revision. This female is from Tanbark Flat, San Gabriel Mountains, Los Angeles County, California, July 11, 1956, and is in the collection of the University of California, Davis. The upper surface of the wings is a uniform dull black and is without maculation except for the s. t. lines; on the forewings the latter are whitish gray, relatively broad, and complete, and on the hind wings much narrower and of a darker gray. The under surface of the wings is a uniform grayish black, without maculation.

***Pterotaea lamiaria* tythos**, new subspecies

Figures 6, 27

The population that occurs east of the Sierra Nevada Range in California is small, and the upper surface of the wings has less strongly developed maculation than the nominate subspecies.

**MALE:** Head with longest pectinations of antennae 1.2 mm. in length; palpi projecting beyond front a distance slightly greater than length of eye.

**UPPER SURFACE OF WINGS:** Forewings with

cross lines moderately prominent and with dull brown or brownish black shade bands not strongly represented.

**LENGTH OF FOREWING:** 13.5 to 14 mm.; holotype, 13.5 mm.

**FEMALE:** As described for the species.

**LENGTH OF FOREWING:** 13 to 15 mm.; allotype, 15 mm.

**MALE GENITALIA:** As described for the species; smaller than those of nominate subspecies; valves with row of three heavy and one slender spines; aedeagus 1.5 mm. in length.

**FEMALE GENITALIA:** As described for the species.

**EARLY STAGES:** Undescribed.

**FOOD PLANT:** Unknown.

**TYPES:** Holotype, male, allotype, female, and one male and one female paratypes, Owens Valley, Inyo County, California, August 10, 1955 (W. A. Rees). The genitalia of the holotype are mounted on slide F.H.R. No. 15492; those of the allotype, on F.H.R. No. 15437.

The holotype and allotype are in the collection of the Los Angeles County Museum of Natural History; paratypes are in that collection and the collection of the American Museum of Natural History.

**DISTRIBUTION:** Eastern California (Inyo County) (see fig. 6).

**TIME OF FLIGHT:** August.

**REMARKS:** A total of four specimens (two males and two females) and two genitalic dissections (one male and one female) have been studied.

***Pterotaea campestraria* McDunnough**

Figures 7, 28, 64, 97

*Pterotaea campestraria* McDUNNOUGH, 1941, p. 76.

This species is similar to *lamiaria* in color and maculation, but can be separated from the preceding species by the much shorter palpi and by its larger size. It occurs in southern California and in northwestern Baja California.

**MALE:** Head with vertex grayish brown, with brownish black scales between bases of antennae; front brown or brownish black, with variable amount of gray scaling across top and bottom; antennae with longest pectinations 1.0 mm. in length; palpi short, projecting beyond front not more than one-third of length of eye, brownish black. Thorax and abdomen similar to those of *lamiaria*, but with first abdominal



segment above only slightly paler than remaining segments.

**UPPER SURFACE OF WINGS:** Forewings dark brownish gray, with dark brown and grayish scaling; maculation as in *lamiaria* but not so prominent, with shade bands of t. a., t. p., and extradiscal lines tending to be less conspicuous and more grayish brown, maculation thus appearing less contrasting.

**UNDER SURFACE OF WINGS:** Similar to that of *lamiaria*, brownish gray.

**LENGTH OF FOREWING:** 16 to 18 mm.

**FEMALE:** Similar to male, but with upper surface of wings tending to be slightly grayer and less contrastingly colored.

**LENGTH OF FOREWING:** 16 to 18 mm.

**MALE GENITALIA:** Similar to those of *lamiaria* but differing mainly as follows: uncus with posterior end weakly bilobed; valves with raised posterodistal area of costa extending almost to costal margin, spining tending to be asymmetrical, with three thick spines on right side and with four, rarely three or five, thick spines arising from broader base on left side, both sides may have from one to three smaller, additional spines; cristae tending to be more numerous and longer; aedeagus 2.2 mm. in length, longer than combined lengths of uncus, tegumen, and saccus; vesica with single row of from 16 to 24 spines, elongate anteriorly, 0.2 mm. in length, becoming shorter and thicker posteriorly. Abdomen with medioventral row of bristles on third segment.

**FEMALE GENITALIA:** Similar to those of *lamiaria* but differing mainly as follows: sterigma without posterior transverse striations, and with larger and more elongate lateral areas around ostium; anterior sclerotized margin of sterigma narrower, with posterior ends broader; ductus bursae with elongate posterior end extending anteriorly of anterior margin of sterigma, in length almost twice as long as widened anterior portion; corpus bursae with membranous anterior portion tending to be attenuate; signum 0.4 to 0.5 mm. in width. Apophyses posteriores 1.8 to 2.0 mm. in length.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**TYPE:** The holotype, male, of *campestraria* is in the Canadian National Collection (C.N.C. No. 5188); its genitalia were mounted on slide Pt. 8a by McDunnough.

**TYPE LOCALITY:** La Posta, San Diego County, California.

**DISTRIBUTION:** The mountainous regions of southern California, extending as far north as Santa Barbara and Kern counties, and northwestern Baja California (see fig. 7).

**TIME OF FLIGHT:** June and July.

**REMARKS:** A total of 18 specimens (14 males and four females) and 12 genitalic dissections (nine males and three females) have been studied, including the primary type and its genitalia.

Members both of this population and of *lamiaria* fly together in at least two areas at the same time. The moths of both resemble one another closely. Specimens of *campestraria* can be recognized by their short palpi, usually larger size, and by the fact that the upper surface of the wings tends to be a darker brown with rather obscure maculation, as compared with the preceding species.

In two male specimens from Ojai, Ventura County, June 25, 28, 1963 (R. Rail; in collection of the University of California, Davis), however, these maculation characters do not hold. The genitalia, size of the moths, and length of the palpi indicate that the specimens are best placed as *campestraria* at present. The upper surface of the forewing is dark grayish brown, with broad black cross lines, the t. p. being bordered outwardly by a prominent brown band. The extradiscal line on the secondaries is also strongly represented and has a broad shade band.

The male genitalia of the present species can easily be separated from those of *lamiaria* by the configuration of the valves. They are more like those of the following species and of *melanocarpa*.

The female genitalia are quite similar to those of *lamiaria*. The specific differences are outlined in the description.

#### ***Pterotaea succurva*, new species**

Figures 7, 29, 32, 65, 100

*Pterotaea campestraria* McDUNNOUGH, 1941, p. 76 (*partim*).

This species is similar to *campestraria*, but it can be recognized by the somewhat curved t. p. line and by the more contrasting maculation. It occurs in central and northern California.

MALE: Head, thorax, and abdomen similar to those of *campestraria*, with upper surface of abdomen conspicuously marked on posterior margin of each segment with black transverse band, followed by narrow grayish white band; antennae with longest pectinations 1.2 to 1.3 mm. in length; palpi short, projecting beyond front about one-half of length of eye.

UPPER SURFACE OF WINGS: Forewings light gray, with dark brown and blackish brown scaling, appearing more contrastingly colored than in *campestraria*; maculation similar to that of *campestraria* but with larger and more prominent discal dots and with t. p. line having definite basal bend in cell  $Cu_2$ ; t. p. line shaded outward by dark brown band; s. t. line set in elongate,

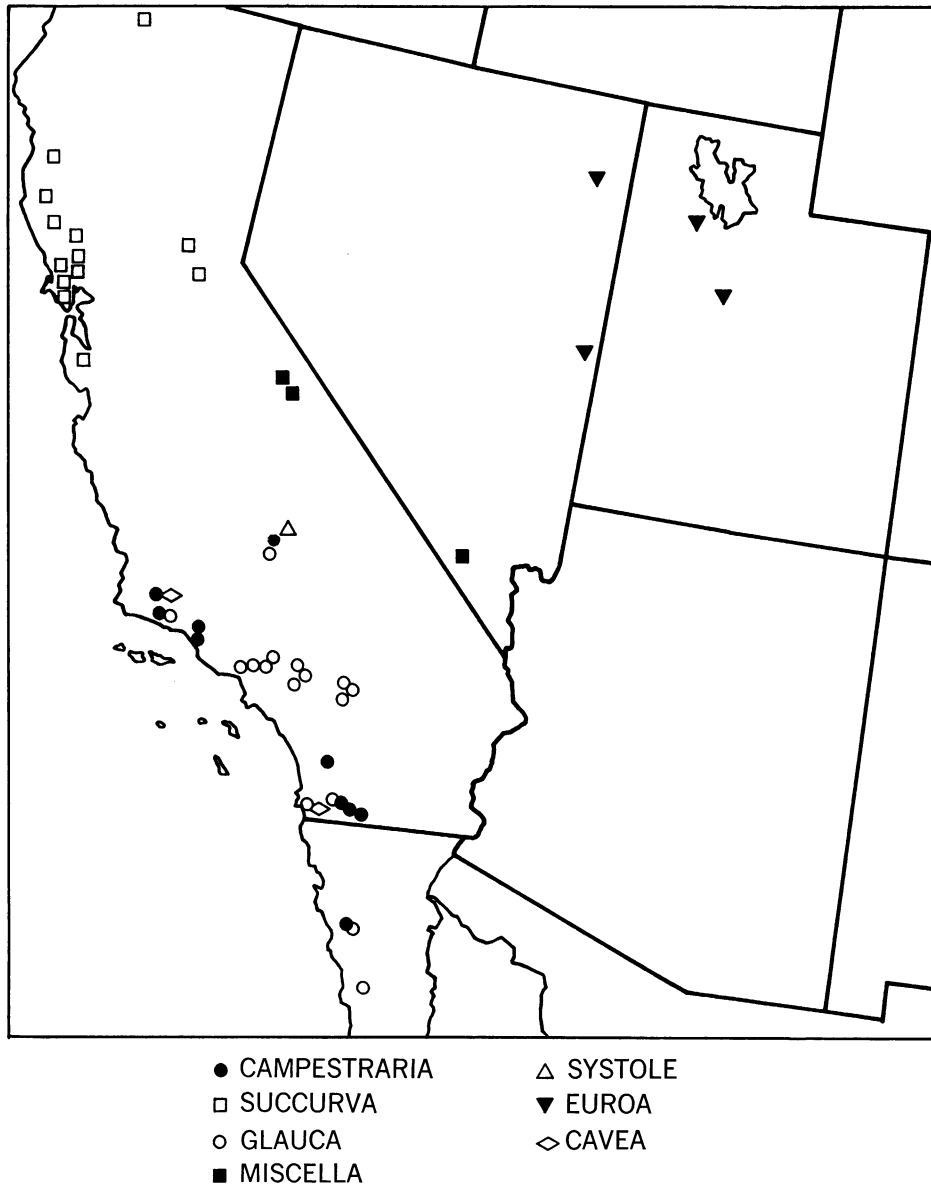


FIG. 7. Distribution of *Pterotaea campestraria* McDunnough, *P. succurva*, new species, *P. glauca*, new species, *P. cavea*, new species, *P. miscella*, new species, *P. systole*, new species, and *P. euroa*, new species.

blackish brown sagittate markings. Hind wings contrastingly colored, with prominent discal spot and with complete, anteriorly curved, extradiscal line; s. t. line set in short sagittate markings.

UNDER SURFACE OF WINGS: Similar to that of *campestraria*, but with more prominent discal spots.

LENGTH OF FOREWING: 16 to 18 mm.; holotype, 18 mm.

FEMALE: Similar to male, but with upper surface having much less brown scaling.

LENGTH OF FOREWING: 15 to 17 mm.; allotype, 15 mm.

MALE GENITALIA: Similar to those of *campestraria* but differing mainly as follows: uncus with tip slightly broader and with thicker points; valves with costal spines on right side varying from four slender, elongate spines plus one much smaller lateral one (holotype) to three or two thick spines and one to five smaller ones (paratypes); left costa with from six, elongate, slender spines (holotype) to four or three shorter, thick spines and five smaller ones (paratypes); aedeagus 2.2 to 2.4 mm. in length; vesica with anterior, oblique row of from five to seven elongate (0.3 to 0.4 mm.) spines, with row curving dorsally and extending posteriorly, the spines becoming somewhat shorter. Abdomen with ventral row of spines on third segment.

FEMALE GENITALIA: Similar to those of *campestraria* but differing mainly as follows: sterigma with ostium more elongate and having broad, U-shaped, anterior margin; corpus bursae with posterior portion shorter, more slender, and with deeper striations; signum slightly smaller, 0.4 to 0.5 mm. in width, with shorter rays around margin. Apophyses posteriores 1.5 to 2.2 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, Alma, Santa Clara County, California, April 7, 1945; allotype, female, Mill Valley, Marin County, California, August 2, 1946 (F. H. Rindge). The genitalia of the holotype are mounted on slide F.H.R. No. 15408; those of the allotype on F.H.R. No. 15057. Paratypes, all from California: Lucas Valley, Marin County, 1937, one female; Spring Mountain, Sonoma County, July 24, 1938 (E. C. Johnston), one male (paratype of *P. campestraria* McDunnough), one female (allotype of

*P. campestraria* McDunnough); Santa Rosa, Sonoma County, June 26, 1937 (E. C. Johnston), one female (paratype of *P. campestraria* McDunnough); Anderson Springs, Lake County, July 2, 1950 (W. R. Bauer), one female; Laytonville, Mendocino County, August 3, 1949 (R. F. Sternitzky), one female; Ukiah, Mendocino County, July 2, 1965 (R. L. Langston), one female; Circle D Ranch, 5 miles north of Cloverdale, Mendocino County, July 12, 1958 (J. S. Buckett), one male; Yreka, Siskiyou County, July 15, 1963, one male, July 14, 26, 1961 (T. Callion), two females; Weimar, Placer County, July 12, 1932 (Fourness), one male; Webber Creek, near Camino, El Dorado County, June 25, 1959 (J. Powell), one male.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of the American Museum of Natural History, the California Department of Agriculture, the California Insect Survey, the Canadian National Collection, and the University of California, Davis.

DISTRIBUTION: The coastal region of central and northern California, ranging from Santa Clara to Mendocino and Siskiyou counties, and extending up the Sacramento River into the foothills of the Sierra Nevadas (see fig. 7).

TIME OF FLIGHT: April, June, July, and August.

REMARKS: A total of 15 specimens (six males and nine females) and eight genitalic dissections (five males and three females) have been studied.

#### *Pterotaea glauca*, new species

Figures 7, 30, 66, 98

This species is similar to *campestraria* in that both have short palpi and similar maculation, but *glauca* is grayer, and it has longer antennal pectinations in both sexes and more distinct maculation. The present species occurs in southern California and northwestern Baja California.

MALE: Head with vertex whitish gray, with blackish brown scales between bases of antennae; front blackish brown, with pale gray scaling ventrally; antennae with longest pectinations about 1.4 mm. in length; palpi short, projecting beyond front not more than one-third of length of eye, dark gray, with variable number

of blackish brown scales. Thorax and abdomen similar to those of *lamiaria*, but with more whitish gray scaling.

**UPPER SURFACE OF WINGS:** Forewings grayish white, with variable number of dark gray, grayish brown, and brownish black scales; maculation as in *lamiaria*, with considerable variation in strength of t. a. and t. p. lines, ranging from being weakly represented to very prominent; t. a. line tending to be more weakly represented than t. p. line in many specimens; both cross lines with brownish gray shade bands, outer one more prominent than inner; s. t. line white, sharply pointed basad on veins. Hind wings similar to those of *lamiaria*, but with extradiscal line tending to be somewhat more curved.

**UNDER SURFACE OF WINGS:** All wings pale gray, with scattered brownish gray scaling; discal dots present on all wings; without maculation except for traces of t. p. and extradiscal lines; terminal line present.

**LENGTH OF FOREWING:** 17 to 19 mm.; holotype, 18 mm.

**FEMALE:** Similar to male, but with upper surface without brown scaling.

**LENGTH OF FOREWING:** 16 to 20 mm.; allotype, 20 mm.

**MALE GENITALIA:** Similar to those of *campestraria* but differing mainly as follows: slightly larger; uncus with apex tending to be slightly broader and to have stronger apical points; each valve with costa tending to have longer and more slender raised apical area and with raised median swelling. Abdomen with ventral row of spines on third segment.

**FEMALE GENITALIA:** Similar to those of *campestraria* but differing mainly as follows: sterigma with ostium tending to be slightly wider and shorter, and with anterior sclerotized area tending to be of equal width throughout; ductus bursae with posterior portion wider and shorter, barely projecting beyond anterior sclerotized area of sterigma, and with anterior area longer, the two portions about equal in length; corpus bursae longer, particularly anterior membranous sac; signum larger, being 0.5 to 0.7 mm. in width, and having more numerous and often more slender rays around margin. Apophyses posteriores 1.7 to 2.3 mm. in length.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**TYPES:** Holotype, male, upper Santa Ana

River, San Bernardino County, California, July 29, 1948 (G. H. and J. L. Sperry); allotype, female, same data but August 30, 1948. The genitalia of the holotype are mounted on slide F.H.R. No. 8557; those of the allotype on F.H.R. No. 8600. Paratypes: California: *San Bernardino County*: Same data as types, various dates between July 11 and September 2, 1946–1948, 39 males and 28 females; Barton Flats, August 16, 1945 (G. H. and J. L. Sperry), one male; Lytle Creek, July 1, 1937 (G. H. and J. L. Sperry), one male; Forest Home, August 3, 1966 (M. W. Stone), one male; Big Bear Lake, July 13, 1967 (J. Wilcox), one male. *Los Angeles County*: Verdugo, March 3, 1926 (C. Hill), one female; 5 miles north of Beverly Hills, Santa Monica Mountains, elevation 1100 feet, June 25, 1956 (N. McFarland), one female; Topanga, elevation 1500 feet, various dates between June 8 and July 25, 1957–1958 (H. Notman), two males and 14 females; Crystal Lake, San Gabriel Canyon, August 3, 1946 (J. A. Comstock and L. M. Martin), one male and five females; Mt. Lowe, June 12–30, 1928, one female; Malibu, May 26, 1935 (R. H. Andrews and L. M. Martin), one female; Wrightwood, July 4, 1964 (R. H. Leuschner), one male; Buckhorn Flats, on Angeles Crest Highway, elevation 6400 feet, July 21, 1956 (R. H. Leuschner), one female; Manaker Flats, San Gabriel Mountains, August 23, 1933 (R. P. Minahan), one female. *Kern County*: Isabella, June 9, 1936 (E. C. Johnston), one female. *Santa Barbara County*: 1 mile northeast of San Marcos Pass, elevation 1500 feet, July 4, 19, 1965 (J. Powell), two females. *Riverside County*: Idyllwild, elevation 6000 feet, July 7, 1962 (R. H. Leuschner), one male. *San Diego County*: San Diego, June 14, 1924, July 10, two females; Descanso, July 13, 1947 (N. Crickmer), one female. Mexico: *Baja California*: Santo Tomas, July 8, 1953 (W. J. and J. W. Gertsch), one female; dam site, Arroyo Santo Domingo, 5.7 miles east of Hamilton Ranch, April 23, 1963 (H. B. Leech and P. H. Arnaud, Jr.), one male.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the California Academy of Sciences, of the California Insect Survey, of the Canadian National Collection, of the Los

Angeles County Museum of Natural History, of C. W. Kirkwood, and of R. H. Leuschner.

**DISTRIBUTION:** The foothills and mountains of southern California (Kern and Santa Barbara counties to San Diego County) and northwestern Baja California (see fig. 7).

**TIME OF FLIGHT:** From late June into early September. In addition, two specimens caught in March and April have been examined.

**REMARKS:** A total of 112 specimens (51 males and 61 females) and 10 genitalic dissections (four males and six females) have been studied.

This species is larger than the two preceding ones, and it is rather variable in maculation. Specimens in which the cross lines are very prominent tend to have a paler wing color than do those examples with less prominent maculation.

The genitalia of *glauca* and *campestraria* are very similar in both sexes. No sure way is known at this time to distinguish them in every dissection. The two are considered separate species because of the differences enumerated above; in addition, they both fly together at one of the Baja California localities.

***Pterotaea cavea*, new species**

Figures 7, 31, 99

This species is similar to *glauca*, but the upper surface of the wings is browner, the terminal line is heavier, and the outer margin of the wings is more deeply scalloped. The present species occurs in coastal southern California.

**MALE:** Unknown.

**FEMALE:** Head, thorax, and abdomen similar to those of *glauca*; palpi longer, projecting beyond front nearly three-fourths of length of eye, and rising to only one-fifth of height of eye; antennae shortly pectinate, with pectinations slightly longer than those of *glauca*.

**UPPER SURFACE OF WINGS:** Forewings grayish brown, with scattered pale gray and brownish gray scales, with wing becoming slightly darker in outer portion; maculation as in *glauca*, but with t. p. line appearing to be slightly more inwardly oblique; s. t. line less strongly indicated; terminal line black, conspicuous; fringe gray, darkened at vein endings. Hind wings similar to those of *glauca*, but with terminal line more strongly represented and with outer margin more deeply scalloped.

**UNDER SURFACE OF WINGS:** Similar to those

of *glauca* but browner; terminal line more strongly represented.

**LENGTH OF FOREWING:** 16 to 18 mm.; holotype, 18 mm.

**MALE GENITALIA:** Unknown.

**FEMALE GENITALIA:** Similar to those of *glauca* but differing mainly as follows: sterigma with ostium more tapered anteriorly, and with anterior sclerotized area more V-shaped; ductus bursae with posterior portion narrower, not extending beyond anterior sclerotized area of sterigma, and with anterior area more tapered; corpus bursae with posterior section narrower; signum smaller, 0.45 mm. in diameter. Papillae anales and posterior ends of apophyses posteriores missing in type specimen, but latter estimated to be about 2.0 mm. in length.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**TYPE:** Holotype, female, Figueroa Mountain, Santa Barbara County, California, June 30, 1965 (C. W. Kirkwood), and from the Kirkwood collection. The genitalia of the type are on slide F.H.R. No. 15461. Paratype: San Diego, San Diego County, California, June 13, 1937 (E. C. Johnston), one female. Two additional females from San Diego have been examined.

The holotype is in the collection of the American Museum of Natural History; the paratype is in the Canadian National Collection.

**DISTRIBUTION:** This species is known from coastal southern California (see fig. 7).

**TIME OF FLIGHT:** June.

**REMARKS:** A total of four specimens and one genitalic dissection have been studied.

The holotype has much heavier cross lines than does the somewhat rubbed and worn paratype.

***Pterotaea miscella*, new species**

Figures 7, 33, 67, 101

This species is similar to *glauca*, but there is more dark scaling on the upper surface of the wings, particularly in the median area of the forewing. It occurs in southern Nevada and eastern California.

**MALE:** Head, thorax, and abdomen similar to those of *glauca*, but with stronger banding on upper surface of abdomen; antennae with long-est pectinations 1.3 mm. in length.

UPPER SURFACE OF WINGS: Forewings grayish white, with numerous dark gray, grayish brown, and brownish black scales; maculation as in *glauca*, but with tendency for median area to be partially filled with brownish black scales; cross lines strongly represented in most specimens; t. p. line tending to have basal bend above inner margin. Hind wings similar to those of *glauca*.

UNDER SURFACE OF WINGS: Similar to those of *glauca*.

LENGTH OF FOREWING: 16 to 18 mm.; holotype, 18 mm.

FEMALE: Similar to male, but with less brown scaling; cross lines tending to be more weakly represented. Pectinations of antennae shorter and thicker than in *glauca*.

LENGTH OF FOREWING: 16 to 18 mm.; allotype, 16 mm.

MALE GENITALIA: Similar to those of *glauca* but differing mainly as follows: valves with terminal transverse portion of costa broader and more swollen apically, and without raised median swelling. Abdomen with ventral row of spines on third segment.

FEMALE GENITALIA: Similar to those of *glauca* but differing mainly as follows: sterigma with lateral margins of ostium more divergent posteriorly, and with narrow, slitlike incision anteriorly; ductus bursae with posterior portion equal in length to anterior part; corpus bursae with narrow posterior portion tending to be more definitely and more heavily sclerotized. Apophyses posteriores 2.2 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, Lee Canyon, 39 miles northwest of Las Vegas, Charleston Mountains, Clark County, Nevada, elevation 7400 feet, July 24, 1966 (F., P., and M. Rindge); allotype, female, Lee Canyon, 40 miles northwest of Las Vegas, Charleston Mountains, Clark County, Nevada, elevation 7500 feet, July 27, 1966 (F., P., and M. Rindge). The genitalia of the holotype are on slide F.H.R. No. 15446; those of the allotype, on F.H.R. No. 15261. Paratypes: Lee Canyon, 38–40 miles northwest of Las Vegas, Charleston Mountains, Clark County, Nevada, elevation 6900–7500 feet, July 23–29, 1966 (F., P., and M. Rindge), 14 males and 41 females; Tom's Place, Mono County, California, July 10, 1966 (R. H. Leuschner), one female; 1 mile west of Tom's Place, Mono

County, California, August 13, 1957 (J. Powell), one female; 1 mile southwest of Tom's Place, Mono County, California, August 10, 1963 (C. A. Toschi), August 13, 1963 (M. J. Tauber and C. A. Toschi), two males and one female; Rock Creek, Mono County, California, August 11, 1955 (W. A. Rees), one female.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the California Insect Survey, of C. W. Kirkwood, and of R. H. Leuschner.

DISTRIBUTION: Southern Nevada (Clark County) and eastern California (Mono County) (see fig. 7).

TIME OF FLIGHT: July and August.

REMARKS: A total of 72 specimens (17 males and 55 females) and six genitalic dissections (three males and three females) have been studied.

#### ***Pterotaeca systole*, new species**

Figures 7, 34, 68

This species can be distinguished from *miscella* by the more contrastingly colored upper surface of the forewings and by the more sinuous t. p. line. The present species occurs in the southern Sierra Nevada Range of California.

MALE: Head and thorax similar to those of *miscella*.

UPPER SURFACE OF WINGS: Wings shorter and broader than those of *miscella*; forewings whitish gray, with numerous dark gray, grayish brown, and brownish black scales in middle of median area and in outer portion of wing, leaving upper part of median area and lower subterminal area contrastingly whitish gray; maculation as in *miscella*, but with t. p. line having deeper basal bend below cubital vein, and with broad, two-colored brown shade band. Hind wings similar to those of *miscella*, but extradiscal line more sinuous.

UNDER SURFACE OF WINGS: Similar to those of *miscella* but with more brown scaling and with larger discal dots.

LENGTH OF FOREWING: 18 mm. (holotype).

FEMALE: Unknown.

MALE GENITALIA: Similar to those of *miscella* but differing mainly as follows: valves with terminal truncate portion of both costas more constricted medially; right costa with three long,



one medium, and one short spines; left costa with five long spines; aedeagus slightly longer; vesica with larger number of shorter spines.

FEMALE GENITALIA: Unknown.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPE: Holotype, male, Smoky Valley, Tulare County, California, June 18, 1954 (C. Ingham and C. Henne); from the collection of C. W. Kirkwood. The genitalia of the type are mounted on slide C.W.K. No. 1925.

The holotype is in the collection of the American Museum of Natural History.

DISTRIBUTION: This species is known only from the type locality near the southern end of the Sierra Nevada Range, in Tulare County, California (see fig. 7).

TIME OF FLIGHT: June.

REMARKS: One specimen and one genitalic dissection have been studied.

The abdomen has not been examined, as this was discarded when the genitalia were dissected. We do not know whether or not the bristle comb on the ventral surface of  $A_3$  is present, so the placement of the species in the second subgroup is not definite. The species has been placed there primarily because of the similarity of its male genitalia to those of both the preceding and following species.

***Pterotaea euroa*, new species**

Figures 7, 35, 69, 102

This species is similar to *miscella*, but there is less dark scaling on the upper surface of the wings. It occurs in western Utah and eastern Nevada.

MALE: Head, thorax, and abdomen similar to those of *miscella*; antennae with longest pectinations 1.3 mm. in length.

UPPER SURFACE OF WINGS: Forewings whitish gray, with some grayish brown and brownish black scaling; maculation as in *miscella*, but median area tending not to be darkened, and cross lines narrower, with t. p. line more broadly shaded outward by brown band; s. t. line with distal dark gray shading. Hind wings similar to those of *miscella*, but with extradiscal line tending to be thinner.

UNDER SURFACE OF WINGS: Similar to those of *miscella*, but with t. p. line represented in anterior portion of wing.

LENGTH OF FOREWING: 17 to 18 mm.; holotype, 17 mm.

FEMALE: Similar to male but with less brown scaling; cross lines tending to be more weakly represented. Pectinations of antennae similar to those of *miscella*.

LENGTH OF FOREWING: 16 to 18 mm.; allotype, 18 mm.

MALE GENITALIA: Similar to those of *campestraria* but differing mainly as follows: slightly larger; valves with raised posterodistal area of costa extending toward costa and then curving anteriorly, distal portion swollen approximately twice as wide as median curved area, and bearing from six to 12 anterodistally directed spines terminally, with left side tending to have more spines than right side; vesica with spines tending to be slightly longer. Abdomen with ventral row of bristles on third segment.

FEMALE GENITALIA: Similar to those of *campestraria* but differing mainly as follows: sterigma with anterior sclerotized margin slightly longer, with posterior ends tending to be weakly out-curved; corpus bursae with posterior portion tending to be slightly longer and slightly thinner; signum about 0.5 mm. in width, tending to be rounded, with shorter rays and with smaller median aperture. Apophyses posteriores 2.3 to 2.4 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, Eureka, Juab County, Utah, August 14, 1911 (T. Spalding); allotype, female, same data but August 18, 1911. The genitalia of the holotype are on slide F.H.R. No. 3537; those of the allotype on F.H.R. No. 3634. Paratypes: Same data as types, August 1, 22, 1911, two females; Loop Camp, 13 miles southwest of Grantsville, Tooele County, Utah, elevation 7400 feet, July 20, 1958 (F., P., and J. Rindge), one male; Pequop Mountains, Elko County, Nevada, August 3, 1934 (G. H. and J. L. Sperry), one female; Baker Creek Camp, 8 miles west of Baker, White Pine County, Nevada, elevation 7700 feet, August 3, 1966 (F., P., and M. Rindge), one female.

All the type material is in the collection of the American Museum of Natural History.

DISTRIBUTION: Eastern Nevada and western Utah (see fig. 7).

TIME OF FLIGHT: July and August.

REMARKS: A total of seven specimens (two

males and five females) and five genitalic dissections (two males and three females) have been studied.

Adequate comparisons with the preceding species, particularly *miscella*, are hampered by the lack of series of specimens. The male genitalia of *euroa* are comparatively distinct for a species in this complex, as they can be recognized by the more spinose area at the end of the costa in the valve.

The present species can be distinguished from *systole* by the more uniformly colored upper surface of the wings and by the straighter t. p. line.

***Pterotaeta lira*, new species**

Figures 8, 36, 70, 103

This species is the first of the third subgroup. The included species have the t. p. line paralleling the outer margin and a strong basal bend above the inner margin; the medioventral row of bristles on the third abdominal segment is lacking. The present species can be recognized by its long palpi and by the pale color of the upper surface of the wings. It occurs in southern California.

MALE: Head with vertex white, with band of blackish brown scales between bases of

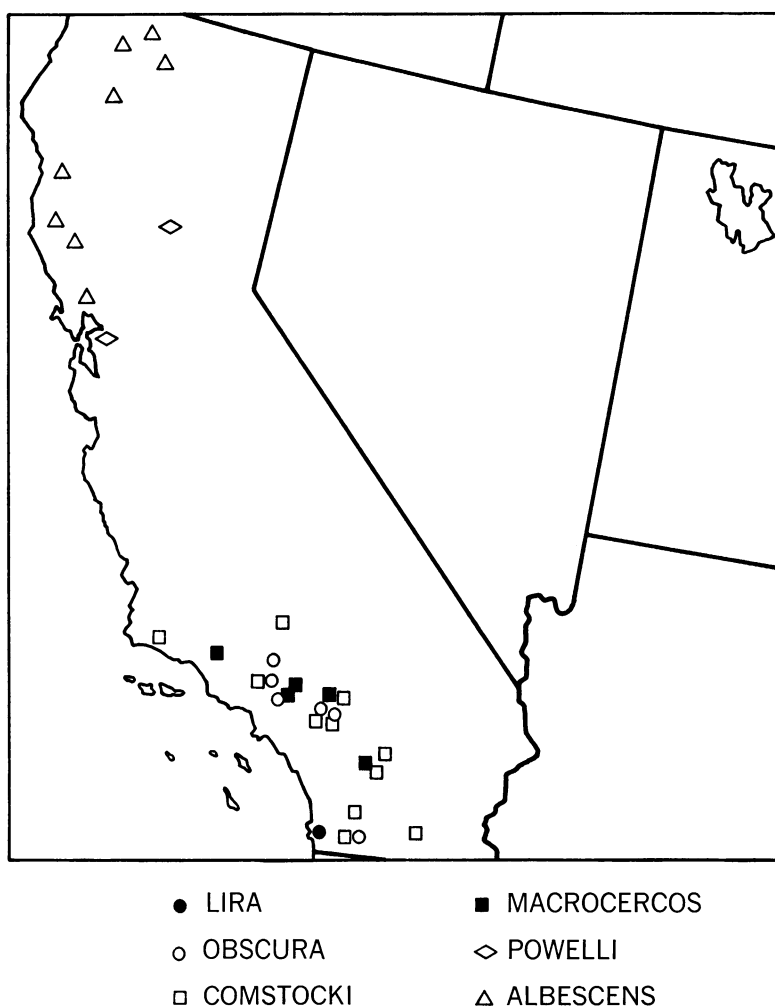


FIG. 8. Distribution of *Pterotaeta lira*, new species, *P. obscura*, new species, *P. comstocki*, new species, *P. macrocercos*, new species, *P. powelli*, new species, and *P. albescens* McDunnough.

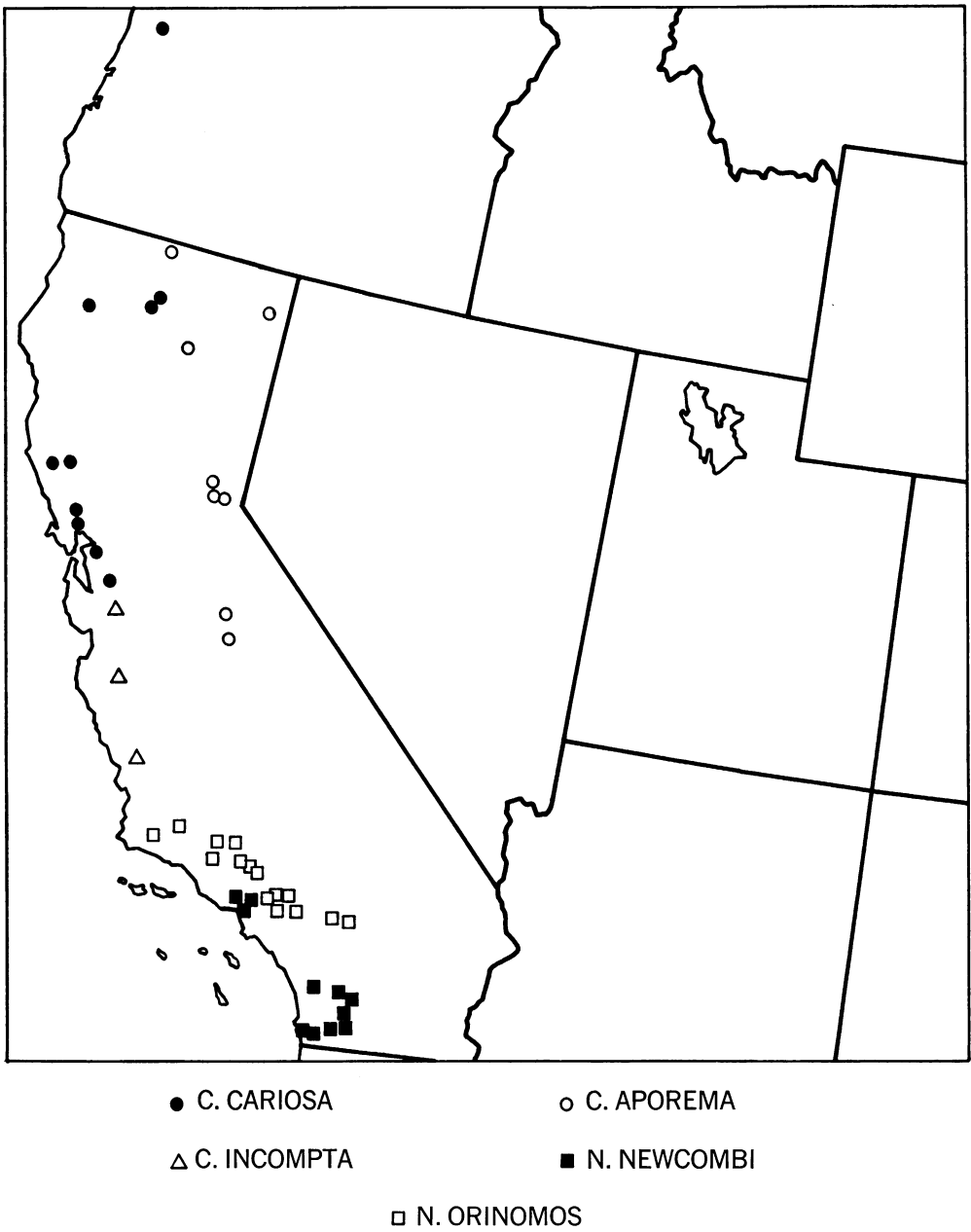


FIG. 9. Distribution of *Pterotaea cariosa* Hulst and *P. newcombi* (Swett).

antennae; front with mixture of whitish gray and brownish black scales; antennae with longest pectinations 1.2 mm. in length; palpi rising to about middle of eye, extending beyond front a distance equal to one-half of length of eye, and covered with mixture of pale gray and dark

brown scales. Thorax white or whitish gray above, with broad blackish brown band on collar, and with narrow dark band crossing patagia in some specimens; with posterior paired tufts; below whitish; legs pale buff, with dark brown scaling on forelegs, and with scattered

paler brown scales on other legs. Abdomen whitish gray, tending to have darker scaling on posterior portion of segments above.

**UPPER SURFACE OF WINGS:** All wings broad, with scalloped outer margins; forewings whitish gray, with grayish brown and dark brown scales; cross lines brownish black, slender, tending to be obsolescent or represented by venular dots in upper portion of wing; t. a. line arising as large dark spot on costa one-third of distance from base, extending outward into cell, with remainder of line weakly represented, and with trace of pale brown, basal shade band; discal dot present; median shade line varying from obsolescent to complete, near t. p. line; t. p. line paralleling outer margin, represented by venular dots in upper portion of wing, with strong basal bend above inner margin, and with pale brown or grayish brown distal shade band; subterminal area with white patch above inner margin; s. t. line white, pointed inward on veins, shaded with brownish gray basally in center of wing and distally near apical angle; terminal line black or brownish black, with small intravenular dots; fringe whitish, broadly darkened at vein endings. Hind wings concolorous with forewings, and with same type of maculation; basal line weakly represented in some specimens; intradiscal line absent; median shade line present in lower portion of wing; discal dot present; extradiscal line weakly represented, not reaching costal margin, and followed by narrow band of ground color and wider band of grayish brown; s. t. line and outer portion of wing similar to those of forewing.

**UNDER SURFACE OF WINGS:** Forewings pale grayish brown; hind wings pale gray; without maculation except for all discal dots and dark, slender, terminal line.

**LENGTH OF FOREWING:** 16 to 18 mm.; holotype, 17 mm.

**FEMALE:** Similar to male, but tending to have

less brown scaling, and to have weaker maculation.

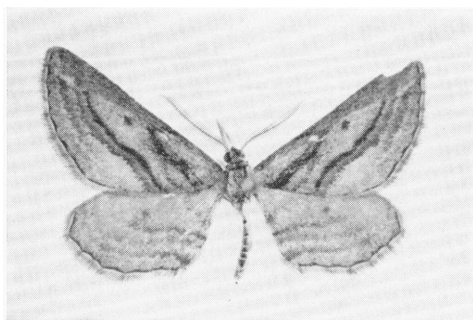
**LENGTH OF FOREWING:** 16 mm. (allotype).

**MALE GENITALIA:** Uncus with elongate, slender apex, in length about two-fifths of length of entire uncus, and with posterior end bilobed, concave between; gnathos with slender, slightly swollen, finely spinulate, terminally truncate, median enlargement; valves with costal area occupying almost two-thirds of inner face of valve, posterodistal area not raised, and with single row of from four to five heavy, anterodistally pointed spines, varying from being alike on both valves to having one or two smaller spines on right valve than on left; sacculus broadly sclerotized, and with small raised ridge; cristae numbering about 25 on each side, very slender, in length slightly longer than maximum width of aedeagus; juxta broad anteriorly, weakly constricted medially, rounded apically; aedeagus longer than combined lengths of uncus, tegumen, and saccus, very slender, weakly swollen medially, and with pointed posterior end; vesica with two overlapping, linearly arranged groups of short spines, anterior group with elongate, basal, flattened piece and with from four to six thick spines, decreasing in size posteriorly, and with posterior group having more numerous, more closely grouped, and thinner spines. Abdomen without medioventral row of bristles on third segment.

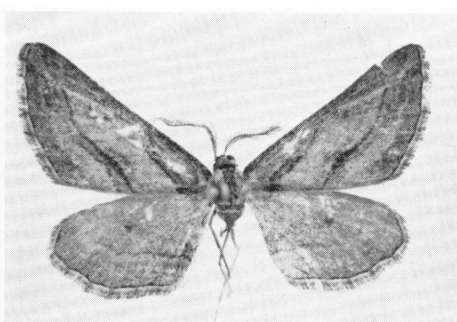
**FEMALE GENITALIA:** Similar to those of *lamia* but differing mainly as follows: sterigma with areas laterad of ostium more heavily sclerotized; ostium larger, evenly tapering anteriorly, and with larger anterolateral areas; anterior margin of sterigma slightly narrower; corpus bursae with sclerotized posterior portion enlarged dorsally, weakly curved, relatively short, 0.85 mm. in length, and with membranous anterior portion tending to be pointed caudally, 1.6 mm. in length; signum slightly larger, 0.5

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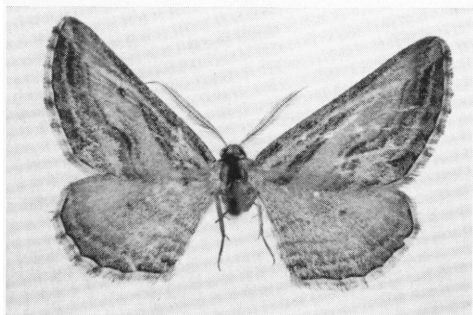
FIGS. 10-17. Males. 10. *Hulstina formosata* (Hulst), Monument Valley, Utah, June 20, 1949 (N. Crickmer; A.M.N.H.). 11. *Hulstina imitatrix imitatrix*, new subspecies, holotype, Kingston Camp, Nevada, July 15, 1966 (F., P., and M. Rindge; A.M.N.H.). 12. *Hulstina imitatrix fulva*, new subspecies, holotype, Coleville, California, July 16, 1948 (R. Coleman; A.M.N.H.). 13. *Hulstina tanyraeros tanyraeros*, new subspecies, holotype, Smoky Valley, California, June 22, 1947 (C. Ingham; A.M.N.H.). 14. *Hulstina tanyraeros deserta*, new subspecies, holotype, Bailey Peak, California, July 4, 1940 (C. Henne; L.A.M.). 15. *Hulstina aridata* Barnes and Benjamin, Granite Well, California, May 24, 1939 (G. H. and J. L. Sperry; A.M.N.H.). 16. *Hulstina xera*, new species, holotype, Alturas, California, August 3, 1948 (R. Coleman; A.M.N.H.). 17. *Hulstina grossbecki*, new species, holotype, Rancho La Sierra, California, May 21, 1949 (A. H. Rindge; A.M.N.H.). All  $\times 1.5$ .



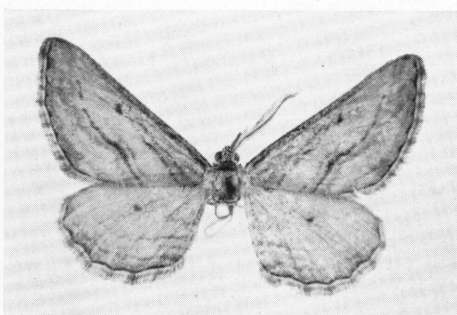
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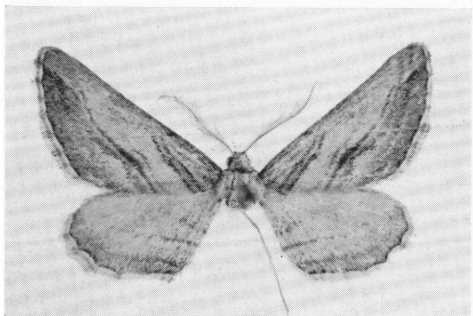
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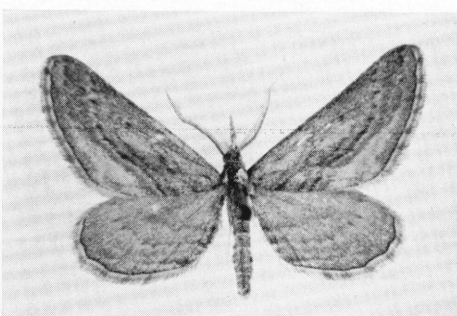
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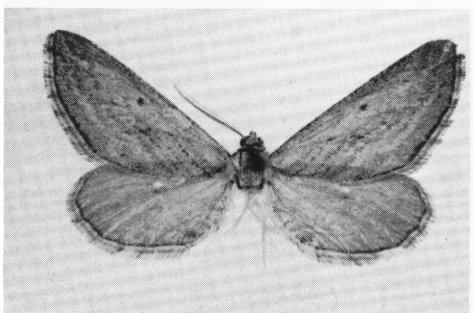
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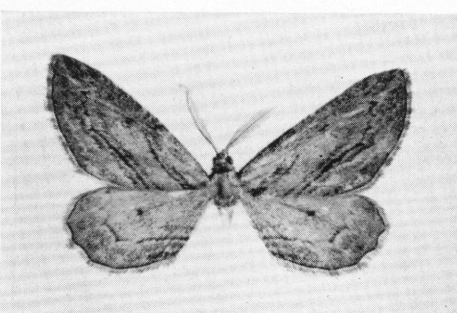
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15



16



17

mm. wide, round, with more numerous rays. Apophyses posteriores 2.6 mm. in length.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, San Diego, San Diego County, California, June 3, 1911 (Geo. H. Field); allotype, female, also San Diego, California, June 28, 1924. The genitalia of the holotype are mounted on slide F.H.R. No. 3469; those of the allotype, on F.H.R. No. 15481. Paratypes: All from San Diego, California, June 5, 7, 1911 (Ricksecker), May 10, 1920 (K. R. Coolidge), and June 11, 1924, four males.

The holotype is in the collection of the American Museum of Natural History, and the allotype is in that of the Los Angeles County Museum of Natural History; paratypes are in the collections of those two institutions.

DISTRIBUTION: This species is known only from San Diego County in southern California (see fig. 8).

TIME OF FLIGHT: May and June.

REMARKS: A total of six specimens (five males and one female) and three genitalic dissections (two males and one female) have been studied.

***Pterotaea obscura*, new species**

Figures 8, 37, 71, 104

This species has shorter palpi than *lira*, and the upper surface of the wings is a grayish brown with obscure maculation. It occurs in southern California.

MALE: Head with vertex pale gray, with band of blackish brown scales between bases of antennae; front with mixture of gray and brownish black scales; antennae with longest pectinations 1.3 mm. in length; palpi rising to one-sixth of height of eye, extending beyond front distance equal to two-fifths of length of eye, and covered with mixture of gray and dark brown scales. Thorax pale gray above, with brownish gray band on collar; patagia with hairlike and elongate, spatulate-tipped scales; with posterior

paired tufts; below pale buff; legs pale buff to pale gray, with dark brown scaling on forelegs, and with scattered paler brown scaling on other legs. Abdomen gray, with dark brown scaling at ends of segments above; paler below.

UPPER SURFACE OF WINGS: All wings broad, with scalloped outer margins; forewings unicolorous grayish brown; cross lines obsolescent but with t. p. line usually weakly represented; discal dot present; s. t. line pale, weakly indicated, at least in lower portion of wing; terminal line brownish black, with small intravenular dots; fringe concolorous with wing, darkened at vein endings. Hind wings concolorous with forewings, and with obsolescent maculation; discal dot present; outer portion of wing similar to that of forewing.

UNDER SURFACE OF WINGS: All wings brownish gray; without maculation except for discal dots and dark, slender, terminal line.

LENGTH OF FOREWING: 14 to 16 mm.; holotype, 15 mm.

FEMALE: Similar to male, but with slightly browner upper surface, and with weaker maculation; antennae shortly pectinate.

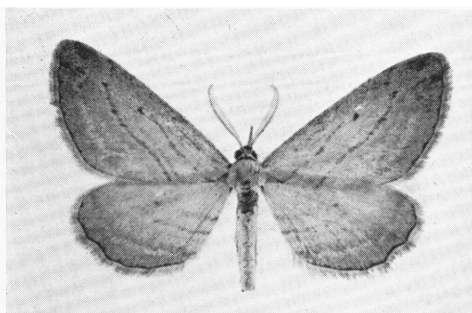
LENGTH OF FOREWING: 14 to 17 mm.; allotype, 16 mm.

MALE GENITALIA: Similar to those of *lira* but differing mainly as follows: valves with four spines on right side and with three or four spines on left side; vesica with variable number of spines in anterior group, ranging from about six to 12. Abdomen without ventral row of bristles on third segment.

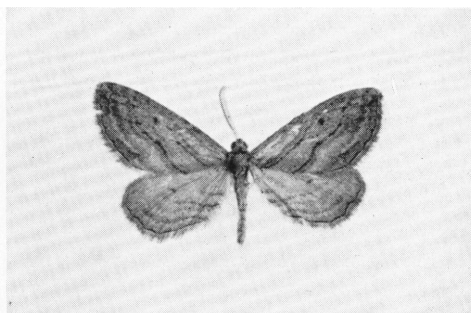
FEMALE GENITALIA: Similar to those of *lira* but differing mainly as follows: ostium with smaller sides; corpus bursae with posterior sclerotized portion shorter, ranging from 0.70 to 0.85 mm. in length, averaging 0.75 mm., with anterior portion 1.6 to 2.1 mm. long, averaging 1.8 mm.; signum smaller, ranging from 0.35 to 0.45 mm. across, averaging 0.40 mm.

EARLY STAGES: Unknown.

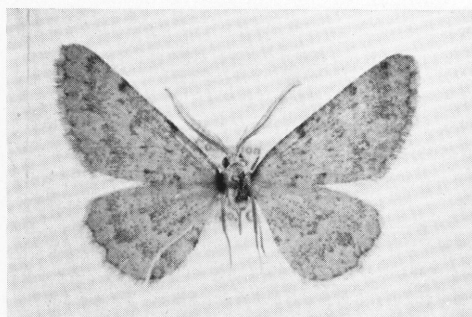
FIGS. 18-25. Males. 18. *Hulstina exhumata* Swett, San Diego, California, May 21, 1911 (G. H. Field; A.M.N.H.). 19. *Hulstina wrightiaria* (Hulst), San Diego, California, May 25, 1911 (L. E. Ricksecker; A.M.N.H.). 20. *Pterotaea crickmeri* (Sperry), holotype, Borrego, California, March, 1946 (N. Crickmer; A.M.N.H.). 21. *Pterotaea salvatierrai*, new species, holotype, 10 miles south of Santa Rosalia, Baja California, February 18, 1966 (V. Roth; A.M.N.H.). 22. *Pterotaea crinigera*, new species, holotype, San Clemente Island, California, April 4, 1939 (L.A.M.). 23. *Pterotaea sperryae* McDunnough Split Rock Tank, California, May 19, 1938 (G. H. and J. L. Sperry; A.M.N.H.). 24. *Pterotaea leuschneri*, new species, holotype, Bob's Gap, California, May 29, 1968 (R. H. Leuschner; A.M.N.H.). 25. *Pterotaea plagia*, new species, holotype, Pinyon Crest, California, June 10, 1967 (R. H. Leuschner; A.M.N.H.). All  $\times 1.5$ .



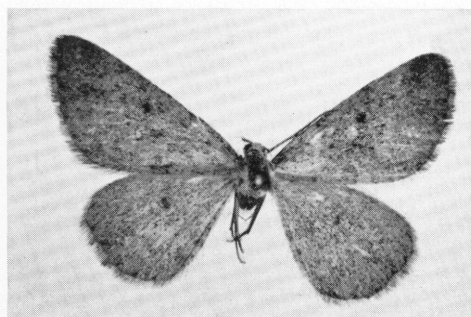
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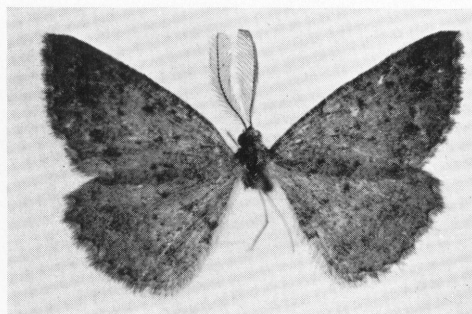
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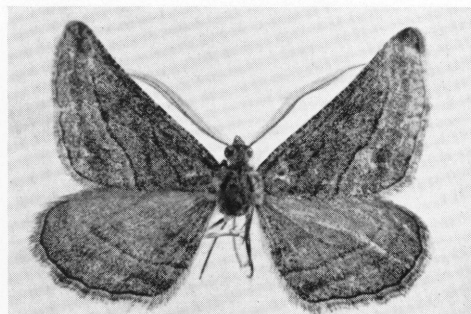
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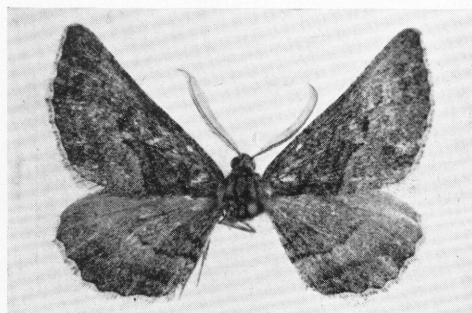
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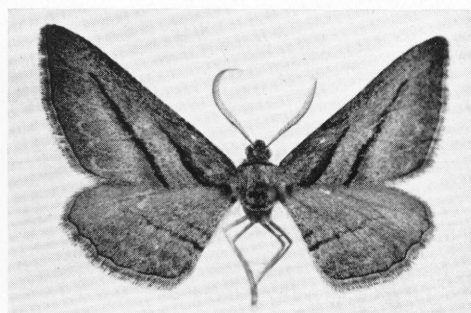
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25



FOOD PLANT: Oak, according to two specimens in the collection of the Los Angeles County Museum of Natural History.

Types: Holotype, male, and allotype, female, Guatay, San Diego County, California, July 9, 1953 (W. J. and J. W. Gertsch). The genitalia of the holotype are mounted on slide F.H.R. No. 5209; those of the allotype on F.H.R. No. 15489. Paratypes, all from California: *San Diego County*: Same data as types, three males and one female. *San Bernardino County*: Lytle Creek, July 1, 2, 1937 (G. H. and J. L. Sperry), four females; Rimforest, July 11, 1959 (R. H. Leuschner), three females. *Los Angeles County*: Lake Hodges, July 12, 1938 (J. C. von Bloeker, Jr.), two females; Mt. Wilson, August 5, 1923, one female; Bouquet Canyon, July 8, 1945, one female; Bouquet Canyon, larva on oak, emerged June 10, 16, 1939 (J. A. Comstock), two females.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the Los Angeles County Museum of Natural History, and of the Canadian National Collection.

DISTRIBUTION: The foothills and mountains of southern California, from Los Angeles County south to San Diego County (see fig. 8).

TIME OF FLIGHT: June (reared specimens in laboratory), July, and August.

REMARKS: A total of 19 specimens (four males and 15 females) and 10 genitalic dissections (three males and seven females) have been studied.

***Pterotaeta comstocki*,<sup>1</sup> new species**

Figures 8, 38, 72, 105

*Pterotaeta serrataria* BARNES AND McDUNNOUGH, 1916a, p. 28 (*partim*).

<sup>1</sup>I take pleasure in naming this species in honor of my long-time friend Dr. John A. Comstock, of Del Mar California.

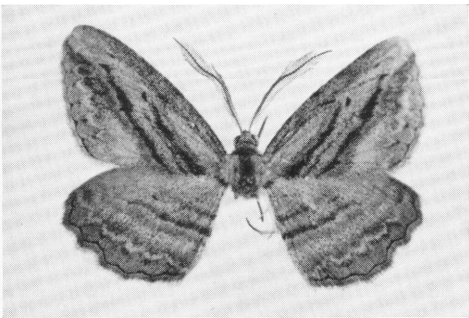
*Pterotaeta melanocarpa* auct.: COMSTOCK, 1937, p. 112, pl. 46 (larva).

This species is similar to *obscura*, but the palpi are longer, the upper surface of the wings is browner, and the maculation is more clearly represented. It occurs in southern California.

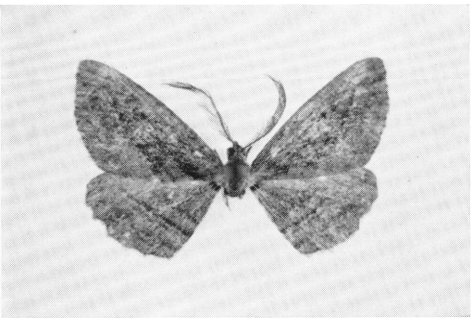
MALE: Head with vertex having mixture of gray and brownish black scales, and with band of blackish brown scales between bases of antennae; front with mixture of gray and brownish black scales; antennae with longest pectinations 1.3 mm. in length; palpi rising to one-third of height of eye, extending beyond front distance equal to one-half to two-thirds of length of eye, and covered with mixture of grayish brown and brownish black scales. Thorax grayish brown above, with blackish brown band on collar; patagia having numerous hairlike scales and indistinct dark cross band; with poorly defined posterior tufts; below pale buff; legs pale buff to pale gray, with dark brown scaling on forelegs, and with scattered paler brown scaling on other legs. Abdomen dark gray above, with broad blackish brown scaling posteriorly on each segment; paler below.

UPPER SURFACE OF WINGS: All wings broad, with scalloped outer margins; forewings brownish gray, with numerous grayish white, dark grayish brown, and blackish brown scales; cross lines black, narrow, complete except for upper part of t. p. line; course of lines as in *lira*; discal dot weakly represented; median shade line obsolescent; t. p. line with broad, dark brownish gray shade band; subterminal area narrowly whitish gray above inner margin; s. t. line pale gray, shaded basally by dark gray in center of wing; terminal line black, with small intravenular spots; fringe narrowly pale at base, then concolorous with wing, darkened at vein endings. Hind wings concolorous with forewings, and with same type of maculation; basal line

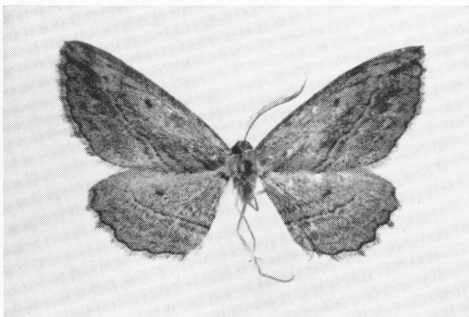
FIGS. 26-33. Males and females. 26. *Pterotaeta lamiaria lamiaria* (Strecker), male, San Diego, California, July 7, 1920 (K. R. Coolidge; A.M.N.H.). 27. *Pterotaeta lamiaria tythos*, new subspecies, holotype male, Owens Valley, California, August 10, 1955 (W. A. Rees; L.A.M.). 28. *Pterotaeta campestraria* McDunnough, male, Santo Tomas, Baja California, July 8, 1953 (W. J. and J. W. Gertsch; A.M.N.H.). 29. *Pterotaeta succurva*, new species, holotype male, Alma, California, April 7, 1945 (A.M.N.H.). 30. *Pterotaeta glauca*, new species, holotype male, upper Santa Ana River, California, July 29, 1948 (G. H. and J. L. Sperry; A.M.N.H.). 31. *Pterotaeta cavea*, new species, holotype female, Figueroa Mountain, California, June 30, 1965 (C. W. Kirkwood; A.M.N.H.). 32. *Pterotaeta succurva*, new species, allotype female, Mill Valley, California, August 2, 1946 (F. H. Rindge; A.M.N.H.). 33. *Pterotaeta miscella*, new species, holotype male, Lee Canyon, Nevada, July 24, 1966 (F. P., and M. Rindge; A.M.N.H.). All  $\times 1.5$ .



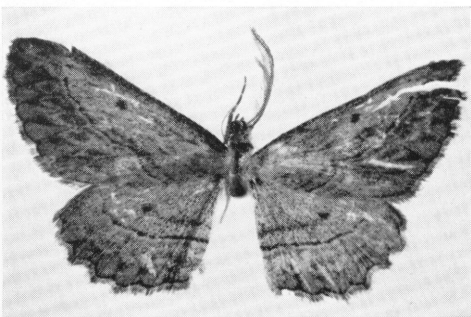
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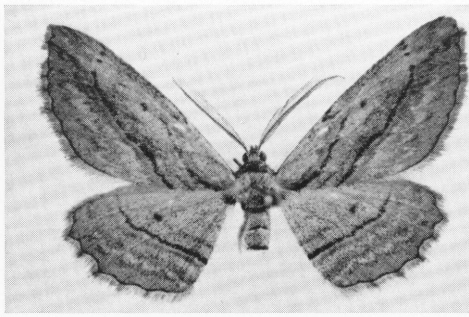
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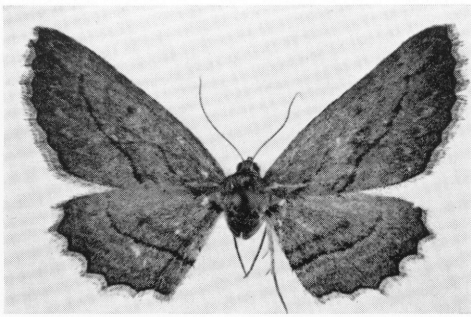
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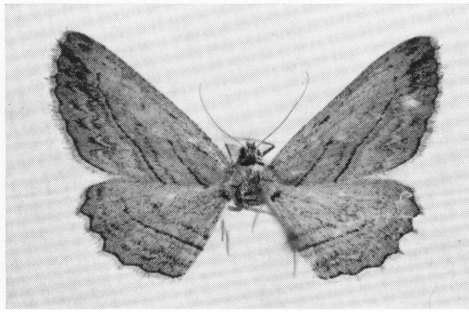
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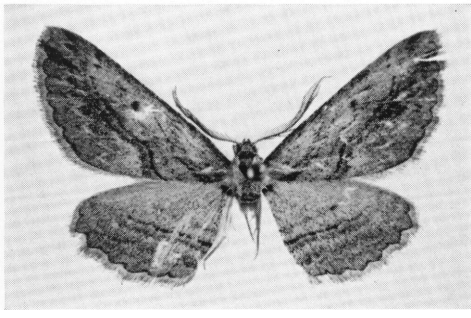
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present; intradiscal line absent; median shade band and discal dot present; extradiscal line present, but not on anterior portion of wing, followed by brownish gray shade band; outer portion of wing similar to that of forewing.

UNDER SURFACE OF WINGS: Forewings light brownish gray; hind wings pale gray; without maculation except for discal spots and dark, slender, terminal line.

LENGTH OF FOREWING: 13 to 17 mm.; holotype, 15 mm.

FEMALE: Similar to male, but with upper surface of wings tending to be slightly grayer; antennae shortly pectinate.

LENGTH OF FOREWING: 13 to 16 mm.; allotype, 15 mm.

MALE GENITALIA: Similar to those of *lira* but differing mainly as follows: valves with four (rarely three) large spines on right side and with three or four large spines on left side, both sides with or without smaller terminal spine; vesica with from eight to 12 spines in anterior group. Abdomen without ventral row of bristles on third segment.

FEMALE GENITALIA: Similar to those of *lira* but differing mainly as follows: ostium slightly wider, with deep cleft in ventral wall; corpus bursae with posterior sclerotized portion longer, ranging from 0.9 to 1.0 mm. in length, averaging 0.95 mm., with anterior portion 1.8 mm. long; signum 0.45 mm. across.

EARLY STAGES: The mature larva and pupa were described by Comstock (1937), and the former was illustrated.

FOOD PLANT: Comstock reared his material from oak. The present author reared the types from *Quercus dumosa* Nuttall.

TYPES: Holotype, male, Pinyon Flat, San Jacinto Mountains, Riverside County, California, emerged June 12, 1941 (F. H. Rindge); allotype, female, same data, emerged June 13, 1941; both specimens are from the author's

collection. The genitalia of the holotype are mounted on slide F.H.R. No. 15556; those of the allotype on F.H.R. No. 15479. Paratypes, all from California: *Riverside County*: Same data as types, emerged June 15, 1941, one male; Pinyon Crest, elevation 4200 feet, May 30, 1969 (R. H. Leuschner), one male; Palm Springs, June 10, 1937 (E. C. Johnston), one male and one female. *San Diego County*: Guatay, July 9, 1953 (W. J. and J. W. Gertsch), one male. *Imperial County*: Niland, June 9, 1937 (E. C. Johnston), two males. *San Bernardino County*: Cajon Valley, June 30, 1939 (G. H. and J. L. Sperry), one male; Lytle Creek, July 1, 1937 (G. H. and J. L. Sperry), one male; Baldy Mesa, near Cajon Pass, June 13, 1937 (L. M. Martin), one male. *Los Angeles County*: Tehachapi, July, one male; Bouquet Canyon, larva on oak, emerged June 17-30, 1937 (J. A. Comstock), eight males and eight females. *Kern County*: Above Kernville, on Kern River, elevation 4000 feet, June 22, 1957 (R. H. Leuschner), one male. *Santa Barbara County*: Figueroa Mountain, June 22 to July 7, 1965 (C. W. Kirkwood), 15 males and five females.

The specimen of *serrataria* Barnes and McDunnough bearing the "type ♂" label is a dark, contrastingly colored example of this species. This moth is in the collection of the United States National Museum.

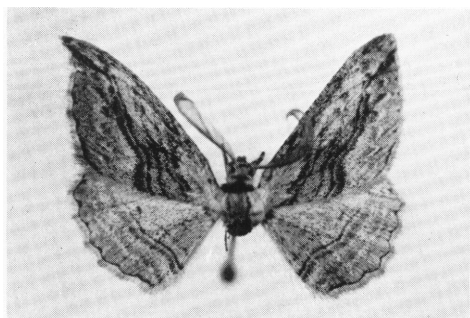
The holotype and allotype are in the American Museum of Natural History; paratypes are in the collections of that institution, of the Los Angeles County Museum of Natural History, of the Canadian National Collection, of the University of California, Davis, of C. W. Kirkwood, and of R. H. Leuschner.

DISTRIBUTION: The foothills and mountains of southern California, from San Diego and Imperial counties north to Santa Barbara and Kern counties (see fig. 8).

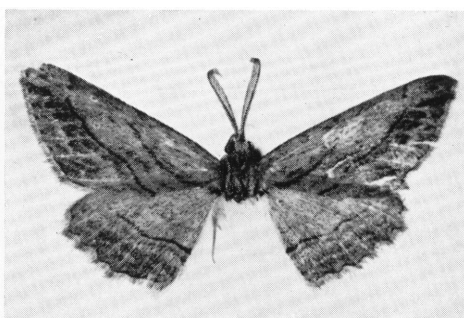
TIME OF FLIGHT: June and July.

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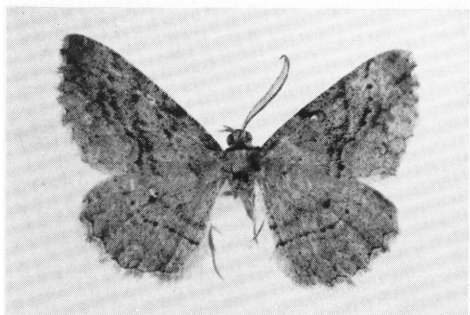
FIGS. 34-41. Males and females. 34. *Pterotaea systole*, new species, holotype male, Smoky Valley, California, June 18, 1954 (C. Ingham and C. Henne; A.M.N.H.). 35. *Pterotaea euroa*, new species, holotype male, Eureka, Utah, August 14, 1911 (T. Spalding; A.M.N.H.). 36. *Pterotaea lira*, new species, holotype male, San Diego, California, June 3, 1911 (G. H. Field; A.M.N.H.). 37. *Pterotaea obscura*, new species, holotype male, Guatay, California, July 9, 1953 (W. J. and J. W. Gertsch; A.M.N.H.). 38. *Pterotaea comstocki*, new species, holotype male, Pinyon Flat, California, June 12, 1944 (F. H. Rindge; A.M.N.H.). 39. *Pterotaea macroceros*, new species, holotype female, Camp Ozena, California, July 7, 1964 (C. W. Kirkwood; A.M.N.H.). 40. *Pterotaea powelli*, new species, paratype male, Walnut Creek, California, June 13, 1961 (J. Powell; A.M.N.H.). 41. *Pterotaea albescentis* McDunnough, male, near Douglas City, California, July 24, 1937 (J. A. Comstock; L.A.M.). All  $\times 1.5$ .



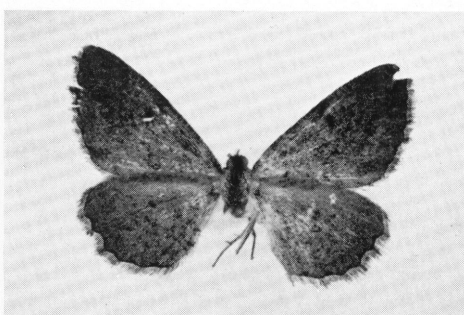
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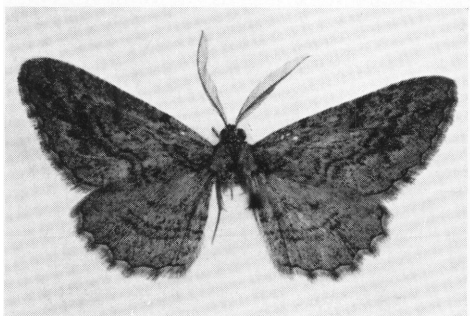
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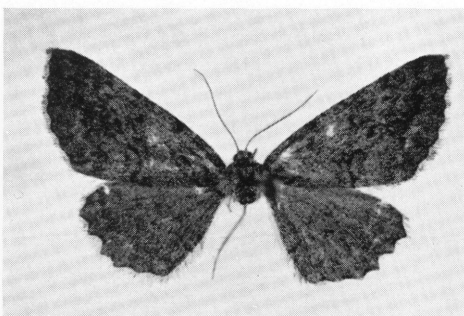
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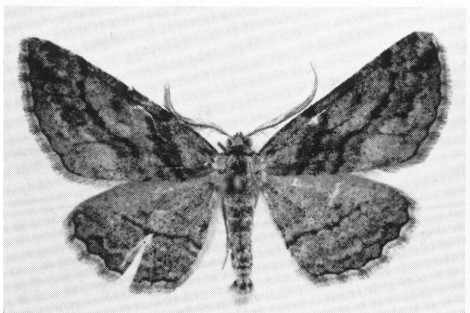
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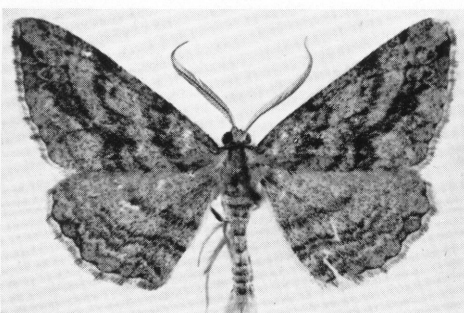
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REMARKS: A total of 51 specimens (36 males and 15 females) and 13 genitalic dissections (nine males and four females) have been studied.

This species occurs in several places together with *obscura*, and both species have caterpillars that feed on oak. There appear to be sufficient differences between the two to recognize them as distinct species, although it is not always easy to separate the two.

The specimens from Santa Barbara County are slightly larger, tend to be darker, and to have less well-defined maculation than the moths from the more southern localities.

***Pterotaea macrocercos*, new species**

Figures 8, 39, 73, 106

This species can be separated from the preceding ones by the longer pectinations of the female antennae and by the longer sclerotized portion of the corpus bursae. It also occurs in southern California.

MALE: Head, thorax, and abdomen similar to those of *comstocki*; palpi rising to one-fourth of height of eye, extending beyond front a distance equal to two-thirds of length of eye.

UPPER SURFACE OF WINGS: All wings broad, with scalloped outer margins; forewings brownish gray, with grayish white, dark grayish white, dark grayish brown, and blackish brown scales, appearing slightly browner and more evenly colored than *comstocki*; cross lines black, narrow, tending to be weakly represented in anterior portion of wing, and with t. p. line tending to have less of basal curve in lower part than in *comstocki*; discal dot and median shade line weakly represented; t. p. line with outer brown or grayish brown shade band not prominent; subterminal area with whitish gray area above inner margin weakly represented or absent; s. t. line pale gray, shaded basally by dark gray; terminal line narrowly black, with small intravenular spots; fringe narrowly pale at base, then

concolorous with wing, darkened at vein endings. Hind wings concolorous with forewings, and with same type of maculation; basal line present; intradiscal line absent; median shade band and discal dot present; extradiscal line present, but not on anterior portion of wing, followed by grayish brown shade band; outer portion of wing similar to that of forewings.

UNDER SURFACE OF WINGS: All wings pale grayish brown; without maculation except for discal spots and dark, slender, terminal line.

LENGTH OF FOREWING: 14 to 16 mm.; allotype, 16 mm.

FEMALE: Similar to male, but with upper surface of wings tending to be slightly grayer; antennae moderately pectinate, the pectinations about twice as long as in *comstocki*.

LENGTH OF FOREWING: 15 to 16 mm.; holotype, 16 mm.

MALE GENITALIA: Similar to those of *lira* but differing mainly as follows: slightly larger; gnathos with end of median enlargement more rounded; valves with four large spines on right side and four, rarely five, large spines on left side, both sides with or without smaller terminal spine; vesica with from nine to 11 spines in anterior group. Abdomen without ventral row of bristles on third segment.

FEMALE GENITALIA: Similar to those of *lira* but differing mainly as follows: ostium larger, more rounded; corpus bursae with posterior sclerotized portion longer, ranging from 1.25 to 1.55 mm. in length, averaging 1.45 mm., and with anterior portion 2.0 to 2.6 mm. in length, averaging 2.2 mm.; signum 0.55 mm. across.

EARLY STAGES: Unknown.

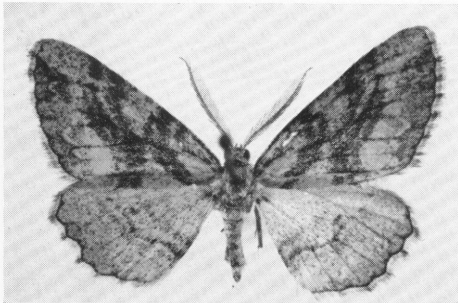
FOOD PLANT: Unknown.

TYPES: Holotype, female, Camp Ozena, upper Cuyama Valley, Ventura County, California, July 7, 1964 (C. W. Kirkwood); allotype, male, same data but July 13, 1964; both specimens are from the Kirkwood collection. The

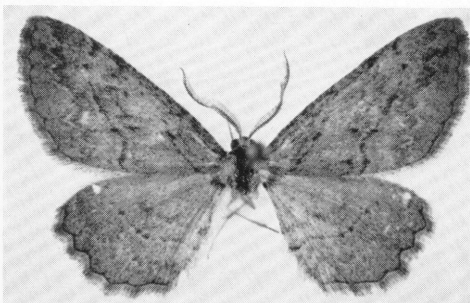
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FIGS. 42-48. Males and females. 42. *Pterotaea melanocarpa melanocarpa* (Swett), male, Mt. Lowe, California, June 12-30, 1928 (A.M.N.H.). 43. *Pterotaea melanocarpa opaca*, new subspecies, holotype male, Camp Ozena, California, June 25, 1963 (C. W. Kirkwood; A.M.N.H.). 44. *Pterotaea cariosa cariosa* Hulst, type female, California (A.M.N.H.). 45. *Pterotaea cariosa incompta*, new subspecies, holotype male, San Antonio Ranger Station, California, July 19, 1948 (R. van den Bosch; A.M.N.H.). 46. *Pterotaea cariosa aporema*, new subspecies, paratype male, Hat Creek Ranger Station, California, July 20, 1947 (F. H. Rindge; A.M.N.H.). 47. *Pterotaea newcombi newcombi* (Swett), male, Live Oak Park, California, June 13, 1948 (Melander; A.M.N.H.). 48. *Pterotaea newcombi orinomos*, new subspecies, holotype male, upper Santa Ana River, California, August 12, 1945 (G. H. and J. L. Sperry; A.M.N.H.). All  $\times 1.5$ .

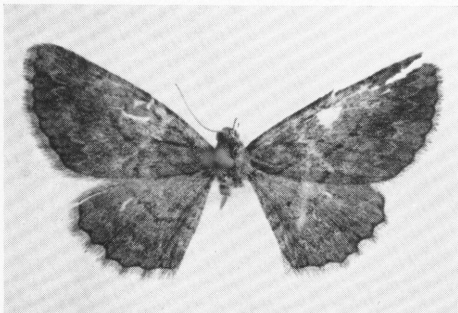




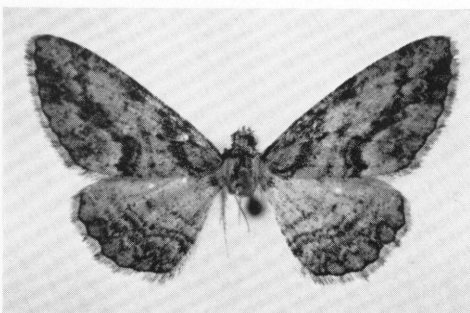
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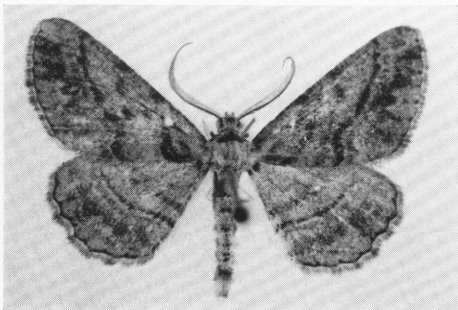
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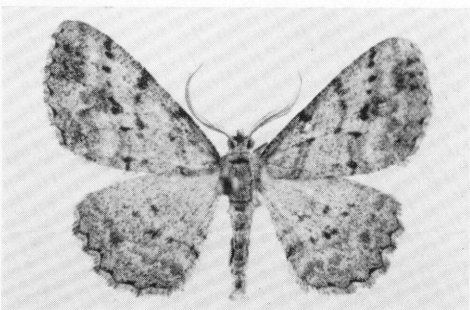
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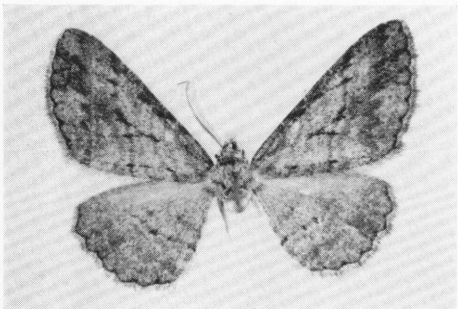
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genitalia of the holotype are mounted on slide F.H.R. No. 15477; those of the allotype, on F.H.R. No. 15542. Paratypes, all from California: *Ventura County*: Same data as types, July 6, 7, 9, 12, 13, 1964, five males and two females. *Los Angeles County*: Mt. Lowe, June 7, 1924, one female; Crystal Lake, San Gabriel Canyon, August 3, 1946 (J. A. Comstock and L. M. Martin), one female. *San Bernardino County*: Baldy Mesa, near Cajon Pass, June 13, 1937 (L. M. Martin), one male. *Riverside County*: Pinyon Flat, San Jacinto Mountains, May 28, 1940 (F. H. Rindge), one male.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the Los Angeles County Museum of Natural History, and of C. W. Kirkwood.

**DISTRIBUTION:** The foothills and mountains of southern California, from Ventura County south to Riverside County (see fig. 8).

**TIME OF FLIGHT:** Late May and June, with one August record.

**REMARKS:** A total of 13 specimens (eight males and five females) and nine genitalic dissections (five males and four females) have been studied.

The two females from Los Angeles County are more contrastingly colored than are the other three known females; in addition, the cross lines on the forewings are broader and the median area is more suffused with black. In appearance these two moths closely resemble *melanocarpa melanocarpa*, but the antennal and genitalic characters place them as *macroceros*.

The single male from San Bernardino County has the upper surface of the wings more heavily and evenly suffused with dark brown scales than do the other known males.

***Pterotaea powelli*,<sup>1</sup> new species**

Figures 8, 40, 74, 107

This species can be distinguished from the four preceding ones by the grayer wings, and by

<sup>1</sup>I take pleasure in naming this species in honor of my friend and colleague Jerry A. Powell, who collected most of the type series.

the heavier and more prominent cross lines on the upper surface. It occurs in central California.

**MALE:** Head, thorax, and abdomen similar to those of *lira*, but tending to be grayer above; antennae with longest pectinations 0.9 mm. in length.

**UPPER SURFACE OF WINGS:** Forewings with slightly scalloped margin, and hind wings with strongly scalloped outer edge; forewings light gray, with numerous whitish gray and brownish gray scales; cross lines black, prominent, arranged like those of *lira*; t. a. line with prominent dark grayish black basal shade line; t. p. line with broad brown or brownish gray distal shade band; subterminal area with large whitish area above inner margin, and with dark patch near center of wing; s. t. line white, complete, pointed inward on veins; terminal area with grayish black oblique dash below apex; terminal line black, with intravenular dots; fringe narrowly white at base, then concolorous with wing, and broadly darkened opposite veins. Hind wings concolorous with forewings, and with same type of maculation as in *lira*.

**UNDER SURFACE OF WINGS:** Forewings gray, hind wings pale gray, with both having numerous brownish gray scales; without maculation except for all discal dots and dark, slender, terminal line; fringe whitish, contrasting with wing, darkened at vein endings.

**LENGTH OF FOREWING:** 15 to 18 mm.; holotype, 17 mm.

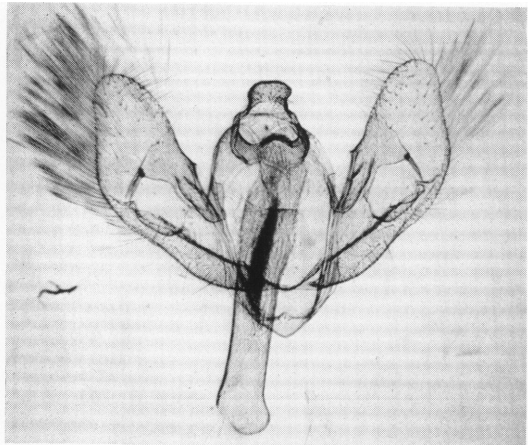
**FEMALE:** Similar to male, but with upper surface evenly suffused with grayish brown scales; maculation clearly represented; antennae weakly serrate.

**LENGTH OF FOREWING:** 18 mm. (allotype).

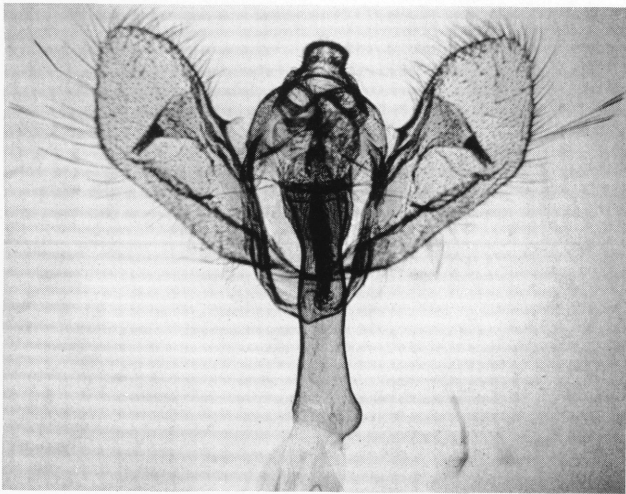
**MALE GENITALIA:** Similar to those of *lira* but differing mainly as follows: slightly larger; gnathos with apically swollen median enlargement; valves with costal area bearing three thick spines on right valve and four thick spines on left valve, both sides with or without single slender apical spine; vesica with two distinct, linearly arranged groups of short spines, anterior group with short, basal, flattened piece and eight thick spines, decreasing in size posteriorly,

FIGS. 49-51. Male genitalia. 49. *Hulstina formosata* (Hulst), Stockton, Utah, July 18, 1907 (T. Spalding; A.M.N.H.). 50. *Hulstina imitatrix fulva*, new subspecies, holotype, Coleville, California, July 16, 1948 (R. Coleman; A.M.N.H.). 51. *Hulstina tanyraeros tanyraeros*, new subspecies, paratype, 2½ miles south-southwest of Valermo, California, June 21, 1958 (N. McFarland; A.M.N.H.).

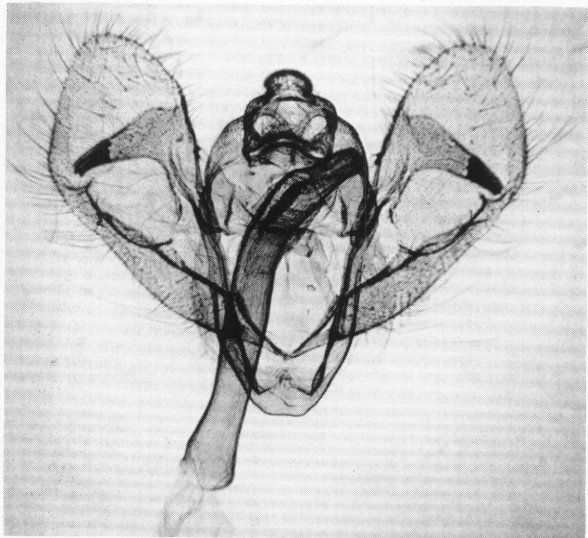




49



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51

and posterior group having more closely grouped and thinner spines. Abdomen without ventral row of bristles on third segment.

**FEMALE GENITALIA:** Similar to those of *lira* but differing mainly as follows: sterigma with areas laterad of ostium less heavily sclerotized; ostium smaller, with inconspicuous sides; anterior sclerotized area of sterigma slightly larger, and continued posteriorly as rugose extensions; ductus bursae more slender; corpus bursae with sclerotized posterior portion swollen anteriorly, then narrowed before joining membranous anterior portion; posterior portion 0.9 mm. in length, and anterior part 1.5 mm. long; signum larger, 0.6 mm. wide, with longer and more numerous rays. Apophyses posteriores 2.85 mm. in length.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**TYPES:** Holotype, male, foot of Shell Ridge, Walnut Creek, Contra Costa County, California, June 18, 1966 (J. Powell); allotype, female, same data, June 22, 1964. The genitalia of the holotype are mounted on slide F.H.R. No. 12190; those of the allotype, on F.H.R. No. 15451. Paratypes: Same data as types, various dates between June 11–24, 1961–1964, seven males and one female; Walnut Creek, Contra Costa County, California, June 6, 1961 (J. Powell), one male; same data as last specimen, May 20, 1958 (G. Kelly), one male; Oroville, Butte County, California, May 27, 1966 (R. P. Allen), one male and one female.

The holotype and allotype, from the California Insect Survey Collection at the University of California, Berkeley, will be deposited in the collection of the California Academy of Sciences. Paratypes are in the collections of the American Museum of Natural History, of the California Department of Agriculture, and of the California Insect Survey.

**DISTRIBUTION:** This species occurs in central California (see fig. 8).

**TIME OF FLIGHT:** May and June.

**REMARKS:** A total of 14 specimens (11 males

and three females) and four genitalic dissections (three males and one female) have been studied.

The genitalia of *powelli* are quite similar to those of *lira*. The males of the present species can be recognized by the different spining in the vesica, and the females by the smaller ostium and by the different configuration of the ductus bursae.

***Pterotaea albescens* McDunnough**

Figures 8, 41, 75, 108

*Pterotaea albescens* McDUNNOUGH, 1941, p. 75.

This species can be distinguished from *powelli* by the whiter wings and by the shortly pectinate antennae of the female. It occurs in northwestern California.

**MALE:** Head, thorax, and abdomen similar to those of *lira*, but tending to have more white scaling dorsally; palpi shorter, not rising to middle of eye, extending beyond front less than one-half of length of eye; antennae with longest pectinations 0.9 to 1.0 mm. in length.

**UPPER SURFACE OF WINGS:** All wings broad, with weakly scalloped outer margins; forewings white, with variable number of grayish brown and blackish brown scales; maculation of all wings similar to that of *lira* but more prominent, with wider cross lines and broader shade bands; median area of forewings tending to be partially suffused with black scaling in some specimens.

**UNDER SURFACE OF WINGS:** All wings light gray, with hind wings tending to be slightly paler than forewings; faint traces of cross lines indicated in some specimens; discal dots present on all wings.

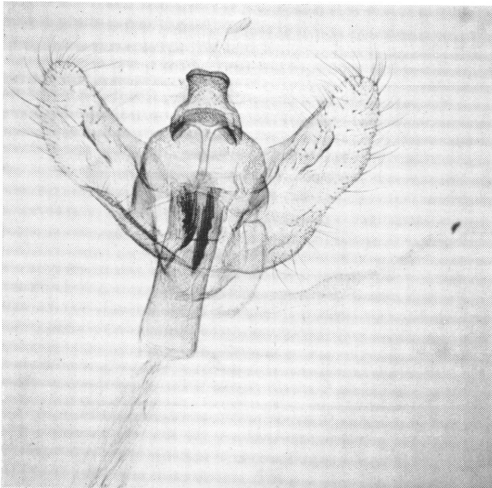
**LENGTH OF FOREWING:** 16 to 18 mm.

**FEMALE:** Similar to male but with upper surface slightly darker; antennae shortly pectinate.

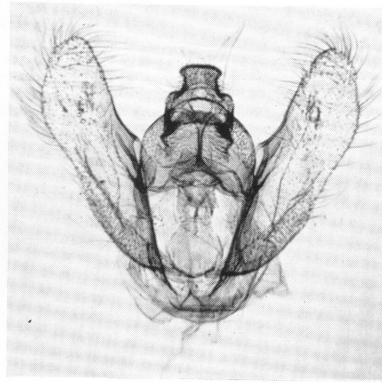
**LENGTH OF FOREWING:** 17 mm.

**MALE GENITALIA:** Very similar to those of *powelli*; no certain way is known at present to separate the two species.

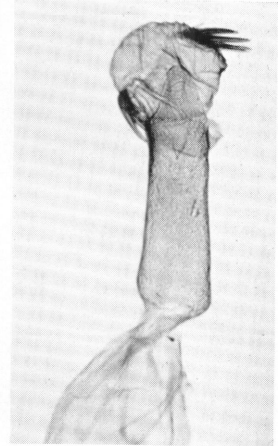
FIGS. 52–56. Male genitalia. 52. *Hulstina aridata* Barnes and Benjamin, Apple Valley, California, May 23, 1941 (G. H. and J. L. Sperry; A.M.N.H.). 53. *Hulstina xera*, new species, paratype, Sun Lake State Park, Washington, June 29–30, 1963 (W. C. Cook; A.M.N.H.). Aedeagus shown with vesica exerted. 54. *Hulstina grossbecki*, new species, holotype, Rancho La Sierra, California, May 21, 1949 (A. H. Rindge; A.M.N.H.). 55. *Hulstina exhumata* Swett, San Diego, California, May 10, 1910 (L. E. Ricksecker; A.M.N.H.). 56. *Hulstina wrightiaria* (Hulst), Central Valley, Santa Cruz Island, California, April 30, 1966 (J. Powell; A.M.N.H.).



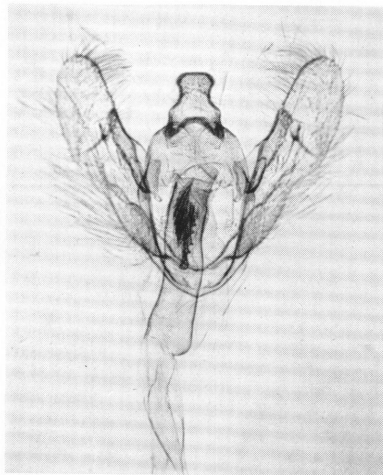
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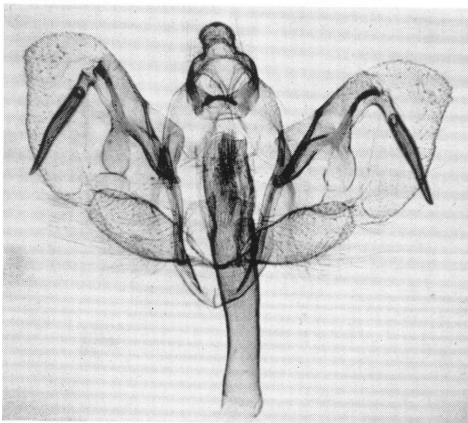
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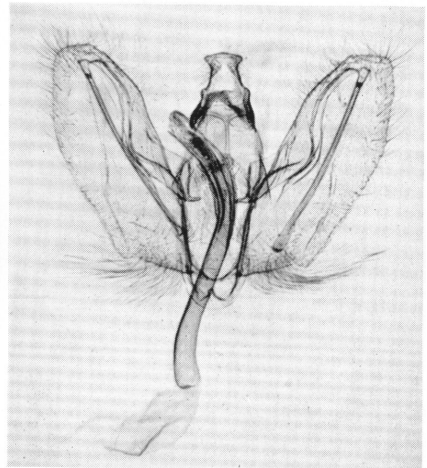
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56



**FEMALE GENITALIA:** Similar to those of *lira* but differing mainly as follows: ostium with smaller lateral areas; anterior margin of sterigma slightly enlarged medially both anteriorly and posteriorly, and areas posteriad of ends of sclerotized area rugose; corpus bursae larger, with sclerotized posterior portion longer and with fewer longitudinal striations; posterior portion 1.2 mm. in length, and anterior portion 2.3 mm. long; signum larger, 0.7 mm. wide, with more numerous rays. Apophyses posteriores 1.8 mm. in length.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**TYPE:** The holotype, male, is in the Canadian National Collection, Ottawa (C.N.C. No. 5186); its genitalia were mounted on slide Pt. 6 by McDunnough.

**TYPE LOCALITY:** Ukiah, Mendocino County, California.

**DISTRIBUTION:** Northwestern California, in the Coast Range from Sonoma, Lake, and Mendocino counties to Trinity and Siskiyou counties (see fig. 8).

**TIME OF FLIGHT:** From mid May into August.

**REMARKS:** A total of 22 specimens (21 males and one female) and five genitalic dissections (four males and one female) have been studied, including the genitalia of the type.

The adults of this species can be recognized by their whitish wings and by their northern distribution.

The male genitalia of *albescens* are quite similar to those of *lira*. These structures, in the present species, can be recognized by the reduced costal spining. It is interesting to note that in other species of this subgroup the spining on the left valve is the one that tends to be reduced, whereas in *albescens* that occurs on the right valve.

The female genitalia of *albescens*, as far as can be determined from the single dissection available, are also similar to those of *lira*. In the present species the apophyses posteriores are shorter than in *lira*, whereas both the corpus bursae and the signum are larger.

### ***Pterotaea melanocarpa* (Swett)**

*Cleora melanocarpa* SWETT, 1916, p. 5.

This species can be recognized by means of the male genitalia. These structures form the basis for placing *melanocarpa* as the sole representative of the fourth subgroup. In color and maculation *melanocarpa* is similar to the species of the preceding group, being particularly close to some examples of *macroceros*. This species occurs in southern California in two named populations.

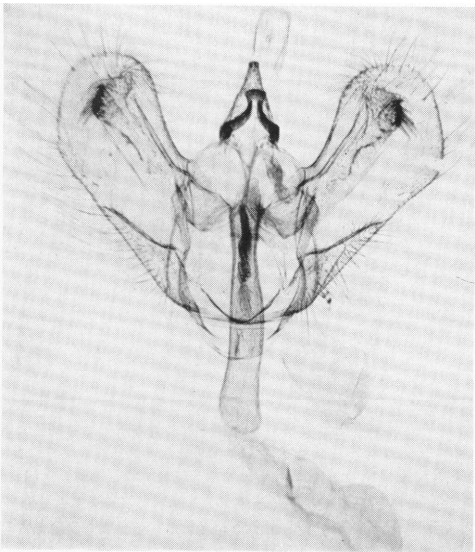
**MALE:** Head, thorax, and abdomen similar to those of *comstocki*; antennae with longest pectinations 1.3 mm. in length; palpi rising to one-third of height of eye, extending beyond front distance equal to one-third to one-half of length of eye.

**UPPER SURFACE OF WINGS:** All wings broad, with scalloped outer margin; forewings pale brownish gray to light gray, with more or less numerous grayish white, dark grayish brown, and blackish brown scales; cross lines black, prominent, complete except for upper part of t. p. line; course of lines as in *lira*, or tending to have stronger basal band in t. p. line; median shade line varying from being weakly represented to very broad; t. p. line with brown shade band varying from inconspicuous to broad and contrasting; subterminal area pale gray above inner margin; s. t. line pale gray, shaded basally by dark gray; terminal line black, with intravenular spots; fringe narrowly pale at base, then concolorous with wing, broadly darkened at vein endings. Hind wings concolorous with forewings, and with same type of maculation; basal line present; median shade band and small discal dot present; extradiscal line extending most of width of wing, followed by brownish gray shade band; outer portion of wing similar to that of forewing.

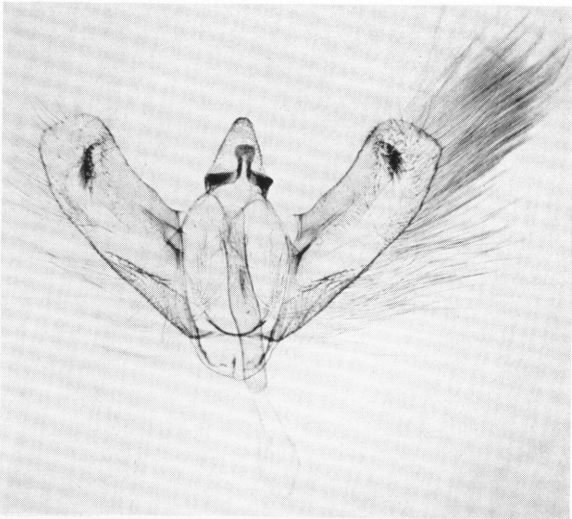
**UNDER SURFACE OF WINGS:** All wings light gray, with scattered brownish gray scales, these becoming more numerous on hind wings; maculation variable, from obsolescent to having t. p. line represented by small venular dots paralleling outer margin; discal dots small, present in most specimens.

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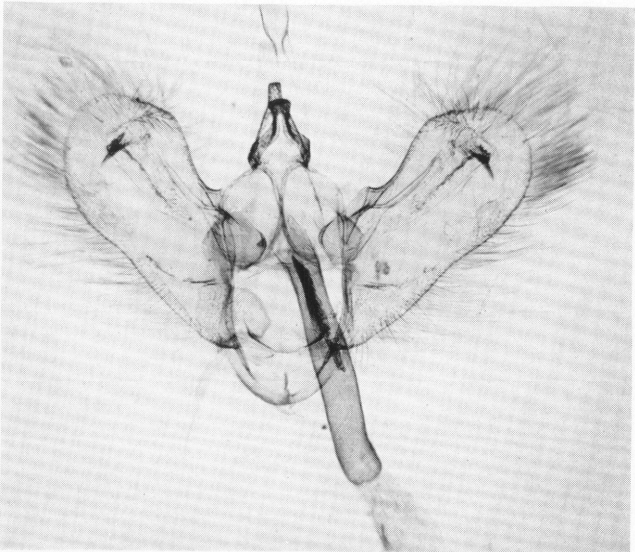
FIGS. 57-59. Male genitalia. 57. *Pterotaea crickmeri* (Sperry), holotype, Borrego, California, March, 1946 (N. Crickmer; A.M.N.H.). 58. *Pterotaea crinigera*, new species, holotype, San Clemente Island, California, April 4, 1939 (L.A.M.). 59. *Pterotaea salvatierrai*, new species, paratype, Punta Pulpita, Baja California, April 12, 1962 (C. F. Harbison; A.M.N.H.).



57



58



59

LENGTH OF FOREWING: 15 to 18 mm.

FEMALE: Similar to male, but with upper surface of wings tending to be grayer, and to have less conspicuous maculation; antennae shortly pectinate.

LENGTH OF FOREWING: 16 to 18 mm.

MALE GENITALIA: Uncus with elongate, slender apex, in length about two-fifths of length of entire uncus, and with posterior end weakly bilobed, shallowly concave between; gnathos with swollen, finely punctate, terminally flattened, median enlargement; valves with costal area occupying more than one-half of inner face of valve, posterior margin flat or weakly concave, posterodistal area strongly raised, narrowing posteromedially, and bearing four thick spines, and one smaller, posterior spine, symmetrically arranged; sacculus broadly sclerotized, and with poorly defined longitudinal ridge; cristae numbering 18 to 25 on each side, very slender; juxta broad anteriorly, broadly digitate posteriorly; aedeagus longer than combined lengths of uncus, tegumen, and sacculus, slender, bluntly pointed posteriorly; vesica with two overlapping, linearly arranged groups of spines of approximately equal length, anterior group with approximately 20 spines, elongate anteriorly but becoming shorter posteriorly, and with posterior group appearing basally as sclerotized piece, changing to numerous, closely grouped, thin spines posteriorly. Abdomen without ventral row of bristles on third segment.

FEMALE GENITALIA: Similar to those of *lira* but differing mainly as follows: sterigma with anterior sclerotized area slightly narrower; corpus bursae with posterior sclerotized portion slightly broader, relatively short, ranging in length from 0.75 to 0.95 mm., averaging 0.85 mm., and with anterior membranous portion ranging from 2.1 to 2.2 mm. in length; signum 0.4 mm. wide. Apophyses posteriores 2.5 to 2.7 mm. in length.

EARLY STAGES: Undescribed.

FOOD PLANT: *Quercus chrysolepis* Liebman.

DISTRIBUTION: Southern California. The southern, and more heavily marked, subspecies

occurs from San Diego County to Los Angeles County. The more lightly marked population occurs in Ventura County.

The male genitalia of *melanocarpa* are basically similar to those of the species of the second subgroup. The present species, however, lacks the medioventral row of bristles on the third abdominal segment.

The female genitalia are very similar to those of the preceding subgroup.

***Pterotaea melanocarpa melanocarpa* (Swett)**

Figures 1, 42, 76, 109

*Cleora melanocarpa* SWETT, 1916 (November), p. 5.

*Pterotaea melanocarpa*: McDUNNOUGH, 1920, p. 35, pl. 6, fig. 12 (male genitalia); 1938a, p. 165.

*Pterotaea tremularia* BARNES AND McDUNNOUGH, 1916a (December), p. 27, pl. 2, fig. 4 (lectotype male); 1917, p. 116. McDUNNOUGH, 1920, p. 35 (synonym of *melanocarpa*); 1938a, p. 165.

*Pterotaea serrataria* BARNES AND McDUNNOUGH, 1916a, p. 28, pl. 2, fig. 9 (lectotype female); 1917, p. 116. McDUNNOUGH, 1920, p. 35, pl. 6, fig. 9 (male genitalia); 1938a, p. 165. New synonymy.

The members of this population have brownish gray forewings, with very heavy maculation.

MALE: Upper surface of wings pale brownish gray; forewings with cross lines thick, prominent; t. p. line with sharp basal bend above inner margin; median shade line varying from being wider than other cross lines to slender; t. p. line with broad, contrasting brown shade band; hind wings with prominent extradiscal line.

LENGTH OF FOREWING: 15 to 17 mm.

FEMALE: Similar to male but with upper surface of wings grayer; maculation reduced but still prominent.

LENGTH OF FOREWING: 17 to 18 mm.

MALE GENITALIA: As described for the species.

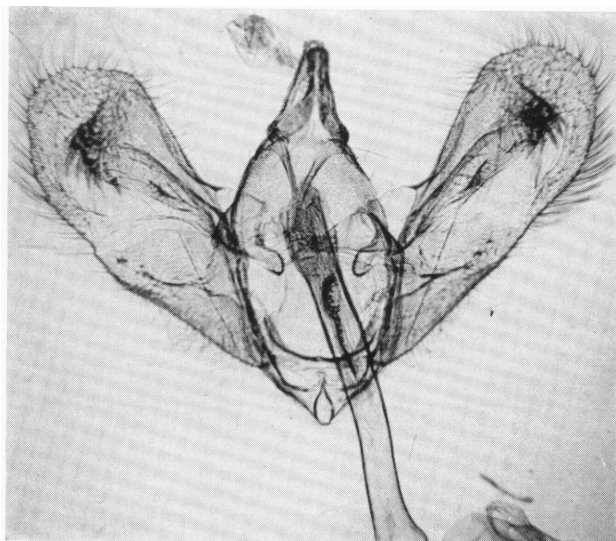
FEMALE GENITALIA: As described for the species.

EARLY STAGES: Undescribed.

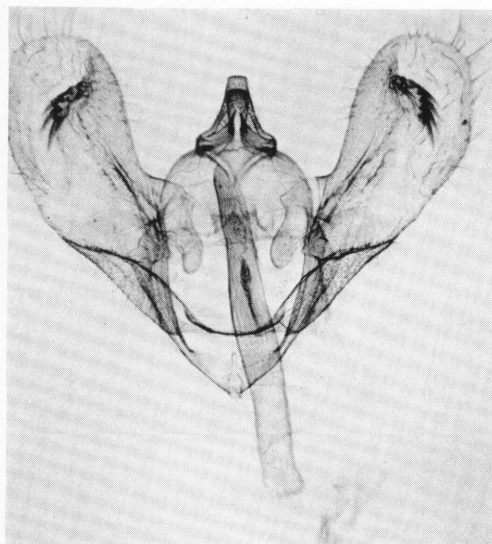
FOOD PLANT: A single female in the California Insect Survey collection is labeled, "larva beaten (night) from *Quercus chrysolepis*"; it is

FIGS. 60-63. Male genitalia. 60. *Pterotaea sperryae* McDunnough, Split Rock Tank, California, May 19, 1938 (G. H. and J. L. Sperry; A.M.N.H.). 61. *Pterotaea leuschneri*, new species, holotype, Bob's Gap, California, May 29, 1968 (R. H. Leuschner; A.M.N.H.). 62. *Pterotaea plagia*, new species, holotype, Pinyon Crest, California, June 10, 1967 (R. H. Leuschner; A.M.N.H.). 63. *Pterotaea lamiaria lamiaria* (Strecker), cotype of *agrestaria* Grossbeck, Thyce Camp, California, July 1 (G. H. Field; A.M.N.H.).

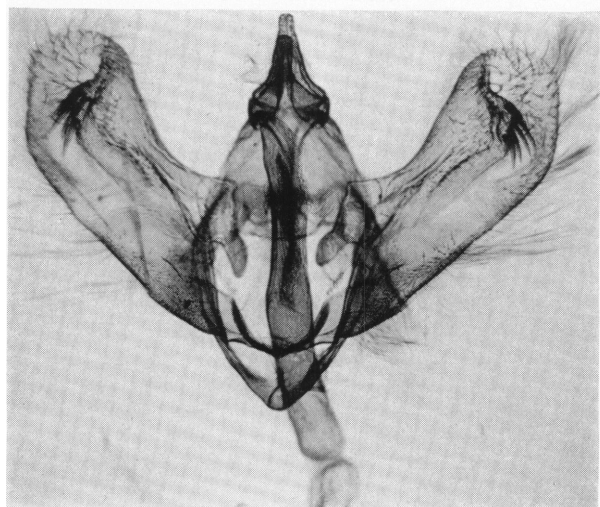




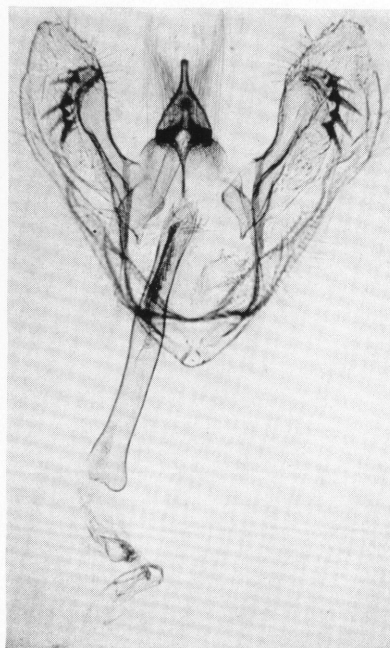
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62



63

from Cloudburst Canyon, San Gabriel Mountains, Los Angeles County.

**Types:** The holotype, male, of *melanocarpa* is in the Museum of Comparative Zoology, Harvard University.

*Pterotaea tremularia* was described from four male specimens. The lectotype is hereby designated as the specimen bearing the "type ♂" label; its genitalia are mounted on slide E.L.T. No. 2373. It is in the collection of the United States National Museum.

*Pterotaea serrataria* was described from one male and two females. The lectotype is hereby designated as the specimen bearing the "type ♀" label; its genitalia are mounted on slide J.F.G.C. No. 2109. It is also in the United States National Museum. The "type ♂" is not conspecific; it is referable to *comstocki*.

**TYPE LOCALITIES:** Boulevard, San Diego County, California (*melanocarpa*); Camp Baldy, San Bernardino Mountains, San Bernardino County, California (*tremularia*); Witch Creek, San Diego County, California (*serrataria*).

**DISTRIBUTION:** Southern California, extending from San Diego County to Los Angeles County (see fig. 1).

**TIME OF FLIGHT:** June, July, and August.

**REMARKS:** A total of 22 specimens (17 males and five females) and 11 genitalic dissections (eight males and three females) have been studied, including all primary types and the genitalia of the two lectotypes.

Specimens from the mountains of Los Angeles and San Bernardino counties tend to have heavier maculation, particularly in the central portion of the forewing, than do the moths from San Diego County.

These moths closely resemble certain members of *macroceros* occurring in the same area. Based on the limited material available (two females of each), nominate *melanocarpa* can be recognized by the position of the discal dot on the forewing, as it is 2 mm. from the t. p. line; in *macroceros*, the dot is 1 mm. distant. The safest way to separate the two is by means of the genitalia.

***Pterotaea melanocarpa opaca***, new subspecies

Figures 1, 43

The members of this population have grayish forewings, with much less prominent maculation.

**MALE:** Upper surface of wings light gray; forewings with cross lines slender; t. p. line evenly curved in lower part of wing; median shade line varying from obsolescent to complete, when present not wider than other cross lines; t. p. line with grayish brown shade band inconspicuous; hind wings with narrow extradiscal line.

**LENGTH OF FOREWING:** 16 to 18 mm.; holotype, 18 mm.

**FEMALE:** Similar to male but with upper surface of wings darker gray; maculation obsolescent except for most of t. p. line.

**LENGTH OF FOREWING:** 16 to 17 mm.; allotype, 17 mm.

**MALE GENITALIA:** As described for the species.

**FEMALE GENITALIA:** As described for the species.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**Types:** Holotype, male, Camp Ozena, upper Cuyama Valley, Ventura County, California, June 25, 1963 (C. W. Kirkwood); allotype, female, same data, July 12, 1964; both specimens are from the Kirkwood collection. The genitalia of the holotype are mounted on slide F.H.R. No. 15364; those of the allotype, on F.H.R. No. 15347. Paratypes: Same data as types (either Camp Ozena or Ozena Forestry Camp), various dates between June 25 and 27, 1963, June 30–July 10, 1964, and June 26, 1967, 11 males; Howard Creek, Ventura County, California, July 22, 1967 (C. W. Kirkwood), one female.

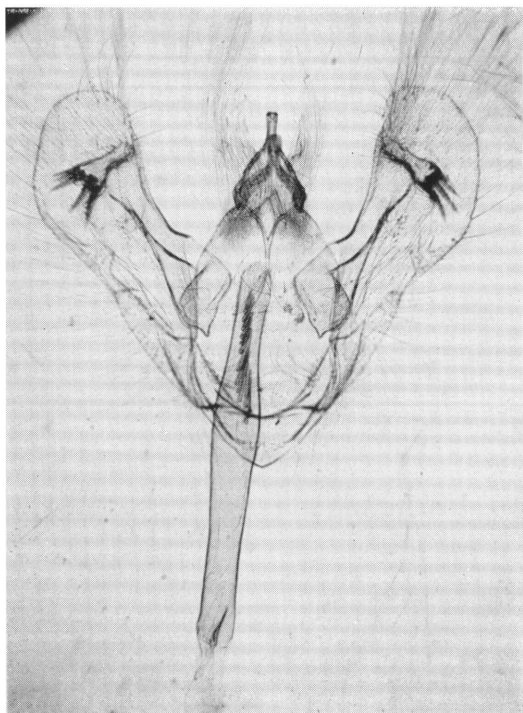
The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution and of C. W. Kirkwood.

**DISTRIBUTION:** Ventura County, California (see fig. 1).

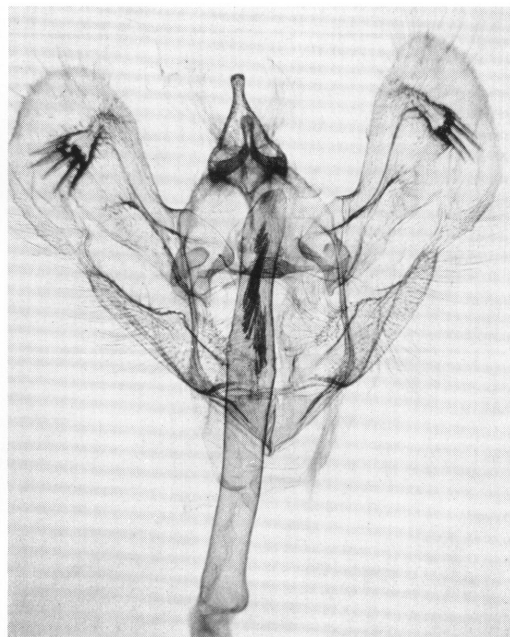
**TIME OF FLIGHT:** June and July.

FIGS. 64–67. Male genitalia. 64. *Pterotaea campestraria* McDunnough, Santo Tomas, Baja California, July 8, 1953 (W. J. and J. W. Gertsch; A.M.N.H.). 65. *Pterotaea succurva*, new species, holotype, Alma, California, April 7, 1945 (A.M.N.H.). 66. *Pterotaea glauca*, new species, holotype, upper Santa Ana River, California, July 29, 1948 (G. H. and J. L. Sperry; A.M.N.H.). 67. *Pterotaea miscella*, new species, paratype, Lee Canyon, Nevada, July 25, 1966 (F., P., and M. Rindge; A.M.N.H.).

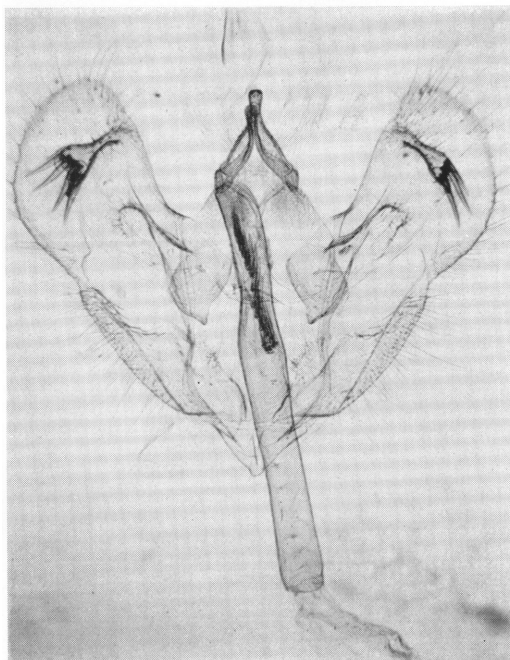




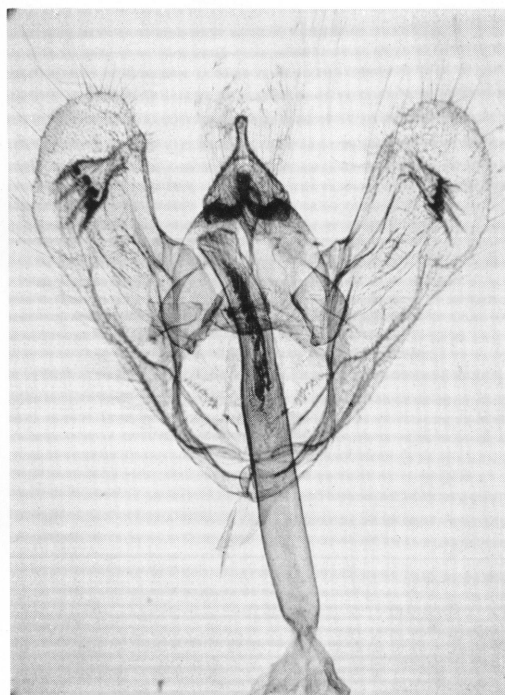
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67

REMARKS: A total of 14 specimens (12 males and two females) and four genitalic dissections (three males and one female) have been studied.

It is interesting to note the parallel variation in *melanocarpa* and *macroceros*. The specimens of both species at Camp Ozena have grayer wings, with relatively light maculation, whereas to the south they both become browner and have much heavier maculation.

***Pterotaea cariosa* Hulst**

*Pterotaea cariosa* HULST, 1896, p. 349.

This species is the first representative of the fifth subgroup, which is characterized by the asymmetrical spining on the costa of the valves. The adults of *cariosa* closely resemble the moths of the preceding two groups. Most specimens of the present species have a large, rectangular, pale area along the middle of the outer margin of the forewings which is usually lacking in the preceding species. The species is found in northern and central California in three subspecific populations.

MALE: Head, thorax, and abdomen similar to those of *comstocki*; antennae with longest pectinations 1.0 mm. in length; palpi variable, extending horizontally at lower edge of eye or rising to about one-third of height of eye, extending beyond front a distance equal to about one-half of length of eye.

UPPER SURFACE OF WINGS: All wings broad, with scalloped outer margins; forewings pale gray or light brownish gray, variably overlain with numerous grayish black and brownish black scales; cross lines black, prominent, complete except for upper part of t. p. line; course of lines as in *melanocarpa*; median shade line varying from being absent to moderately prominent; t. p. line with strong basal bend below cubital vein, and with brown shade band varying from inconspicuous to broad and prominent; subterminal area narrowly pale gray above inner margin; s. t. line varying from narrow and complete to obsolescent; terminal area with broad, rectangular or square, pale space in middle of

wing, extending from middle of cell  $M_2$  to middle of cell  $Cu_1$ ; terminal line black, with intravenular spots; fringe narrowly pale at base, then concolorous with wing, broadly darkened at vein endings. Hind wings concolorous with forewings, and with same type of maculation; basal line present; median shade band and discal dot usually present; extradiscal line extending most of width of wing, followed by brownish gray shade band; outer portion of wing similar to that of forewing but lacking large pale area.

UNDER SURFACE OF WINGS: All wings light gray, with scattered brownish gray scales; maculation absent except anterior portion of t. p. line and some dark scaling in terminal area of forewing below apex; discal dots present in most specimens.

LENGTH OF FOREWING: 15 to 18 mm.

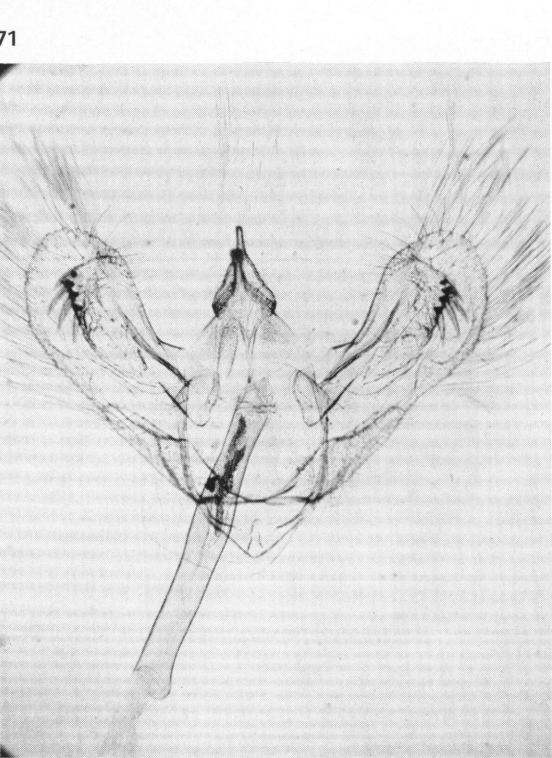
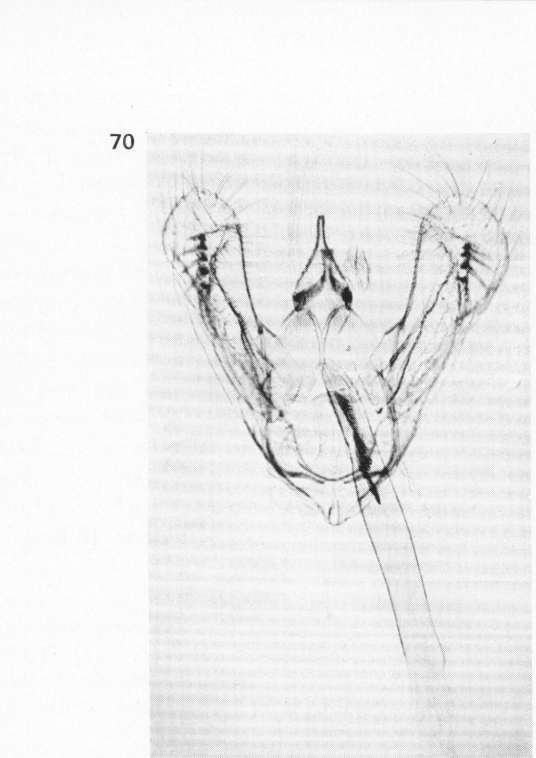
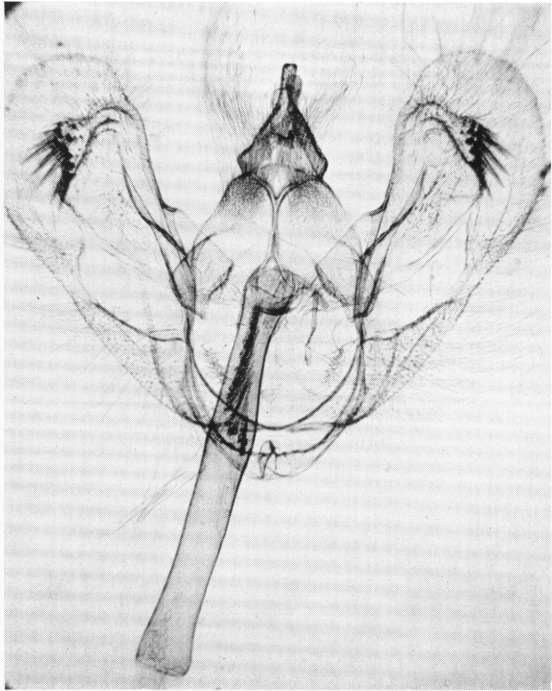
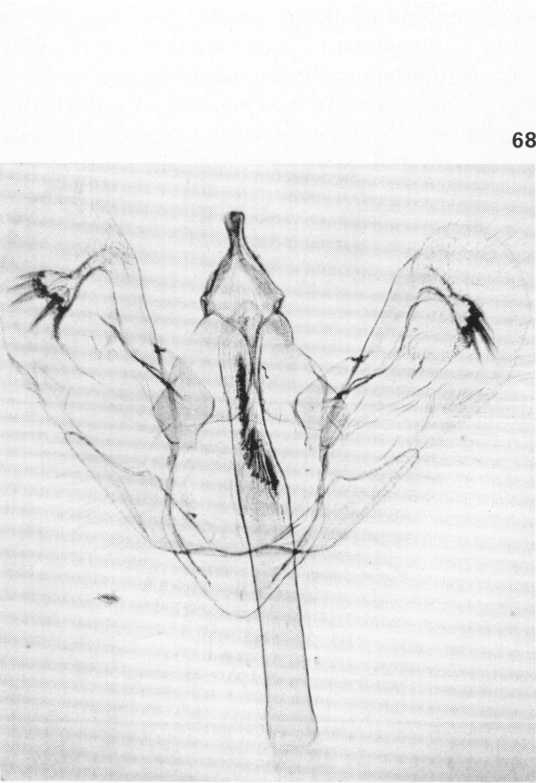
FEMALE: Similar to male, but with upper surface of wings tending to be grayer and to have less conspicuous maculation; antennae shortly pectinate.

LENGTH OF FOREWING: 15 to 17 mm.

MALE GENITALIA: Uncus with apex attenuate, slightly tapering, in length about one-fourth of length of entire uncus, with posterior end weakly bilobed and shallowly concave medially; gnathos with scarcely swollen, finely punctate, terminally rounded, median enlargement; valves with costal areas occupying about two-thirds of inner face of valves, asymmetrical; costal area of right valve rectangular in outline, terminally truncate, with posterodistal area raised and bearing about eight (varying from six to nine) short, broad spines in single terminal row, and with variable number of very short spines in comblike arrangement along posterior margin of swelling; costal area of left valve triangular in outline, with outer margin swollen and bearing anteriorly a row of five (rarely four) large and two or three small spines, increasing in length anteriorly; sacculus broadly sclerotized and swollen; cristae numerous, elongate; juxta broad anteriorly, tapering posteriorly, tending to have truncate apex; aedeagus equal in length

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FIGS. 68-71. Male genitalia. 68. *Pterotaea systole*, new species, holotype, Smoky Valley, California, June 18, 1954 (C. Ingham and C. Henne; A.M.N.H.). 69. *Pterotaea euroa*, new species, paratype, Loop Camp, Utah, July 20, 1958 (F., P., and J. Rindge; A.M.N.H.). 70. *Pterotaea lira*, new species, holotype, San Diego, California, June 3, 1911 (G. H. Field; A.M.N.H.). 71. *Pterotaea obscura*, new species, holotype, Guatay, California, July 9, 1953 (W. J. and J. W. Gertsch; A.M.N.H.).



to combined lengths of uncus, tegumen, and saccus; vesica anteriorly with five to seven very long and slender spines, 0.6 mm. in length, and with somewhat curved, sclerotized, spinose or spinulate band posteriorly. Abdomen with ventral row of bristles on third segment.

**FEMALE GENITALIA:** Similar to those of *melanocarpa* but differing mainly as follows: sterigma with anteroventral area raised, lightly sclerotized, continuing posterolaterally from ends of sclerotized anterior margin as elongate rugose areas; anterior sclerotized margin recessed, concave in cross section, with irregular posterior border; corpus bursae with more elongate and less striate posterior sclerotized section, and with more definite border between posterior and anterior sections; signum larger, 0.6 to 0.7 mm. in diameter, with more lateral and median rays. Apophyses posteriores 1.7 to 1.9 mm. in length.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**DISTRIBUTION:** The mountainous areas of the northern portion of California, extending into western Oregon, occurring both in the Sierra Nevadas and the Coast Ranges.

This species occurs in three named populations.

***Pterotaeta cariosa cariosa* Hulst**

Figures 9, 44, 110

*Pterotaeta cariosa* HULST, 1896, p. 349. DYAR, "1902" [1903], p. 322. SMITH, 1903, p. 76. BARNES AND McDUNNOUGH, 1917, p. 116. McDUNNOUGH, 1920, p. 34, pl. 6, fig. 10 (male genitalia); 1938a, p. 165. RINDGE, 1955, p. 139.

The moths of the population that occur in the coastal areas of California and western Oregon north of the San Francisco Bay area usually have the upper surface of the wings heavily suffused with dark brown scales.

**MALE:** Upper surface of wings gray or brownish gray, heavily suffused with dark brown or brownish black scales, in some specimens tending to cover the maculation; rarely without any dark scaling except for cross lines; t. p. line with

broad, dark brownish gray shade band; s. t. line weakly represented.

**LENGTH OF FOREWING:** 15 to 17 mm.

**FEMALE:** Similar to male, but with upper surface of wings tending to be a grayer brown, and with some specimens appearing more mottled.

**LENGTH OF FOREWING:** 15 to 17 mm.

**MALE GENITALIA:** As described for the species.

**FEMALE GENITALIA:** As described for the species.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**TYPE:** Hulst apparently described *cariosa* from one specimen, although he gave neither the number of specimens nor their sex in the original description. The unique type is a female, and it is now in the collection of the American Museum of Natural History (Rindge, 1955, p. 139); its genitalia are mounted on slide F.H.R. No. 8594.

**TYPE LOCALITY:** Soda Springs, Siskiyou County, California.

**DISTRIBUTION:** The coastal regions of California, extending northward from Alameda and Contra Costa counties, eastward into northwestern Shasta County, and north along the coast at least as far as Benton County, Oregon (see fig. 9).

**TIME OF FLIGHT:** Late June, July, and August.

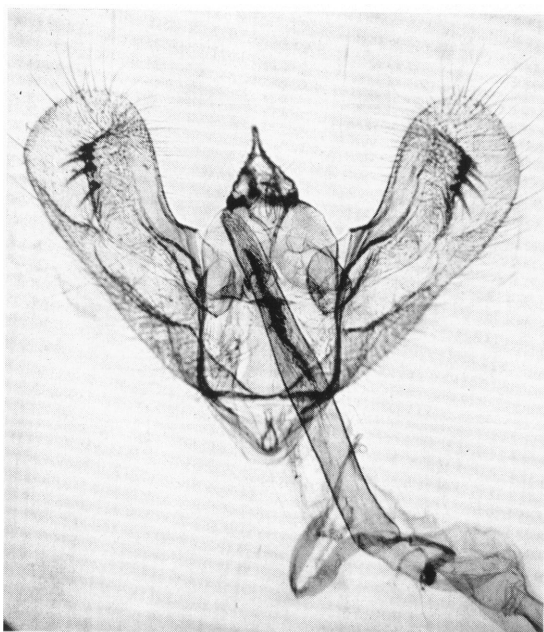
**REMARKS:** A total of 37 specimens (25 males and 12 females) and 17 genitalic dissections (13 males and four females) have been studied.

Five pale specimens, without the heavy brown scaling, have been examined; all are males. One is from Alameda County, and another from Trinity County, California; they are the only members of the species seen from these localities. One is from Anderson Springs, Lake County, California; 12 "normal" males have also been studied from the same locality. The other two are from 5 miles northwest of Corvallis, Benton County, Oregon, and they are the only Oregon specimens seen. It remains to be ascertained whether or not this northernmost portion of the population is all pale.

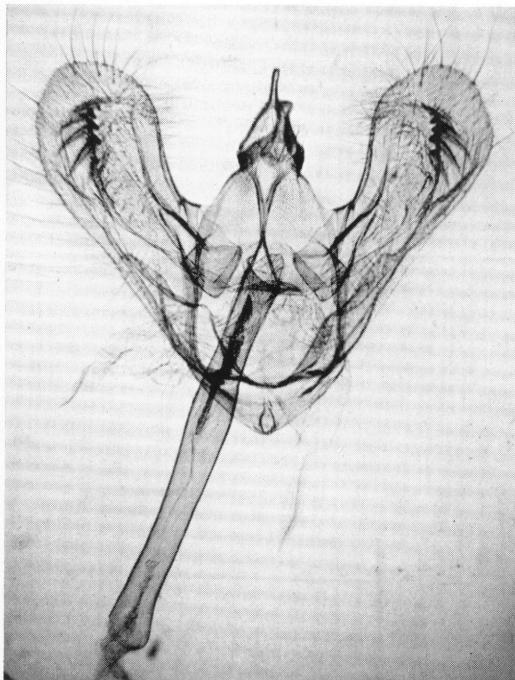
FIGS. 72-75. Male genitalia. 72. *Pterotaeta comstocki*, new species, paratype, Figueroa Mountain, California, July 7, 1965 (C. W. Kirkwood; A.M.N.H.). 73. *Pterotaeta macroceros*, new species, paratype, Pinyon Flat, California, May 28, 1940 (F. H. Rindge; A.M.N.H.). 74. *Pterotaeta powelli*, new species, holotype, Walnut Creek, California, June 18, 1962 (J. Powell; C.A.S.). 75. *Pterotaeta albescens* McDunnough, Laytonville, California, June 16, 1949 (R. F. Sternitzky; A.M.N.H.).



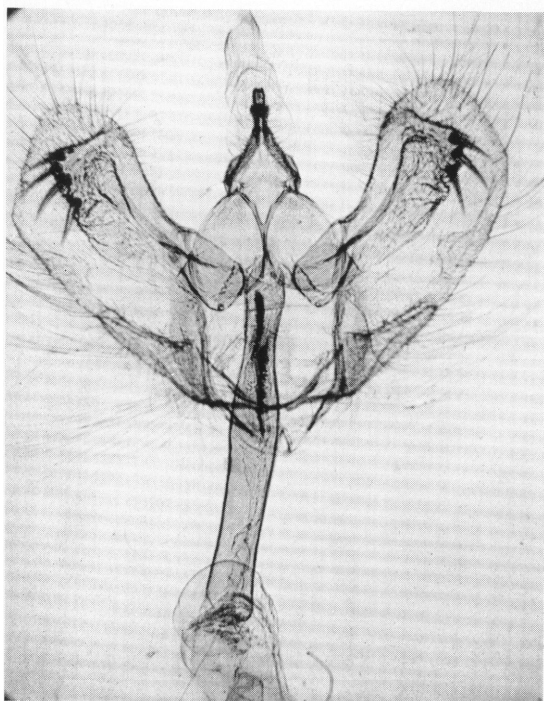
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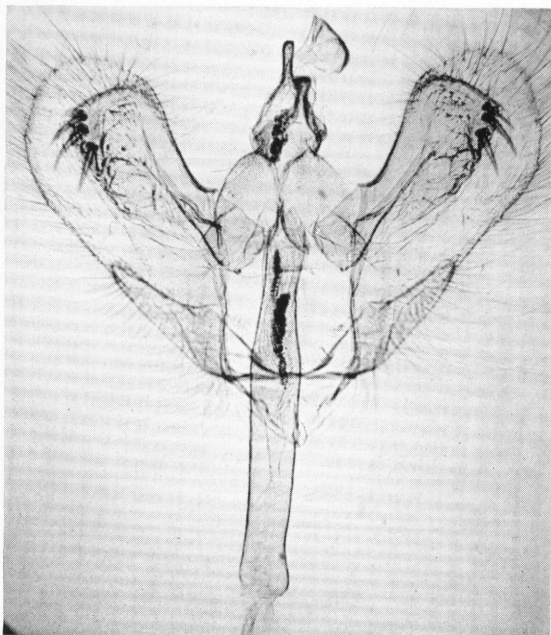
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***Pterotaea cariosa incompta***, new subspecies

Figures 9, 45

The moths of this population occur in the coast ranges south of the San Francisco Bay area, and they lack the heavy suffusion of dark brown scales on the upper surface of the wings found in nominate *cariosa*.

MALE: Upper surface of wings grayish white, with only a few scattered darker scales; t. a. and t. p. lines prominent, both with broad brownish black shade bands; s. t. line weakly represented or obsolescent.

LENGTH OF FOREWING: 15 to 17 mm.; holotype, 16 mm.

FEMALE: Upper surface of wings tending to be a more or less unicolorous gray, with rather indistinct maculation.

LENGTH OF FOREWING: 15 to 17 mm.; allotype, 16 mm.

MALE GENITALIA: As described for the species.

FEMALE GENITALIA: As described for the species.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: Holotype, male, San Antonio Ranger Station, Santa Clara County, California, July 19, 1948 (R. van den Bosch); allotype, female, same data but July 17, 1948; both specimens are from the author's collection. The genitalia of the holotype are mounted on slide F.H.R. No. 14904; those of the allotype, on F.H.R. No. 15005. Paratypes, all from California: Same data as types, various dates between July 17 and 30, 1948, seven males and two females; Pinnacles National Monument, June 11, 1936 (E. C. Johnston), one male; Atascadero, San Luis Obispo County, July 3, 1948 (R. Dickenson), one male.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution and of the Los Angeles County Museum of Natural History.

DISTRIBUTION: Coastal central California, known only from Santa Clara, San Benito, and San Luis Obispo counties (see fig. 9). This

corresponds to the Idrian District of the Californian Biotic Province.

TIME OF FLIGHT: June and July.

REMARKS: A total of 13 specimens (10 males and three females) and four genitalic dissections (two males and two females) have been studied.

Of the eight topotypical males, one lacks most of the dark scaling along the cross lines, so appears rather similar to the pale specimens of nominate *cariosa*.

***Pterotaea cariosa aporema***, new subspecies

Figures 9, 46, 77

The upper surface of the wings of the moths from the Sierra Nevadas is a rather uniform grayish brown.

MALE: Upper surface of wings more or less evenly grayish brown, with some scattered dark scaling; median area of forewing either concolorous with remainder of wing or paler; t. a. and t. p. lines varying from slender to moderately thick; course of t. p. line varying from having strong basal bend below cubital vein to scarcely indented; shade bands of cross lines weakly represented or obsolescent; s. t. line and pale space in middle of terminal area weakly represented.

LENGTH OF FOREWING: 15 to 18 mm.; holotype, 16 mm.

FEMALE: Similar to male, but tending to be grayer and to have slightly weaker maculation.

LENGTH OF FOREWING: 15 to 17 mm.; allotype, 16 mm.

MALE GENITALIA: As described for the species.

FEMALE GENITALIA: As described for the species.

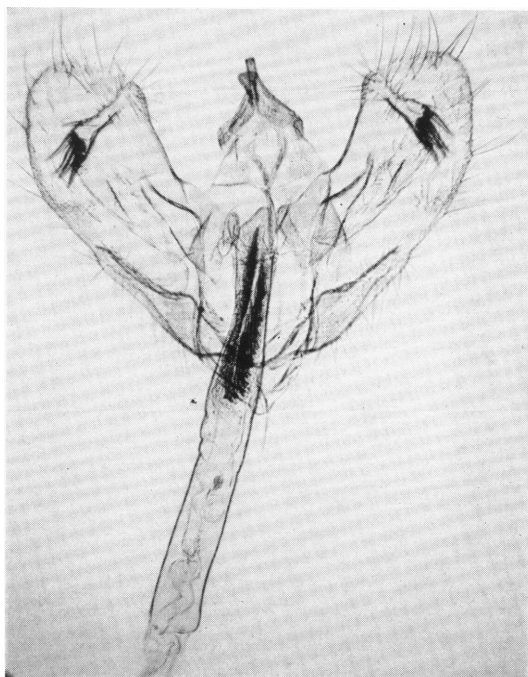
EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

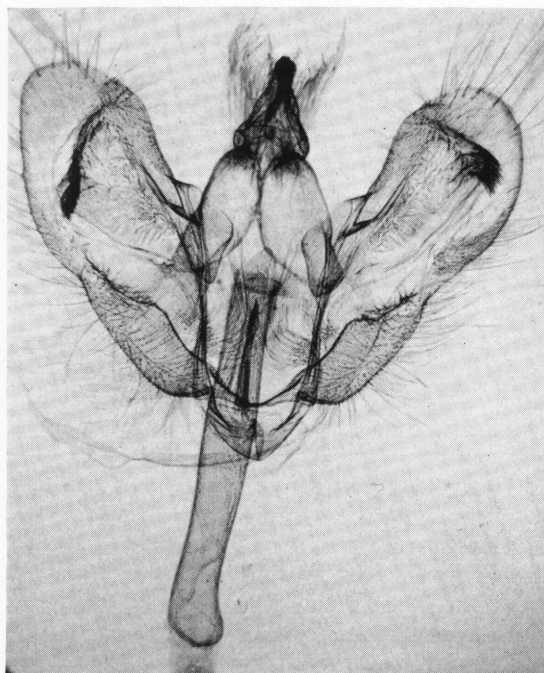
TYPES: Holotype, male, and allotype, female, Oakhurst, Madera County, California, August 8, 1953 (W. J. and J. W. Gertsch). The genitalia of the holotype are mounted on slide F.H.R. No. 5131; those of the allotype, on F.H.R. No. 5101. Paratypes, all from California: Hornbrook, Siskiyou County, August 17, 1948 (R. Coleman), one male; Hat Creek Ranger Station,

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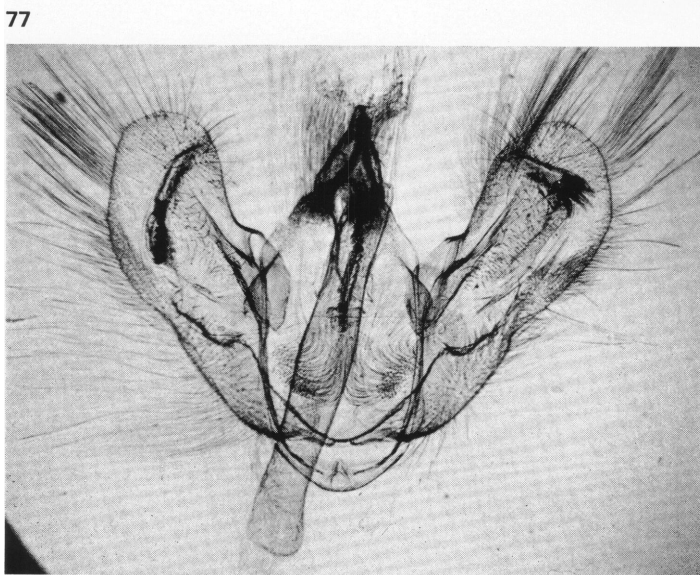
FIGS. 76-78. Male genitalia. 76. *Pterotaea melanocarpa melanocarpa* (Swett), Mt. Lowe, California, June 12-30, 1928 (A.M.N.H.). 77. *Pterotaea cariosa aporema*, new subspecies, holotype, Oakhurst, California, August 8, 1953 (W. J. and J. W. Gertsch; A.M.N.H.). 78. *Pterotaea newcombi newcombi* (Swett), Santa Monica Mountains, California, July 8, 1957 (N. McFarland; A.M.N.H.).



76



78



77

Shasta County, July 20, 1947 (F. H. Rindge), two males; Buck Creek, Modoc County, May 18, 1924, one female; Nelson Creek, Plumas County, July 26, August 3, 7, 11, 1940 (W. R. Bauer), three males and one female; Mohawk, Plumas County, July 19, 24, 28, 1940 (W. R. Bauer), three males; Spencer Lakes Road, 8 miles southwest of Johnsville, Plumas County, August 11, 1961 (W. R. Bauer and J. S. Buckett), one male and two females; Camp 19, Yosemite National Park, July 16, 18, 1937 (F. L. Cramer), one male and one female; Oakhurst, Madera County, August 8, 1953 (W. J. and J. W. Gertsch), two males and one female.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the Canadian National Collection, of the Los Angeles County Museum of Natural History, and of the University of California, Davis.

**DISTRIBUTION:** The southern end of the Cascade Range in California (Siskiyou, Shasta, and Modoc counties) and the Sierra Nevada Range (see fig. 9).

**TIME OF FLIGHT:** May (one record), July, and August.

**REMARKS:** A total of 21 specimens (14 males and seven females) and five genitalic dissections (four males and one female) have been studied.

This population can be distinguished from the moths of *c. cariosa* by its grayer wings, and from *incompta* by the uniformly, non-contrastingly colored wings.

***Pterotaea newcombi* (Swett)**

*Cleora newcombi* SWETT, 1914, p. 290.

This species is very similar in appearance to *cariosa aporema*; it can be distinguished from the latter by the fact that the upper surface of the wings are slightly grayer and by the less strongly indented t. p. line. The present species occurs in southern California in two named populations.

**MALE:** Head, thorax, and abdomen similar to those of *cariosa*; antennae with longest pectinations 1.0 mm. in length; palpi rising to about one-third of height of eye, extending beyond front a distance equal to about one-third to one-half of length of eye.

**UPPER SURFACE OF WINGS:** All wings broad, with scalloped outer margins; forewings pale gray, more or less heavily and evenly overlain with numerous grayish brown and dark brownish scales; cross lines black, varying from prominent to weakly represented, with t. p. line represented by venular dots at least in upper part of wing in most specimens; course of lines as in *cariosa*, except t. p. line is gently curved in lower portion of wing; t. p. line, and to lesser extent t. a. line, with dull grayish brown shade band; subterminal area narrowly pale gray above inner margin in most specimens; s. t. line weakly represented or absent; terminal area with broad pale space in middle of wing weakly developed or absent; terminal line black, narrow, with intravenular dots; fringe concolorous with wing, and darkened at vein endings. Hind wings concolorous with forewings, and with same type of maculation; basal line, median shade line, and discal dot weakly represented; extradiscal line extending most of width of wing, followed by dull grayish brown shade band; outer portion of wing similar to that of forewing.

**UNDER SURFACE OF WING:** All wings pale gray, with brownish gray scaling, especially on forewings; all wings without maculation except for discal dots and, on forewings, with dark area below apex.

**LENGTH OF FOREWING:** 13 to 18 mm.

**FEMALE:** Similar to male, but with upper surface of wings tending to be more heavily suffused with dark gray scales, obliterating cross lines.

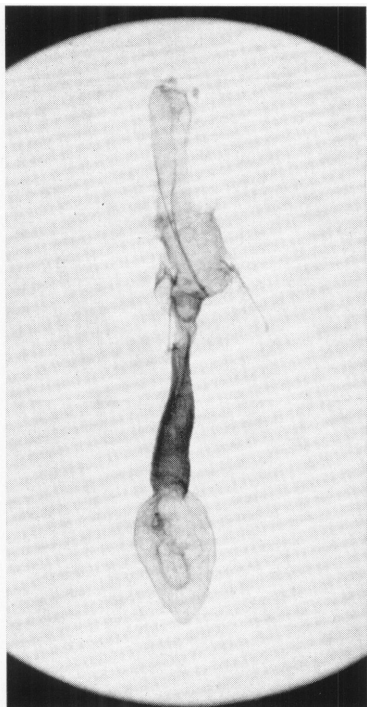
**LENGTH OF FOREWING:** 14 to 18 mm.

**MALE GENITALIA:** Similar to those of *cariosa* but differing mainly as follows: gnathos with median enlargement slightly more swollen;

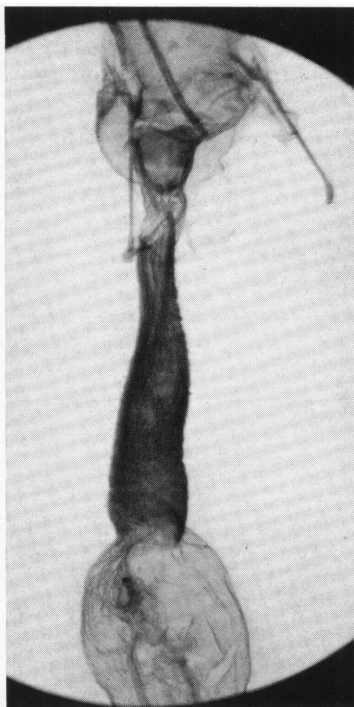
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FIGS. 79-84. Female genitalia. 79, 80. *Hulstina formosata* (Hulst), type, Colorado (Bruce; A.M.N.H.). 81. *Hulstina imitatrix fulva*, new subspecies, allotype, Holbrook, Nevada, August 4, 1938 (G. H. and J. L. Sperry; A.M.N.H.). 82. *Hulstina tanyraeros tanyraeros*, new subspecies, paratype, Camp Ozena, California, July 6, 1964 (C. W. Kirkwood; A.M.N.H.). 83. *Hulstina aridata* Barnes and Benjamin, Trout Creek, Utah, July 14, 1920 (T. Spalding; A.M.N.H.). 84. *Hulstina xera*, new species, paratype, Spring Creek, Oregon, July 28, 1962 (J. H. Baker; A.M.N.H.).

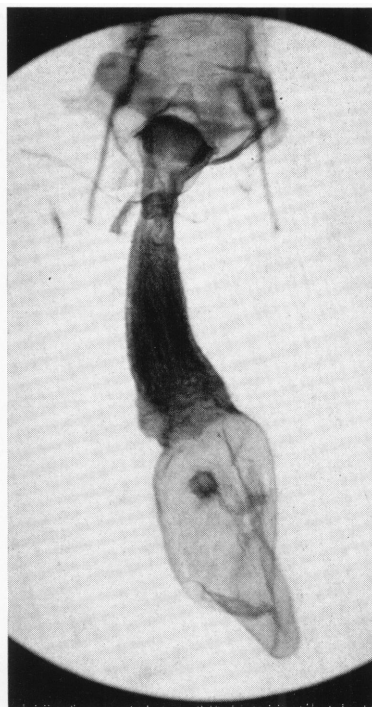




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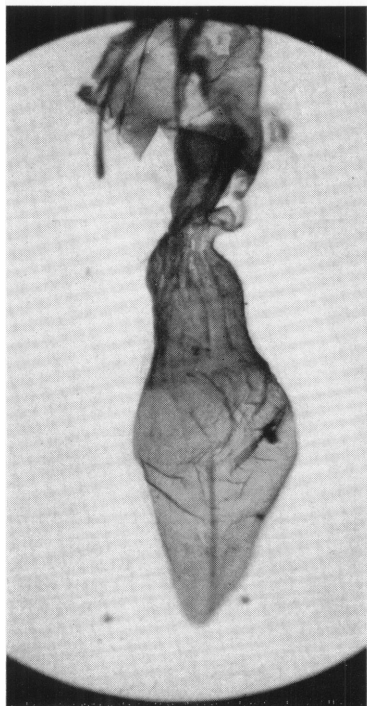


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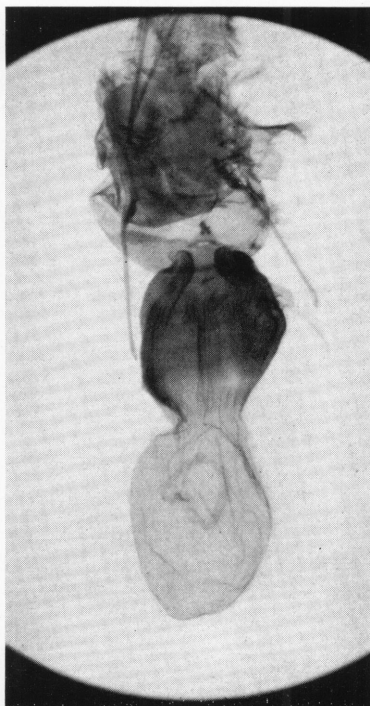
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83



84



right valve with costal area having about nine (varying from seven to 10) short, broad spines in single terminal row; costal area of left valve having anteriorly a row of six (rarely seven) large and two or three small spines, increasing in length anteriorly; vesica armed with five or six long and slender spines, 0.5 mm. in length, and with curved band posteriorly. Abdomen with ventral row of bristles on third segment.

**FEMALE GENITALIA:** Similar to those of *cariosa* but differing mainly as follows: sterigma with anteroventral area slightly larger, and with smooth posterior border to recessed sclerotized area; signum smaller, 0.4 to 0.6 mm. in diameter. Apophyses posteriores shorter, 1.4 to 1.8 mm. in length.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** There is one record of oak.

**DISTRIBUTION:** Southern California. One subspecies is found primarily along the coast, and the second flies in the mountainous areas.

***Pterotaea newcombi newcombi* (Swett)**

Figures 9, 47, 78

*Cleora newcombi* SWETT, 1914, p. 290. BARNES AND McDUNNOUGH, 1917, p. 117.

*Pterotaea newcombi*: McDUNNOUGH, 1920, p. 35 (*partim*); 1938a, p. 165.

The moths of this population, as compared with those of the following subspecies, are larger, have a paler gray upper surface of the wings, and the t. p. line is represented by venular dots. This subspecies occurs along the coast of southern California.

**MALE:** Upper surface of wings grayish white, with scattered grayish brown and dark brownish scales; origins of t. a., median, and t. p. lines marked by large, often diffuse, costal spots; t. p. line represented by venular dots across wing, some specimens having line posteriad of cubital vein; outer portion of wing with relatively prominent pale spaces above inner margin in subterminal area and in middle of wing in terminal area. Hind wings with extradiscal line varying from venular dots to complete line broadened on veins.

**LENGTH OF FOREWING:** 15 to 18 mm.

**FEMALE:** Similar to male, but with upper surface of wings somewhat more heavily suffused with dark gray scaling, more or less obliterating cross lines.

**LENGTH OF FOREWING:** 14 to 18 mm.

**MALE GENITALIA:** As described for the species.

**FEMALE GENITALIA:** As described for the species.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**TYPE:** The holotype, male, is in the collection of the Museum of Comparative Zoology, Harvard College.

**TYPE LOCALITY:** Venice, Los Angeles County, California.

**DISTRIBUTION:** Southern California (see fig. 9). This population is known from coastal Los Angeles County and from both coastal and inland San Diego County.

**TIME OF FLIGHT:** From mid May until early September, with most specimens caught in June and July.

**REMARKS:** A total of 40 specimens (31 males and nine females), including the type, and 10 genitalic dissections (seven males and three females) have been studied.

***Pterotaea newcombi orinomus*, new subspecies**

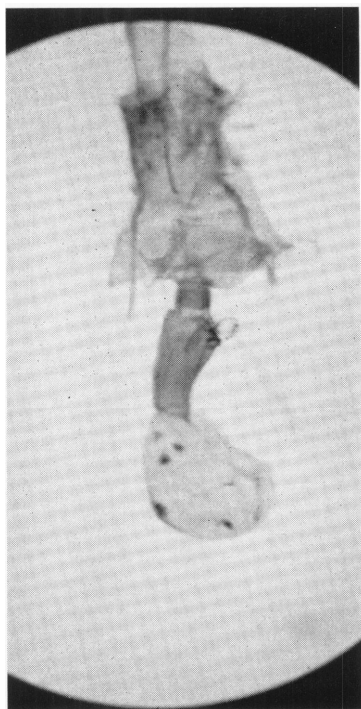
Figures 9, 48, 111

*Pterotaea newcombi*: McDUNNOUGH, 1920, p. 35, pl. 6, fig. 7 (male genitalia), pl. 7, fig. 15 (adult male).

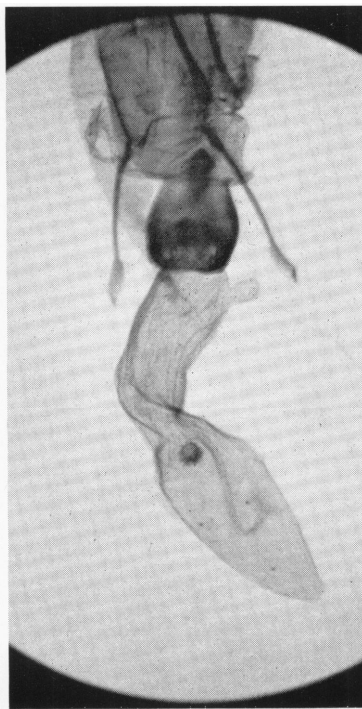
The moths of this population are smaller than the preceding, they have a slightly browner upper surface of the wings, and the lower portion of the t. p. line is solidly represented. This subspecies occurs in the mountainous regions of southern California.

**MALE:** Upper surface of wings pale gray, more or less heavily and evenly overlain with numerous grayish brown and dark brownish scales; origins of t. a., median, and t. p. lines marked by small costal spots; t. p. line varying from being prominent to weakly represented, from complete to at least having lower portion

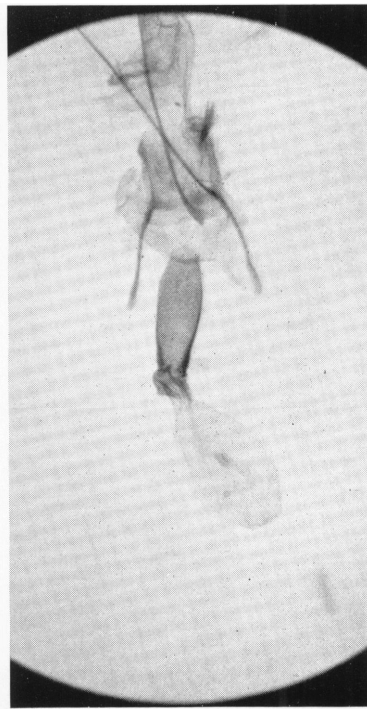
FIGS. 85-90. Female genitalia. 85. *Hulstina grossbecki*, new species, paratype, Box Spring, California, April 15, 1934 (G. H. and J. L. Sperry; A.M.N.H.). 86. *Hulstina exhumata* Swett, Mint Canyon, California, June 20, 1943 (A.M.N.H.). 87. *Hulstina wrightiaria* (Hulst), San Diego, California, June 21, 1920 (A.M.N.H.). 88, 89. *Pterotaea crickmeri* (Sperry), allotype, Borrego, California, March, 1946 (N. Crickmer; A.M.N.H.). 90. *Pterotaea salviatieri*, new species, paratype, Punta Pulpita, Baja California, April 12, 1962 (C. F. Harbison; A.M.N.H.).



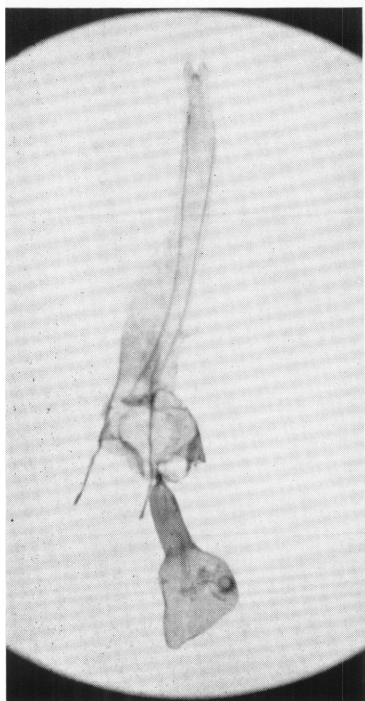
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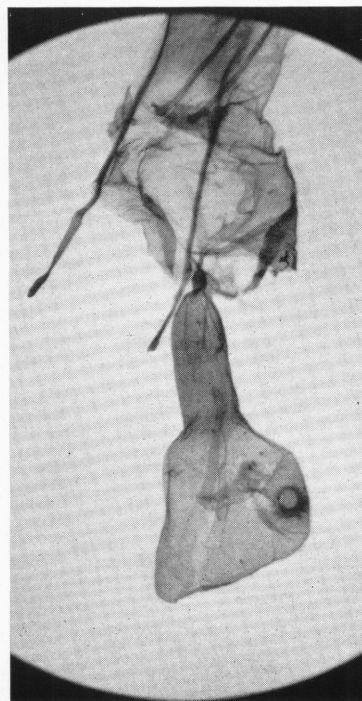
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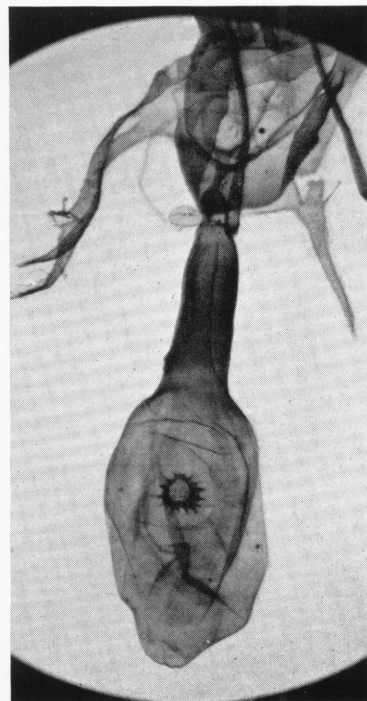
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as solid line; outer portion of wing with relatively poorly developed pale spaces above inner margin in subterminal area and in middle of wing in terminal area. Hind wings with extra-discal line solid, in some specimens enlarged on veins.

LENGTH OF FOREWING: 13 to 17 mm.; holotype, 16 mm.

FEMALE: Similar to male, but with upper surface of wings heavily suffused with dark gray scaling, and with maculation obsolescent.

LENGTH OF FOREWING: 14 to 17 mm.; allotype, 17 mm.

MALE GENITALIA: As described for the species.

FEMALE GENITALIA: As described for the species.

EARLY STAGES: Unknown.

FOOD PLANT: One specimen in the Los Angeles County Museum of Natural History is labeled as having been reared on oak.

TYPES: Holotype, male, upper Santa Ana River, San Bernardino County, California, August 12, 1945 (G. H. and J. L. Sperry); allotype, female, same data but August 22, 1946. The genitalia of the holotype are mounted on slide F.H.R. No. 8535; those of the allotype, on F.H.R. No. 8586. Paratypes, all from California and listed by counties: *San Bernardino County*: Same data as types, July 18, 1946, August 8, 19, 1946, August 21, 27, 1948, two males and five females; Barton Flats, July 10, 1940 (F. H. Rindge), three males, August 16, September 1, 1945 (G. H. and J. L. Sperry), one male and one female; Camp Baldy, San Bernardino Mountains, no date and July 16–23, two males, August 4, 1951 (C. Henne), one female; Hathaway Creek, San Bernardino Mountains, August 2, 1940 (C. Henne), one male. *Los Angeles County*: Mt. Wilson, July 14, 1925, August 6, 7, 1923, August 9, no date, seven males; Mt. Lowe, July 9, 24, 1924, July 30, August 5, 6, four males and two females; Bouquet Canyon, June 7, 14, 1937, four males; Artesian Springs, Bouquet Canyon, June 25, 1939 (L. M. Martin),

“7–8–45,” 10 males; San Francisquito Canyon, June 7, 1937 (E. C. Johnston), one male; Mint Canyon, June 20, 1943 (F. H. Rindge), five males and two females, July 3, 1920, one male; Crystal Lake, San Gabriel Canyon, August 3, 1946 (J. A. Comstock and L. M. Martin), seven males and nine females; Buckhorn Flats, Angeles Crest Highway, San Gabriel Mountains, elevation 6500 feet, August 3, 1948 (C. I. Smith), one male; Cloudburst Canyon, Sierra Madre Mountains, July 11, 1940 (J. A. Comstock), one male; Beverly Hills, August 22–September 15, one female. *Kern County*: Above Kernville, on Kern River, elevation 4000 feet, June 22, 1957 (R. H. Leuschner), one male; Lebec, larva on oak, emerged June 15, 1936 (J. A. Comstock), one male; Camp Condor, near Mt. Pinos, elevation 6500 feet, August 10, 15, 1942 (P. Denton), one male and two females. *Ventura County*: Ozena Forestry Camp, July 18, 1964 (C. W. Kirkwood), one male. *Santa Barbara County*: Figueroa Mountain, June 29, 1965, July 6, 7, 13, 14, 1952–1966, 19 males and nine females; Aliso Canyon, 6 miles southwest of New Cuyama, July 9, 1965 (J. Powell), one male and one female.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, of the California Insect Survey, of the Canadian National Collection, of the Los Angeles County Museum of Natural History, of the University of California, Davis, of C. W. Kirkwood, and of R. H. Leuschner.

DISTRIBUTION: The mountainous regions of southern California, known from San Bernardino County and extending northwest into Kern and Santa Barbara counties (see fig. 9).

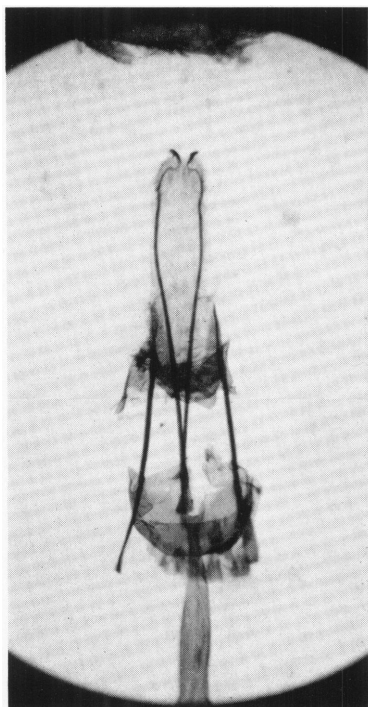
TIME OF FLIGHT: From June into early September, with two April records.

REMARKS: A total of 81 specimens (42 males and 39 females) and 19 genitalic dissections (13 males and six females) have been studied.

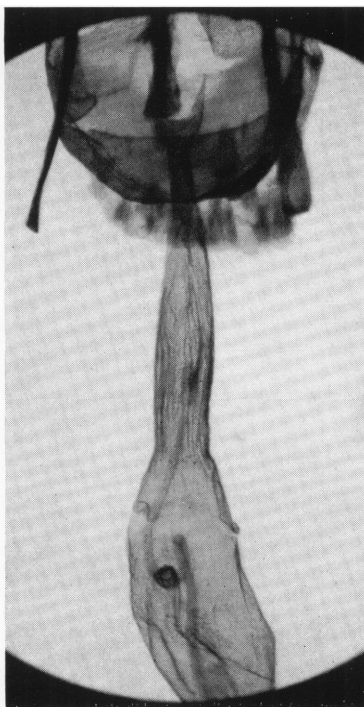
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FIGS. 91–96. Female genitalia. 91, 92. *Pterotaea sperryae* McDunnough, Granite Well, California, May 25, 1939 (G. H. and J. L. Sperry; A.M.N.H.). 93. *Pterotaea leuschneri*, new species, paratype, Bob's Gap, California, May 29, 1968 (R. H. Leuschner; A.M.N.H.). 94. *Pterotaea plagia*, new species, paratype, Pinyon Flat, California, May 30, 1965 (R. H. Leuschner; A.M.N.H.). 95, 96. *Pterotaea lamiaria lamiaria* (Strecker), Rancho La Sierra, California, July 10, 1948 (A. H. Rindge; A.M.N.H.).

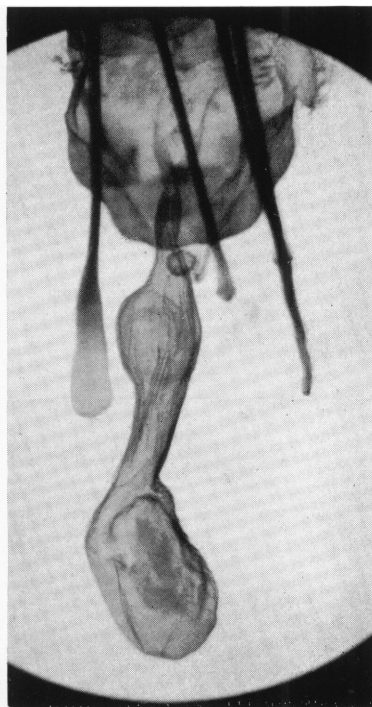




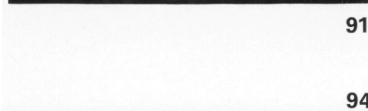
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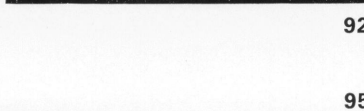
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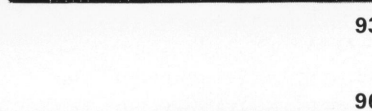
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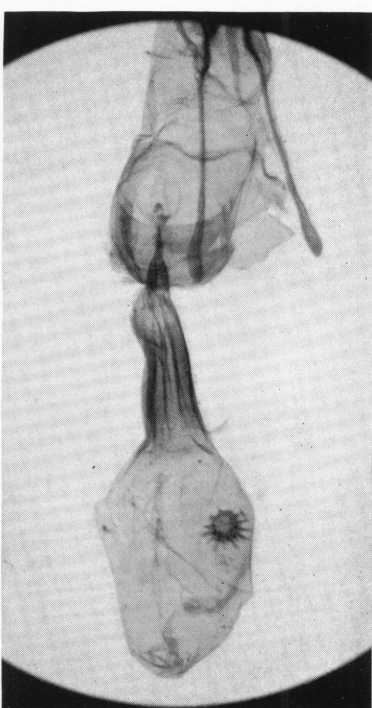
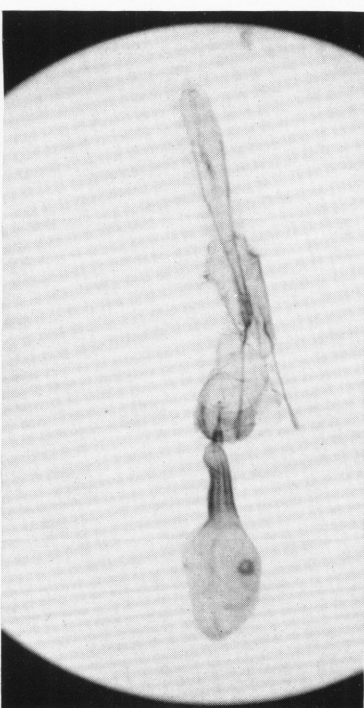
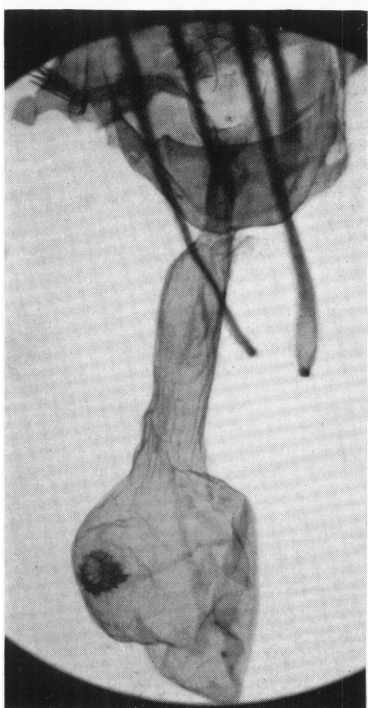
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## LIST OF SPECIES WITH THEIR KNOWN DISTRIBUTION

GENUS *Hulstina* DYAR

## GROUP I

1. *formosata* (Hulst)  
    *terlineata* Dyar  
    Northern Arizona, Colorado, Utah, eastern Nevada
2. *imitatrix*, new species  
    a. *imitatrix*, new subspecies  
    b. *fulva*, new subspecies  
    Nevada, western Utah, eastern Oregon, southern Idaho  
    Eastern California and adjacent Nevada
3. *tanyraeros*, new species  
    a. *tanyraeros*, new subspecies  
    b. *deserta*, new subspecies  
    Southern California  
    Eastern California
4. *aridata* Barnes and Benjamin  
    New Mexico, Arizona, Utah, Nevada, California,  
    northwestern Baja California
5. *xera*, new species  
    Northeastern California, eastern Oregon and Washing-  
    ton, Idaho, Wyoming

## GROUP II

6. *grossbecki*, new species  
    *wrightiaria* auct.  
    Coastal California, northwestern Baja California
7. *exhumata* Swett  
    Coastal California
8. *wrightiaria* (Hulst)  
    *inconspicua* Hulst  
    *aethalodaria* Dyar  
    Coastal California, northwestern Baja California

GENUS *Pterotaea* HULST

## GROUP I

1. *crickmeri* (Sperry)  
    Southern California, Baja California
2. *salvatierrai*, new species  
    Baja California Sur
3. *crinigera*, new species  
    Southern California

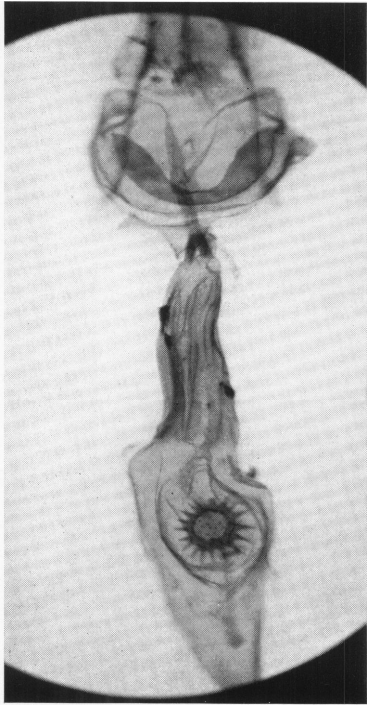
## GROUP II

4. *sperryae* McDunnough  
    Southern California, northwestern Arizona
5. *leuschneri*, new species  
    Southern California
6. *plagia*, new species  
    Southern California

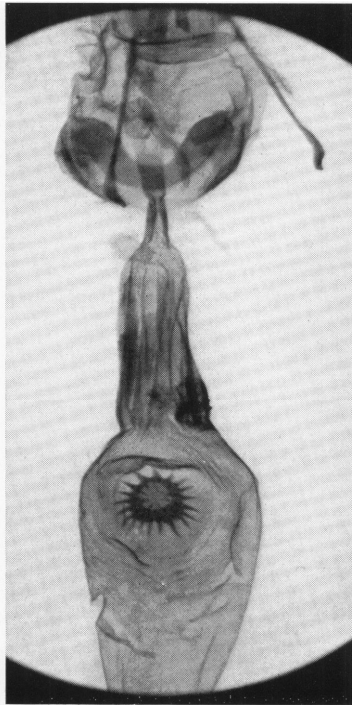
## GROUP III

7. *lamiaria* (Strecker)  
    a. *lamiaria* (Strecker)  
    *agrestaria* (Grossbeck)  
    b. *tythos*, new subspecies  
    Coastal California, northwestern Baja California
8. *campestraria* McDunnough  
    Eastern California
9. *succurva*, new species  
    Southern California, northwestern Baja California  
    *campestraria* McDunnough (*partim*)  
    Central and northern coastal California
10. *glauca*, new species  
    Southern California, northwestern Baja California
11. *cavea*, new species  
    Coastal southern California
12. *miscella*, new species  
    Southern Nevada, eastern California
13. *systole*, new species  
    Southern Sierra Nevada, California
14. *euroa*, new species  
    Eastern Nevada, western Utah
15. *lira*, new species  
    Southern California
16. *obscura*, new species  
    Southern California
17. *comstocki*, new species  
    Southern California  
    *serrataria* Barnes and McDunnough (*partim*)

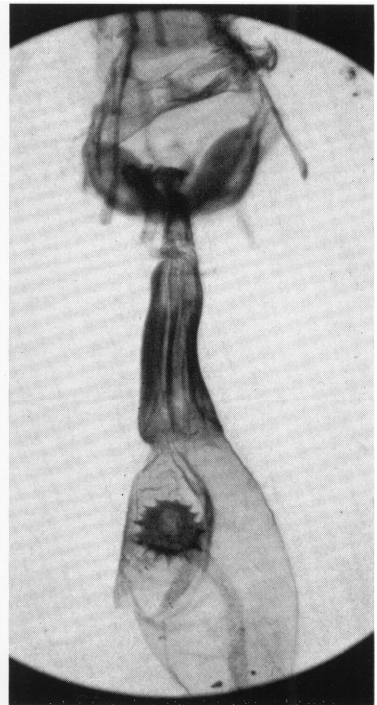
FIGS. 97-102. Female genitalia. 97. *Pterotaea campestraria* McDunnough, Santo Tomas, Baja California, July 8, 1953 (W. J. and J. W. Gertsch; A.M.N.H.). 98. *Pterotaea glauca*, new species, paratype, 5 miles north of Beverly Hills, California, June 25, 1956 (N. McFarland; A.M.N.H.). 99. *Pterotaea cavea*, new species, holotype, Figueroa Mountain, California, June 30, 1965 (C. W. Kirkwood; A.M.N.H.). 100. *Pterotaea succurva*, new species, paratype, Laytonville, California, August 3, 1949 (R. F. Sternitzky; A.M.N.H.). 101. *Pterotaea miscella*, new species, paratype, 1 mile west of Tom's Place, California, August 13, 1957 (J. Powell; A.M.N.H.). 102. *Pterotaea euroa*, new species, paratype, Pequop Mountains, Nevada, August 3, 1934 (G. H. and J. L. Sperry; A.M.N.H.).



97

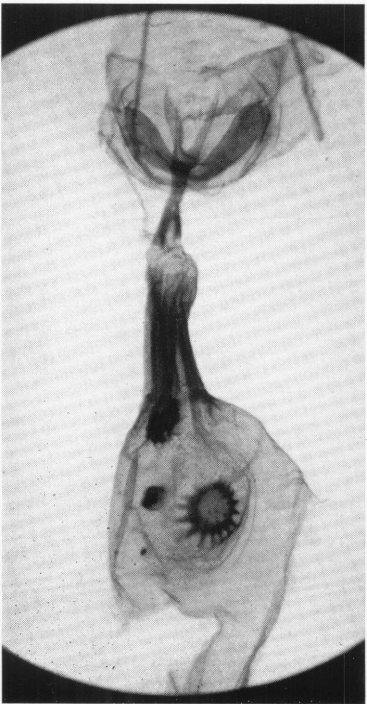


98

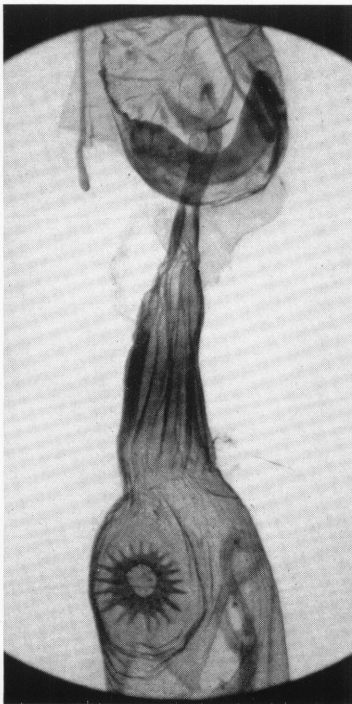


99

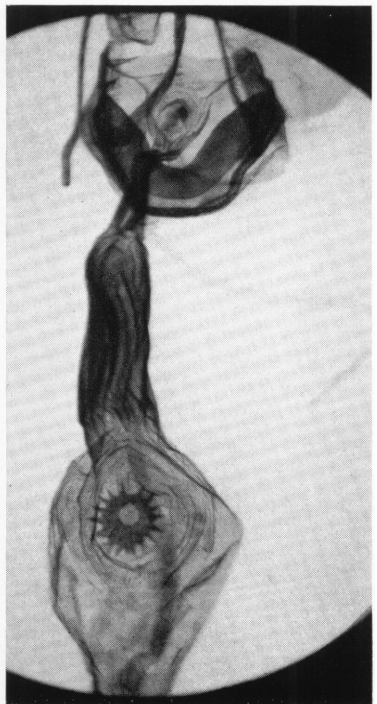
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101



102

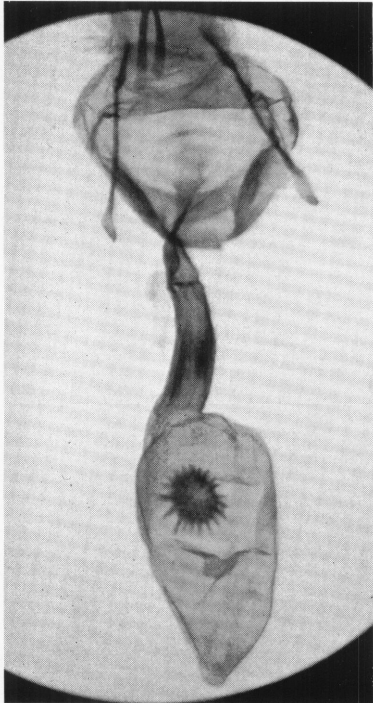


- |   |                                  |
|---|----------------------------------|
| 18. <i>macroceros</i> , new species     | Southern California              |
| 19. <i>powelli</i> , new species        | Central California               |
| 20. <i>albescens</i> McDunnough         | Northern California              |
| 21. <i>melanocarpa</i> (Swett)          |                                  |
| a. <i>melanocarpa</i> (Swett)           | Southern California              |
| <i>tremularia</i> Barnes and McDunnough |                                  |
| <i>serrataria</i> Barnes and McDunnough |                                  |
| b. <i>opaca</i> , new subspecies        | Southern California              |
| 22. <i>cariosa</i> Hulst                |                                  |
| a. <i>cariosa</i> Hulst                 | North coastal California, Oregon |
| b. <i>incompta</i> , new subspecies     | Central coastal California       |
| c. <i>aporema</i> , new subspecies      | Cascade and Sierra Nevada ranges |
| 23. <i>newcombi</i> (Swett)             |                                  |
| a. <i>newcombi</i> (Swett)              | Coastal southern California      |
| b. <i>orinomos</i> , new subspecies     | Inland southern California       |

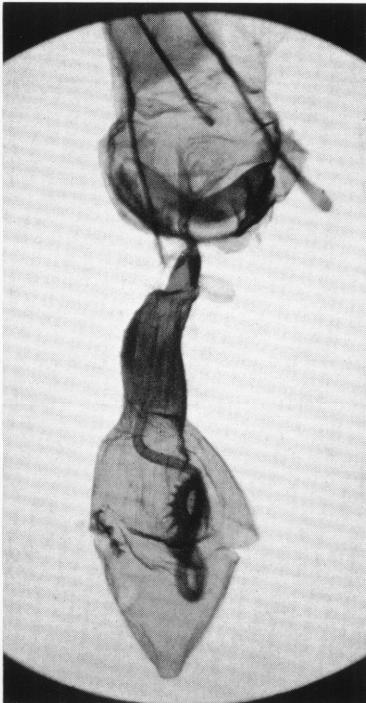
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FIGS. 103–108. Female genitalia. 103. *Pterotaea lira*, new species, allotype, San Diego, California, June 28, 1924 (L.A.M.). 104. *Pterotaea obscura*, new species, paratype, Rimforest, California, July 11, 1959 (R. H. Leuschner; A.M.N.H.). 105. *Pterotaea comstocki*, new species, paratype, Figueroa Mountain, California, July 7, 1965 (C. W. Kirkwood; A.M.N.H.). 106. *Pterotaea macroceros*, new species, paratype, Crystal Lake, California, August 3, 1946 (J. A. Comstock and L. M. Martin; L.A.M.). 107. *Pterotaea powelli*, new species, allotype, Walnut Creek, California, June 22, 1964 (J. Powell; C.A.S.). 108. *Pterotaea albescens* McDunnough, Laytonville, California, August 25, 1948 (R. F. Sternitzky; A.M.N.H.).

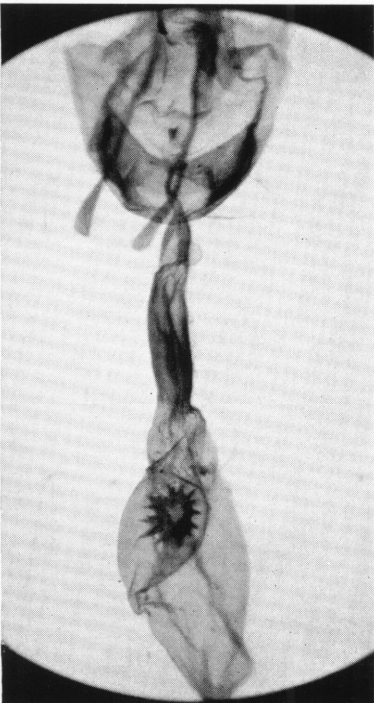




103

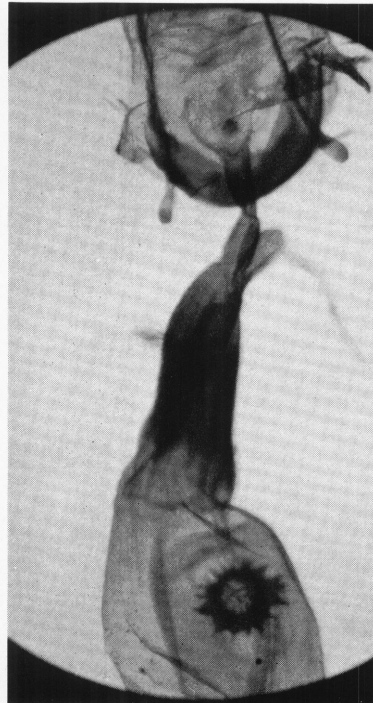


104

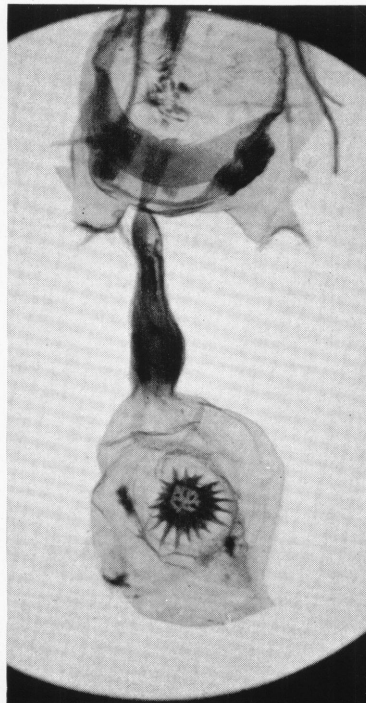


105

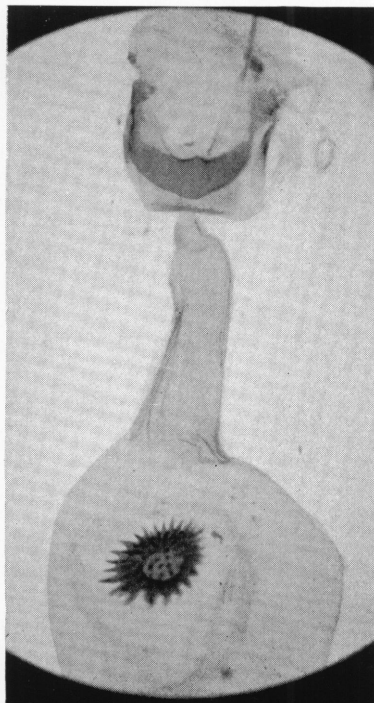
106

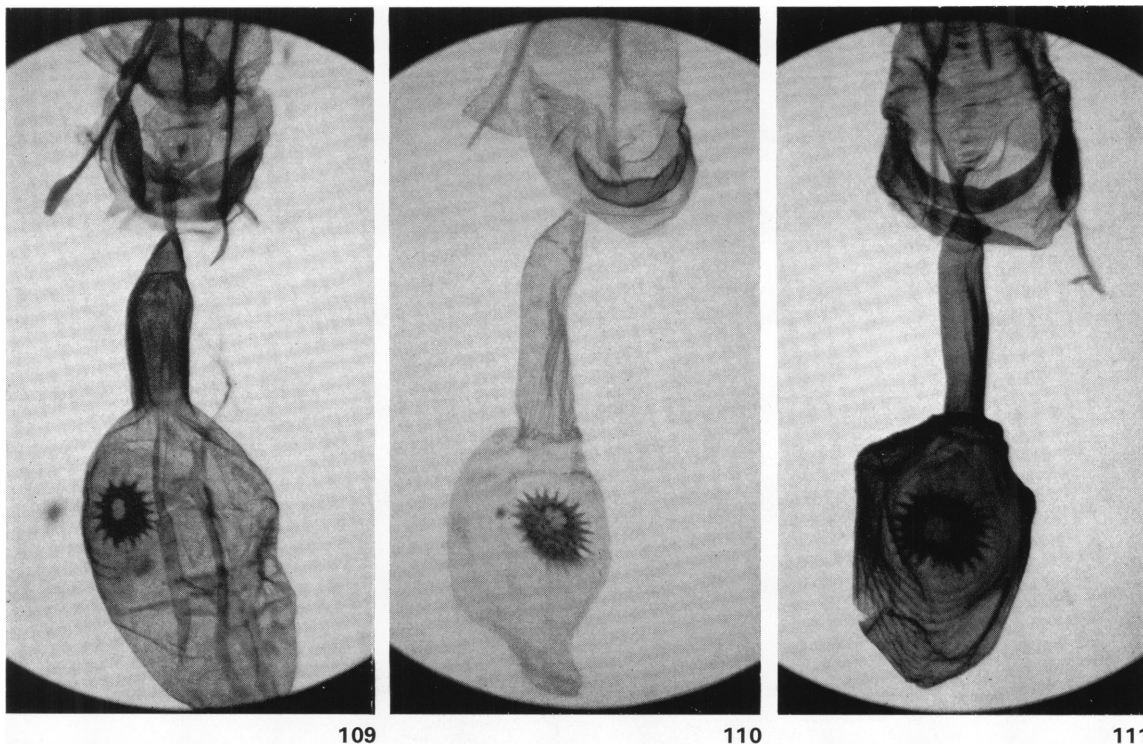


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FIGS. 109–111. Female genitalia. 109. *Pterotaea melanocarpa melanocarpa* (Swett), Alpine, California, July, 1912 (G. H. Field; A.M.N.H.). 110. *Pterotaea cariosa cariosa* Hulst, type, California (A.M.N.H.). 111. *Pterotaea newcombi orinomos*, new subspecies, paratype, Crystal Lake, California, August 3, 1946 (J. A. Comstock and L. M. Martin; L.A.M.).

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