

SEVEN NEW LEPIDOPTEROUS LEAF-MINERS
ASSOCIATED WITH *QUERCUS AGRIFOLIA*
(HELIOZELIDAE, GRACILARIIDAE)

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During the course of a study of the bionomics of Microlepidoptera associated with *Quercus agrifolia* Neé (Fagaceae) in California, it was found that a number of the species are undescribed. In order to provide names for use elsewhere, one new heliozelid and six new gracilariids are herein described. Because the genitalia of the Nearctic members of these families have not been previously studied, the works of Kumata (1963), Kuroko (1961), and Vari (1961) provided bases of homologies and diagnostic features in the genitalia of these moths.

Descriptions in this paper use the holotype and allotype as exemplars. The holotype and allotype of each species are deposited in the California Academy of Sciences, San Francisco, on indefinite loan from the California Insect Survey, University of California, Berkeley. Paratypes are deposited in the American Museum of Natural History, New York; California Academy of Sciences; California Insect Survey; Canadian National Collection, Ottawa; Los Angeles County Museum; and U.S. National Museum, Washington, D.C.

Coptodisca powellella Opler, new species

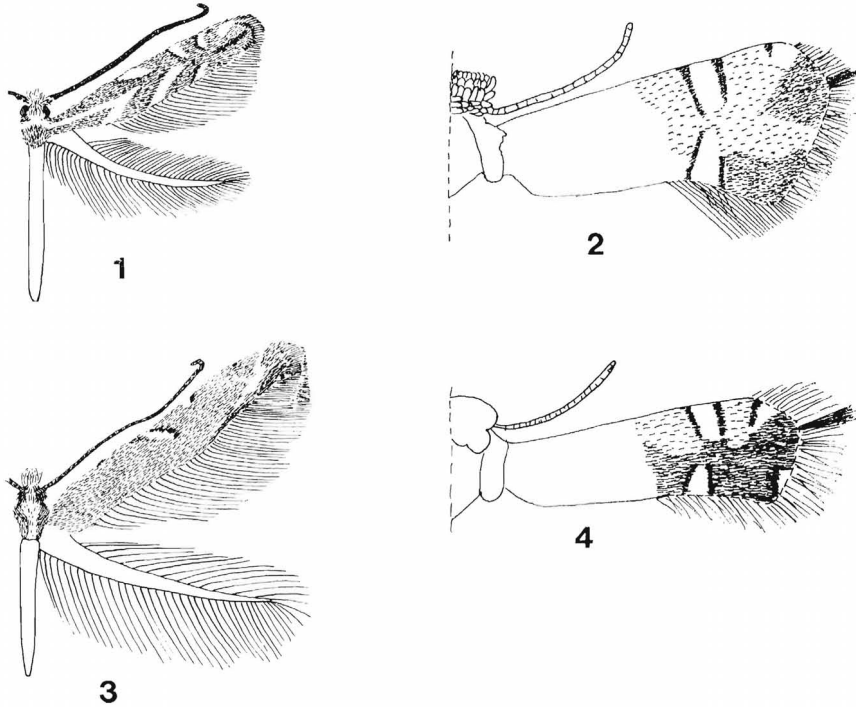
Male. Length of forewing 1.5 to 1.7 mm (reared).

HOLOTYPE MALE. Length of forewing 1.6 mm. *Forewing:* Basal half metallic silver; distal half with pattern as follows: a basal orange patch extending from costa almost to inner margin; followed distally by two opposing triangular patches of silver, one on costal margin, one on inner margin, apices not quite joining; these patches narrowly margined with black basally and distally; costal area orange distal to triangular patches except for subapical black margined silver patch and black apex. Dorsal area black distal to silver patch on inner margin. *Abdomen:* Blackish dorsally, silver ventrally. *Genitalia:* As in Figs. 9, 10, 12, 14, 15 (drawings from paratype, PAO prep. 323); uncus shallowly bilobed at tip.

Female. Length of forewing 1.6 to 1.9 mm (reared).

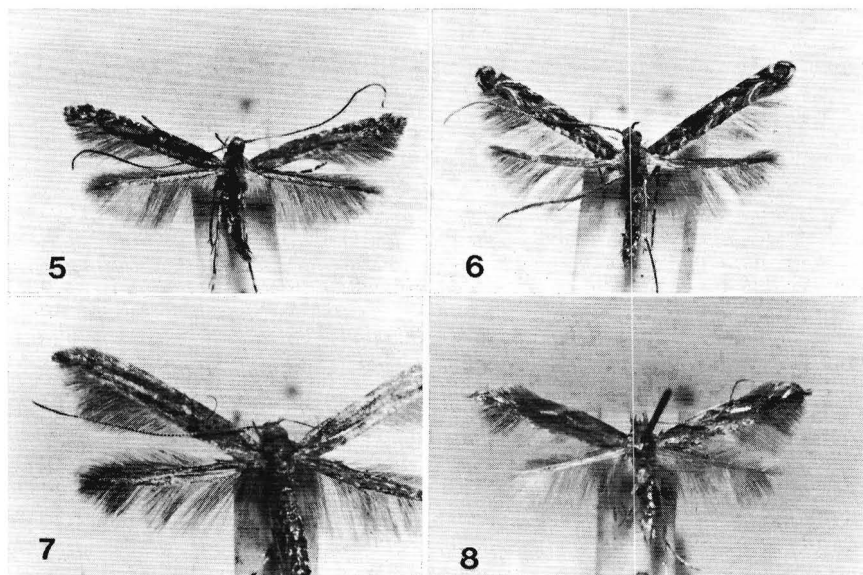
ALLOTYPE FEMALE. Length of forewing 1.7 mm. External features as described for male. *Genitalia:* As in Figs. 28, 29, 30. Comparison with genitalia of other oak-feeding *Coptodisca* was not made. Thus, the included drawings serve only to portray the structures which may later prove to be of diagnostic value.

Type Material. *Holotype male:* California, Descanso Ranger Station, San Diego County, 31 March 1961, reared from *Quercus agrifolia* Neé, J. Powell lot 61C22, emerged 21 April 1961, collected by J. Powell. *Allotype female:* same data except emerged 12 April 1961. *Paratypes:* 66 ♂♂, 83 ♀♀ as follows: **California.**—Contra Costa Co.: Clayton, 6 mi. SE, 1 ♀, II-2-68, r.f. *Q. agrifolia*, J. Powell lot 68B18,



Figs. 1-4. 1, *Lithocolletis antiochella* Opler, ♂, right forewing, holotype; 2, *Coptodisca powellella* Opler, ♂, right forewing, Descanso Ranger Station, San Diego Co., Calif. 31 March 1961 r.f. *Quercus agrifolia* JAP 61C22 emgd. 18 April 1961, J. Powell collector; 3, *Cameraria wislizeniella* Opler, ♂, right forewing, holotype; 4, *Coptodisca querciella* Braun, ♂, right forewing, paratype, Cornville, Yavapai Co., Ariz. r.f. *Quercus emoryi* B1241 emgd. 1 May 1925, H. Brisley collector.

emgd. III-20-68 (P. Opler); Cowell, 1 ♀, II-28-68, r.f. *Q. agrifolia*, J. Powell lot 68B193, emgd. IV-10-68 (P. Opler). Los Angeles Co.: Santa Monica Mts., 3 ♂ ♂, 3 ♀ ♀, III-17-69, r.f. *Q. agrifolia*, J. Powell lot 69C68, emgd. IV-3/10-69 (P. Opler). Monterey Co.: Arroyo Seco Camp, 4 ♂ ♂, II-12-68, r.f. *Q. agrifolia*, J. Powell lot 68B53, emgd. III-27/IV-5-68 (P. Opler). Placer Co.: Penryn, 1 ♂, III-13-68, r.f. *Q. wislizenii*, J. Powell lot 68C14, emgd. IV-8-68 (P. Opler). Riverside Co.: Mountain Center, 1 ♂, III-16-68, r.f. *Q. wislizenii* var. *frutescens*, J. Powell lot 68B127, emgd. III-17-68 (P. Opler). San Bernardino Co.: Forest Home, 1 mi. W, 3 ♂ ♂, 5 ♀ ♀, III-29-68, r.f. *Q. wislizenii* var. *frutescens*, J. Powell lot 68C77, emgd. IV-27/V-7-68 (P. Opler). San Diego Co.: Descanso Rgr. Sta., 5 ♂ ♂, 6 ♀ ♀, III-31-61, II-15-68, r.f. *Q. agrifolia*, J. Powell lots 61C22, 68B110, emgd. IV-10/21-61, II-14/23-68 (P. Opler, J. Powell). Warner Springs, 1 mi. NW, 32 ♂ ♂, 42 ♀ ♀, II-15-68, r.f. *Q. agrifolia* var. *oxyadenia*, J. Powell lot 68B118, emgd. III-12/IV-5-68 (P. Opler). Santa Barbara Co.: Los Prietos, 1 mi. E, 10 ♂ ♂, 12 ♀ ♀, II-13-68, r.f. *Q. agrifolia*, J. Powell lot 68B76, emgd. III-14/IV-5-68 (P. Opler); Santa Cruz Island, Prisoner's Harbor, 4 ♂ ♂, 5 ♀ ♀, III-14-69, r.f. *Q. agrifolia*, J. Powell lot 69C24, emgd. IV-8/14-69 (P. Opler, J. Powell); Santa Cruz Island, U. C. Field Sta., 1 ♂ ♂, 7 ♀ ♀, III-15-69, r.f. *Q. agrifolia*, J. Powell lot 69C48, emgd. III-27/IV-6-69 (P. Opler).

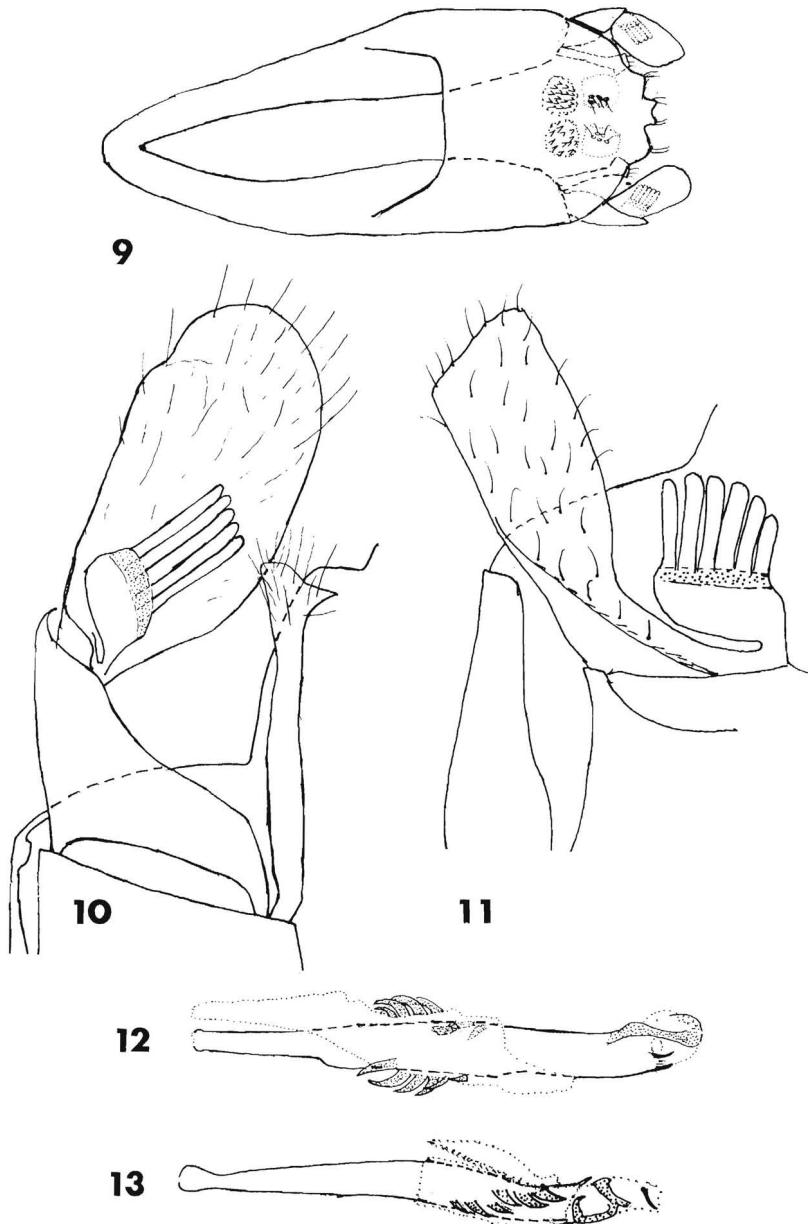


Figs. 5-8. 5, *Acrocercops insulariella* Opler, ♀, Central Valley, Santa Cruz Island, Santa Barbara Co., Calif., 28 April 1966 r.f. *Quercus agrifolia* JAP 66D45, emgd. 31 May 1966, J. Powell and J. Wolf collectors; 6, *Neurobathra bohartiella* Opler, ♂, Strawberry Canyon, Alameda Co., Calif. 30 July 1968, r.f. *Quercus agrifolia* JAP 68G73, emgd. 13 August 1968, P. Opler collector; 7, *Caloptilia agrifoliella* Opler, ♀, two miles southeast of Inverness, Marin Co., Calif., 13 April 1968, r.f. *Quercus agrifolia* JAP 68D1333, emgd. 12 May 1968, P. Opler collector; 8, *Lithocolletis sandraella* Opler, ♂, Descanso Ranger Station, San Diego Co., Calif., 31 March 1961, r.f. *Quercus agrifolia* JAP 61C24, emgd. 9 April 1961, J. Powell collector.

The only previously described western oak-feeding member of this genus is *C. querciella* Braun. In her description of *C. querciella*, Braun (1927) delineates only the maculation features of the adult and states that the host is an evergreen species of *Quercus*. Through Dr. Braun's courtesy I was able to examine leaf mines as well as a male paratype from Cornville, Yavapai County, Arizona, the type locality. The leaf which harbored the mines of *C. querciella* proved to be *Quercus emoryi*, a species which is consubgeneric with the hosts of *C. powellella*.

C. powellella differs from *C. querciella* in features of forewing maculation. The former has extensive orange markings and restricted black markings, while the latter has less extensive orange and more extensive black (Figs. 2, 4).

The most obvious differences in the male genitalia are in the aedeagi and apparent aedeagal sheaths of the two species. The "aedeagal sheath" of *C. powellella* is proportionately larger than that of *C. querciella* and



Figs. 9-13. Male genitalia of *Coptodisca*. 9, *C. powellella* Opler, dorsal aspect, aedeagus removed; 10, *C. powellella*, left valva, ventral aspect; 11, *C. querciella* Braun, left valva, ventral aspect; 12, *C. powellella*, aedeagus and "aedeagal sheath" lateral aspect; 13, *C. querciella*, aedeagus and "aedeagal sheath", lateral aspect.

is of a somewhat different shape, while other apparent differences are shown by the tips of the aedeagi (Figs. 12, 13).

***Acrocercops insulariella* Opler, new species**

Male. Length of forewing, 3.7 to 4.5 mm (reared).

HOLOTYPE MALE. Length of forewing 4.2 mm. *Head:* Maxillary palpus with outer side black scaled, inner side white scaled. Labial palpus primarily white scaled basally, black scaled distally. Antenna longer than wing, uniformly blackish gray. Vestiture of front mixed brownish-gray and gray white. Vestiture of vertex brownish-gray. *Thorax:* Scaling of dorsum and tegulae brownish-gray; scaling of pleural and ventral areas predominantly white with some light gray scales intermixed. Prothoracic leg with femur dirty white, tibia gray, tarsomeres gray black ringed with white; mesothoracic leg with femur white ventrally, blackish-gray dorsally, tibia black with white basoventrally and a white ring around middle, tarsomeres black, ringed with white; metathoracic leg with femur white, tibia white ventrally, black dorsally, tarsomeres black, variously marked with white. *Forewing:* Ground mixed brown and orangish brown; several small patches of five to ten white scales as follows: seven along costal margin, four along inner margin. Underside dark brown. Fringe brown with two patches of white scales at distal end of costa, a few black-tipped white scales at wing tip, and a few white scales in fringe at distal end of inner margin. *Hind wing:* Upperside, underside, and fringe gray brown. *Abdomen:* Gray black dorsally, white ventrally. *Genitalia:* As in Figs. 17, 18 (drawings from Paratype, PAO prep. no. 139); valvae with dorsal margin straight, margin of cucullus slightly convex distally to meet costal margin at bluntly subtriangulate tip, inner face densely covered with setae on distal .8; tegumen .75 length of valvae, distal margin quadrate in ventral view, weakly setate; saccus short; aedeagus with one pointed cornutus at tip.

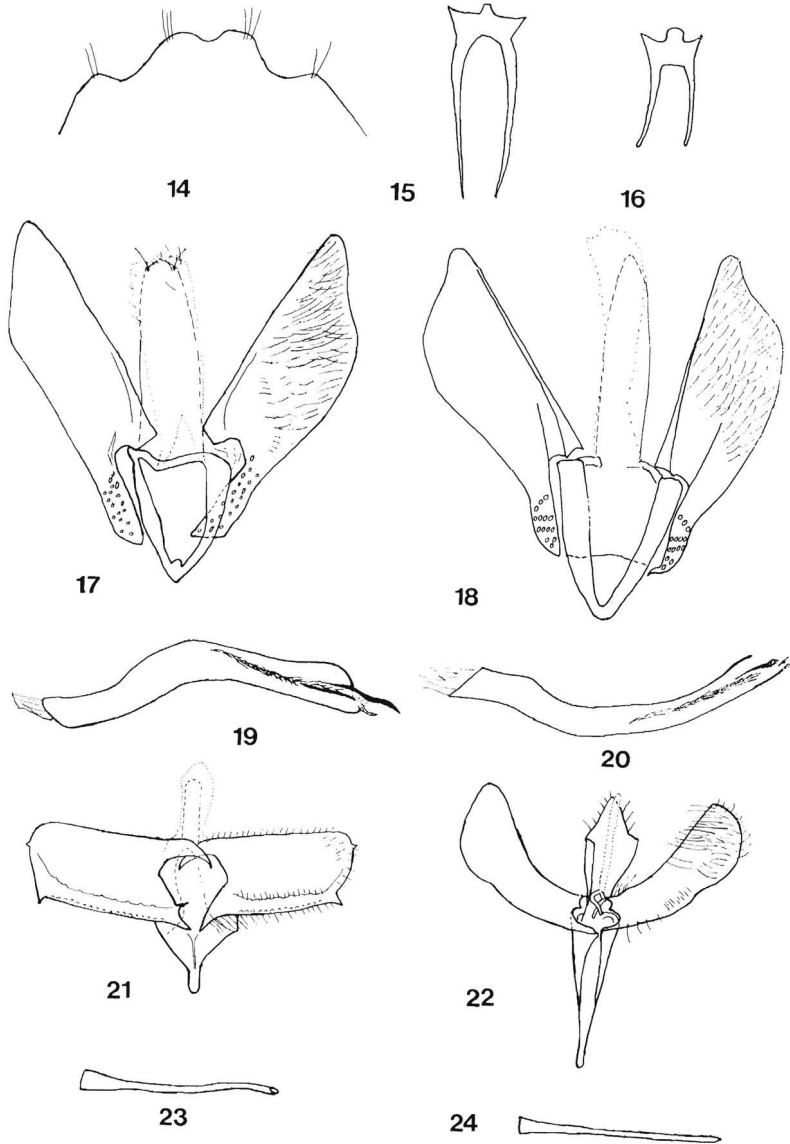
Female. Length of forewing 4.3 to 4.7 mm (field collected).

ALLOTYPE FEMALE. Length of forewing 4.5 mm. External features as described for male. *Genitalia:* Aphophyses anteriores slightly recurved. Ductus bursae with rib-like sclerotizations at .66 from opening. Signum a caliper-shaped sclerotization.

Type Material. Holotype male: California, Santa Cruz Island, Central Valley, Santa Barbara County, 28 April 1966, reared from *Quercus agrifolia* Neé, J. Powell lot 66D45, emerged 31 May 1966, collected by J. Powell, A. Slater, and J. Wolf. *Allotype female*, California, Santa Cruz Island, Eagle Canyon east of Prisoner's Harbor, 9 June 1966, collected by J. A. Powell. *Paratypes:* 6♂♂, 3♀♀ as follows: **California.**—Santa Barbara Co.: Santa Cruz Island, Prisoner's Harbor Creek, 4♂♂, 1♀, IV-28-66, r.f. *Q. agrifolia*, J. Powell Lot 66D45, emgd. V-26/31-66 (J. Powell, A. Slater, J. Wolf); Santa Cruz Island, Eagle Cyn., E of Prisoner's Harbor, 2♂♂, 1♀, VI-9-68 (J. Powell).

Acrocercops insulariella differs from *A. affinis* Braun (1918), the only previously described oak-feeding species which occurs in the west, by features of forewing maculation and the male genitalia. Through the courtesy of Dr. Braun I was able to examine male and female paratypes from Camp Baldy, San Bernardino County, California, the type locality.

Although the two species are closely related there are slight but constant differences. The forewing of *A. affinis* has a pale white patch on the inner margin two-fifths from the base which has quadrate darkened patches to either side. These features are not present in individuals of *A. insulariella*.



Figs. 14-24. Male genitalia. 14, *Coptodisca powellella* Opler, tip of uncus, dorsal aspect; 15, *C. powellella*, transtilla, dorsal aspect; 16, *Coptodisca querciella* Braun, transtilla, dorsal aspect; 17, *Acrocercops insulariella* Opler, ventral aspect, aedeagus removed; 18, *A. insulariella*, aedeagus, lateral aspect; 19, *Acrocercops affinis* Braun, ventral aspect, aedeagus removed; 20, *A. affinis*, aedeagus, lateral aspect; 21, *Neurobathra bohartiella* Opler, ventral aspect, aedeagus removed; 22, *N. bohartiella*, aedeagus, lateral aspect; 23, *Caloptilia agrifoliella* Opler, ventral aspect, aedeagus removed; 24, *C. agrifoliella*, aedeagus, lateral aspect.

The male genitalia of the two species differ in that the uncus of *A. insulariella* is truncate with two prominent long setae distally, while the uncus of *A. affinis* is subacuminate distally and has several short setae.

***Neurobathra bohartiella* Opler, new species**

Male. Length of forewing 4.5 to 4.9 mm (reared).

HOLOTYPE MALE. Length of forewing 4.7 mm. *Thorax:* Scaling of dorsum and tegulae tan; scaling of pleural and ventral areas silvery gray. Prothoracic leg with femur blackish, tibia silvery gray, tarsomeres white basally, black distally; mesothoracic leg with femur white anteriorly, blackish posteriorly, tarsomeres white ventrally, black dorsally with black distally; metathoracic leg with basal .25 of femur blackish, distal .75 white, tibia white ventrally, gray dorsally, tarsomeres black basally, white distally. *Forewing:* Ground gray brown; ground scaling on distal third of wing tipped with tan; a black mark on costa .3 from base, three narrow, black, outwardly directed streaks on costa near .75 from base; three narrow, white, outwardly directed streaks on costa at from .5 to .8 from base; a white, subapical patch on costa; a large white streak curving outwardly from inner margin .75 from base. Underside brown. Inner fringe at wing tip black; outer fringe at wing of black-tipped white scales giving fringe a black-white-black pattern; remainder of fringe brown. *Abdomen:* Brownish-gray dorsally, white ventrally. *Genitalia:* As in Figs. 21, 22 (drawings from Holotype, PAO prep. no. 173); valvae almost half as broad as long, truncated distally; two short, stout, triangulate projections at distal end, the ventral largest; costal margin of valva straight.

Female. Length of forewing 4.1 to 4.7 mm (reared).

ALLOTYPE FEMALE. Length of forewing 4.3 mm. External features as described for male. *Genitalia:* Anterior margin of seventh segment a heavily sclerotized ring. Anterior portion of corpus bursae sclerotized with small finger-like projections interiorly.

Type Material. *Holotype male:* California, Strawberry Canyon, Alameda County, 30 July 1968, reared from *Quercus agrifolia* Neé, J. Powell lot 68G73, emerged 13 August 1968, PAO prep. no. 173, collected by P. Opler. *Allotype female:* California, Golden Gate Park, San Francisco County, 26 February 1968, reared from *Q. agrifolia*, J. Powell lot 68B181, emerged 6 March 1968, collected by P. Opler. *Paratypes:* 4♂♂, 4♀♀ as follows: **California.**—Alameda Co.: Berkeley, 1♂, III-1-59 (J. Powell); Strawberry Cyn., 1♂, VII-30-68, r.f. *Q. agrifolia*, J. Powell lot 68G73, emgd. VIII-13-68 (P. Opler). Los Angeles Co.: Westwood Hills, 1♀, IV-41, Acc. 309 (R. M. Bohart). Mendocino Co.: Yorkville, 6 mi. SE, 1♀, V-18-66 (A. J. 10-69, r.f. *Q. agrifolia*, J. Powell lots 68B33, 68LB, 69B6, emgd. II-19-68, XII-15-Slater). San Francisco Co.: Golden Gate Park, 2♂♂, 1♀, II-6-68, XI-15-68, II-10-69, r.f. *Q. agrifolia*, J. Powell lots 68B33, 68L5, 69B6, emgd. II-19-68, XII-15-68, II-7-69 (P. Opler). Santa Barbara Co.: Refugio Beach, 3 mi. N, 1♀, VII-4-65 (J. Powell).

Neurobathra bohartiella is apparently the only representative of the genus in California. *Neurobathra strigifinitella* (Clemens), the only other described species in the genus, occurs in eastern North America. The genitalia of *N. bohartiella* differ from that of *N. strigifinitella* as figured by Vari (1961) as follows: the costal margin of the valva of *N. bohartiella* is straight while that on *N. strigifinitella* is slightly concave. Additionally the upper tooth on the distal margin of the valva is relatively smaller for *N. bohartiella* than for *N. strigifinitella*.

The life cycles of the two species differ in that pupae of *N. strigifinitella* undergo an obligatory pupal diapause (*vide* T. N. Freeman), while the life cycle of *N. bohartiella* lacks any form of diapause.

Caloptilia agrifoliella Opler, new species

Male. Length of forewing 6.2 to 7.0 mm (reared).

HOLOTYPE MALE. Length of forewing 6.8 mm. *Head:* Maxillary palpus yellow scaled inwardly, mixed yellow and russet outwardly. Labial palpus yellow scaled basally, mixed yellow and russet distally. Antenna slightly longer than forewing; scape orange scaled; flagellar segments yellowish basally, blackish distally. Vestiture of front and vertex brownish orange. *Thorax:* Scaling of dorsum and tegulae brownish orange with bluish iridescence in reflected light; scaling of pro- and mesothoracic pleural areas orange; scaling of metathoracic pleural areas yellowish. Prothoracic leg with femur yellowish-orange; tibia and basal tarsomeres orangish-brown; remainder of tarsomeres silvery white, narrowly ringed with black distally. Mesothoracic leg with femur and tibia dark orangish-brown; tarsomeres white, narrowly ringed with black distally. Metathoracic leg with femur white-scaled, tibia white ventrally, gray dorsally; tarsomeres white, ringed narrowly with dark gray distally. *Forewing:* Brownish-orange with ill-defined yellowish orange areas on costa; a bluish sheen in reflected light. Underside gray black narrowly edged with orange. Fringe gray black. *Hind wing:* Upperside, underside, and fringe gray black. *Abdomen:* Scaled gray black dorsally, white ventrally. *Genitalia:* As in Figs. 23, 24 (drawings from Paratype, PAO prep. no. 148); valva becoming broader distally, slightly truncated at tip, twice as broad distally as at base; dorsal margin flaring; ventral margin with shallow convex lobe at .5 from base, inner face of lobes with about 15 peg-like setae arranged in three rows; anterior corner of valva with a patch of about 30 stout, pointed setae; distal half of valva covered with long hair-like setae on inner face. Tegumen sclerotized, broader and longer than vinculum, triangulate in distal half, basal half with ventrally directed flaps. Tuba analis membranous, projecting beyond vinculum, with weakly sclerotized median ridge. Saccus as long as length of valva, narrow, acuminate distally. Aedeagus tubular, pointed at tip, lacking cornuti. Coremata of two groups of hair-like scales, one group with scales more than $3 \times$ length of the other.

Female. Length of forewing 6.2 to 6.8 mm (reared).

ALLOTYPE FEMALE. Length of forewing 6.6 mm. Externally as described for male. *Genitalia:* Ninth segment ventrally with posteriorly directed peg-like projection. Eighth segment with a deep membranous invasion just posterior and ventral to apophyses anteriores. Signa two slightly curved, cone-like projections.

Type Material. *Holotype male:* California, one mile southeast Inverness, Marin County, 2 May 1969, reared from *Quercus agrifolia* Neé, J. Powell lot 69E76, emerged 19 May 1969, collected by P. Opler. *Allotype female:* California, two miles southeast Inverness, Marin County, 13 April 1968, reared from *Q. agrifolia*, J. Powell lot 68D133, emerged 12 May 1968, collected by P. Opler. Paratypes: 5 ♂♂, 10 ♀♀ as follows: **California.**—Alameda Co.: Strawberry Cyn., 1 ♂, 2 ♀♀, IV-11-68, r.f. *Q. agrifolia*, J. Powell lot 68D124, emgd. IV-7/V-25-68 (P. Opler). Marin Co.: Inverness, 1 mi. SE, 1 ♂, 5 ♀♀, V-10-68, V-2-69, r.f. *Quercus agrifolia*, J. Powell lots 68E19, 69E76, emgd. V-30-68, V-19/23/69 (P. Opler, J. Powell); Inverness, 2 mi. SE, 3 ♀♀, IV-13-68, r.f. *Q. agrifolia*, J. Powell lot 68D133, emgd. V-12/14/68 (P. Opler). Monterey Co.: Bixby Cyn., 1 ♂, VII-27-48 (J. W. Tilden). San Francisco Co.: Golden Gate Park, 1 ♂, VII-30-67, r.f. *Q. agrifolia*, J. Powell lot 67G22, emgd. VIII-25-67 (P. Opler). Santa Barbara Co.: Santa Cruz Island, Prisoner's Harbor, 1 ♂, VI-7-66 (R. L. Langston).

Caloptilia agrifolia can be distinguished from *Caloptilia reticulata* (Braun), the only other described oak-feeding species of the genus occurring in California, on the basis of life cycle features, larval shelter, maculation, and genitalia. *C. agrifoliella* is normally single-brooded, but is facultatively double-brooded, feeds only on young foliage, and has a pupal diapause which usually lasts through the summer, fall and winter. The larval shelter is a rolled leaf. *C. reticulata* is homodynamically multiple-brooded, feeds on older foliage, and lacks any type of diapause. The larval shelter consists of a singly folded leaf. The vestiture on the dorsum of the thorax and tegulae of *C. agrifoliella* is unicolorous; and the forewing is variously colored orangish, tan, or rust colored with faint light areas and black marks. The male genitalia is distinguished by the long acuminate saccus, rounded valvae, and triangulate tegumen. The vestiture on the dorsum of the thorax of *C. reticulata* is reddish-orange, while that of the tegulae is straw-colored, and the forewing is reddish-orange with numerous straw-colored splotches. The male genitalia are distinguished by the short saccus, truncated valvae, and rounded tegumen.

The names *Gracilaria sanguinella* Beutenmüller, *Gracilaria nigristrigella* Beutenmüller, *Gracilaria ruptistrigella* Beutenmüller, *Gracilaria shastella* Beutenmüller described in 1888, and *Gracilaria fuscoochrella* Beutenmüller described in 1889 were synonymized by Ely (1917) under *Gracilaria alnivorella* Chambers. McDunnough (1946) restricted the name *alnivorella* to an alder feeding species of eastern North America and did not include Beutenmüller's names in the synonymy of that species.

Remnants of the Beutenmüller holotypes are located in the U.S. National Museum and were examined by J. A. Powell. The present state of these types is as follows:

G. sanguinella—"1358 California." No abdomen. No host given.

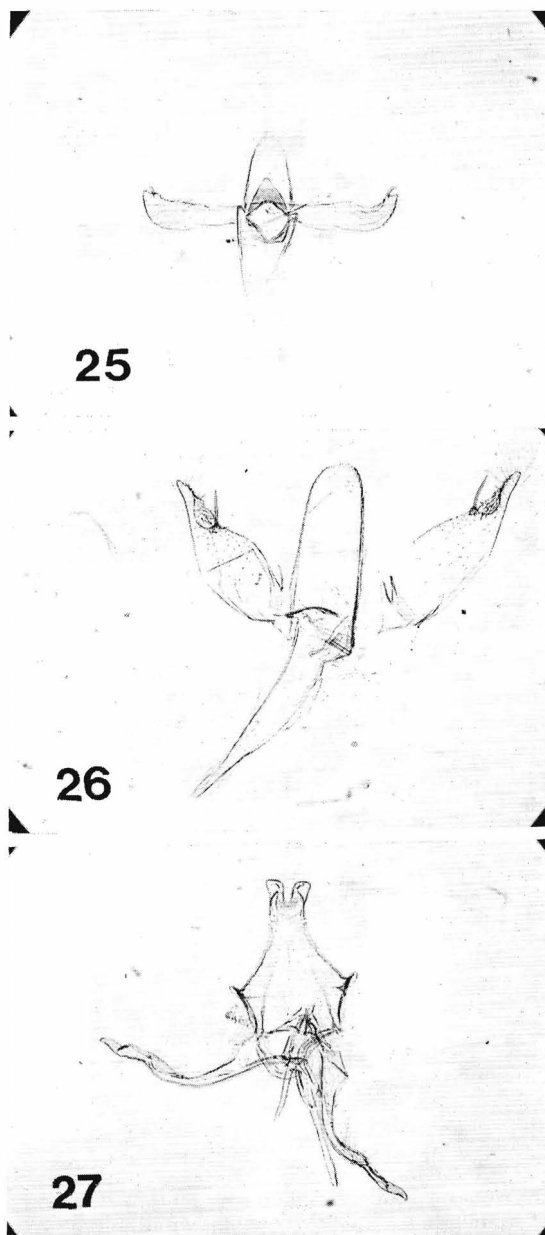
G. nigristrigella—"1333 California." All that remains of the type is one hind wing. Collected on oak tree.

G. ruptistrigella—"1327 California." The specimen is broken in half. No host given.

G. shastella—No abdomen. No host given.

G. fuscoochrella—No abdomen. No host given.

These names could apply to any of a number of Californian *Caloptilia* species which feed on *Acer*, *Alnus*, *Lithocarpus*, or *Quercus*. Because features of the genitalia and host plant are the main criteria for assigning specific status to the moths of this genus and because the above listed Beutenmüller names cannot be evaluated on either basis, I treat them as *nomina dubia*.



Figs. 25–27. Male genitalia, ventral aspect. 25, *Lithocolletis antiochella* Opler; 26, *Lithocolletis sandraella* Opler; 27, *Cameraria wislizeniella* Opler.

***Lithocolletis antiochella* Opler, new species**

Male. Length of forewing 2.7 to 3.9 mm (reared).

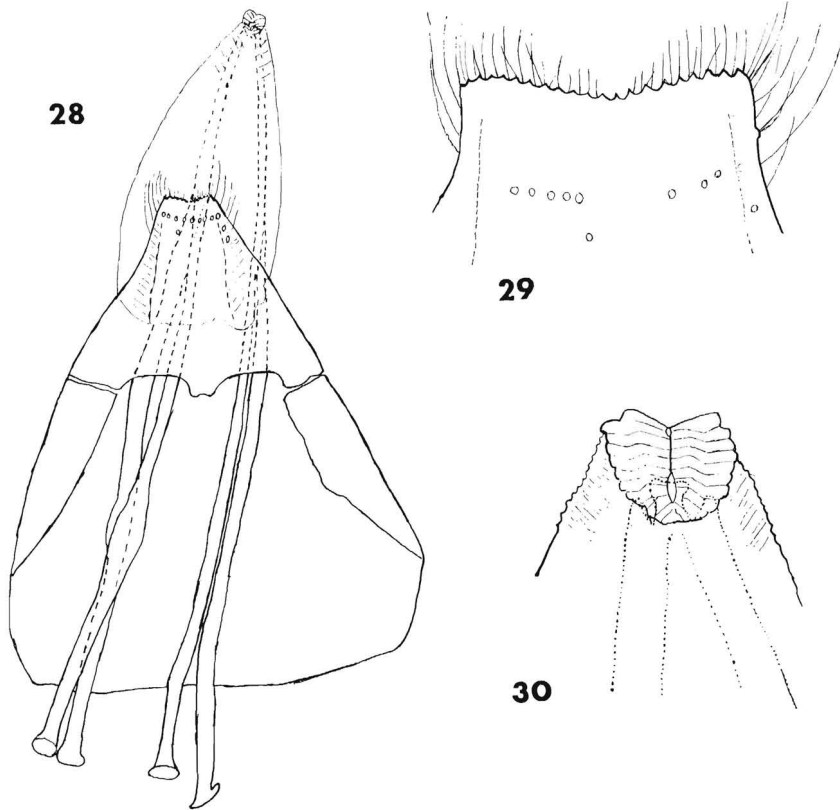
HOLOTYPE MALE. Length of forewing 3.5 mm. *Head:* Maxillary palpus brownish-tan scaled, antenna tan, slightly shorter than length of forewing costa. Vestiture of front shining white; vestiture of vertex, brownish-tan. *Thorax:* Scaling of dorsal portion and anterior half of tegulae brown, whitish at anterior margin; posterior halves of tegulae white-scaled. Pleural and ventral areas with shining white scaling. Legs with shining white scaling except for black scaling on: dorsal halves of femora, tibia, and tarsi of pro- and meso-thoracic legs. A tuft of long white scales on ventral half of tibiae. *Forewing:* Brown, shining gold in reflected light; a white stripe from base through median portion of wing along basal .4 of length, a white dorsal streak at .2 distance from base, directed outwardly and joining basal median stripe; two pairs of opposite white streaks narrowly edged with black inwardly, the basal pair .33 from base directed sharply apically, not quite joining, the dorsal streak largest, distal pair small, triangulate, each extending .33 width of wing; a median streak of black scales on termen not quite reaching wing tip; wing tip edged narrowly with black. Underside brown. Fringe pale tan. *Hind wing:* Upperside pale tan. Underside brownish-tan. Fringe pale tan. *Abdomen:* Tan dorsally, whitish ventrally. *Genitalia:* As in Fig. 25 (photograph from Paratype, PAO prep. no. 246); valvae asymmetrical, both valvae with width gradually increasing distally, dorsal margins strongly decurved; right valva ending with a short, stout spine directed posteroventrally, ventral margin straight; left valva with ventral margin with a concavity just basal to distal end; saccus short, triangular, well sclerotized; transtilla well sclerotized; aedeagus straight, narrow, and sclerotized basally, broadened and weakly sclerotized for distal .33; uncus acutely triangular; flap of ninth sternite long, subacute at tip.

Female. Length of forewing 2.7 to 3.9 mm (reared).

ALLOTYPE FEMALE. Length of forewing 3.2 mm. Externally as described for male. *Genitalia:* Eighth segment completely membranous. Posterior margin of seventh segment concave ventrally at opening of ductus bursae. Signum bursae a small round sclerotization with stout seta-like projection.

Type Material. *Holotype male:* California, 2 miles east of Antioch, Contra Costa County, 28 February 1968, reared from *Quercus agrifolia* Neé J. Powell lot 68B198, emerged 5 March 1968, collected by P. Opler. *Allotype female:* same data. *Paratypes:* 35 ♂♂, 51 ♀♀ as follows: **California.**—Alameda Co.: Strawberry Cyn., 1 ♂, VII-30-68, r.f. *Q. agrifolia*, J. Powell lot 68G71, emgd. II-12-69 (P. Opler). Contra Costa Co.: Antioch, 2 mi. E, 24 ♂♂, 22 ♀♀, II-2-68, II-28-68, r.f. *Q. agrifolia*, J. Powell lots 68B2, 68B198, emgd. II-15/19-68, III-1/10-68 (P. Opler), 7 ♂♂, 27 ♂♂, II-28-68, III-26-69, *Q. agrifolia* assoc. (P. Opler, J. Powell, C. Slobodchikoff); Cowell, 2 ♂♂, 1 ♀, II-28-68, II-16-69, r.f. *Q. agrifolia*, J. Powell lots 68B192, 69B16, emgd. III-7-68, II-21-69 (P. Opler); Russell Farm, 4 mi. NE Orinda, 1 ♀, III-6-70, *Q. agrifolia* assoc. (P. Opler). Los Angeles Co.: Westwood Hills, no abdomen, IV-41, r.f. *Q. agrifolia* (R. M. Bohart). Ventura Co.: Newbury Park, 1 ♂, IX-5-69, r.f. *Q. agrifolia*, J. Powell lot 69J28, emgd. XII-15-69 (P. Opler).

Its life history, maculation, and genitalic features set *Lithocolletis antiochella* apart from all other members of the genus. Among the species treated by Braun (1908) in her revision of the North American *Lithocolletis*, *Lithocolletis diaphanella* Frey and Boll appears to be most closely related in external appearance to *L. antiochella*. *L. antiochella* differs from *L. diaphanella* in that the vestiture of the palpi, antennae, and vertex are brown, not white; that there are three dorsal white streaks instead of two; and that the forewings are brown in color as opposed to



Figs. 28–30. *Coptodisca powellella* Opler, female genitalia. 28, Genital apparatus, ventral aspect; 29, posterior portion of eighth segment, ventral aspect; 30, tip of abdomen showing distal portion of ovipository apparatus.

golden brown. A comparison of the genitalia of these species was not carried out.

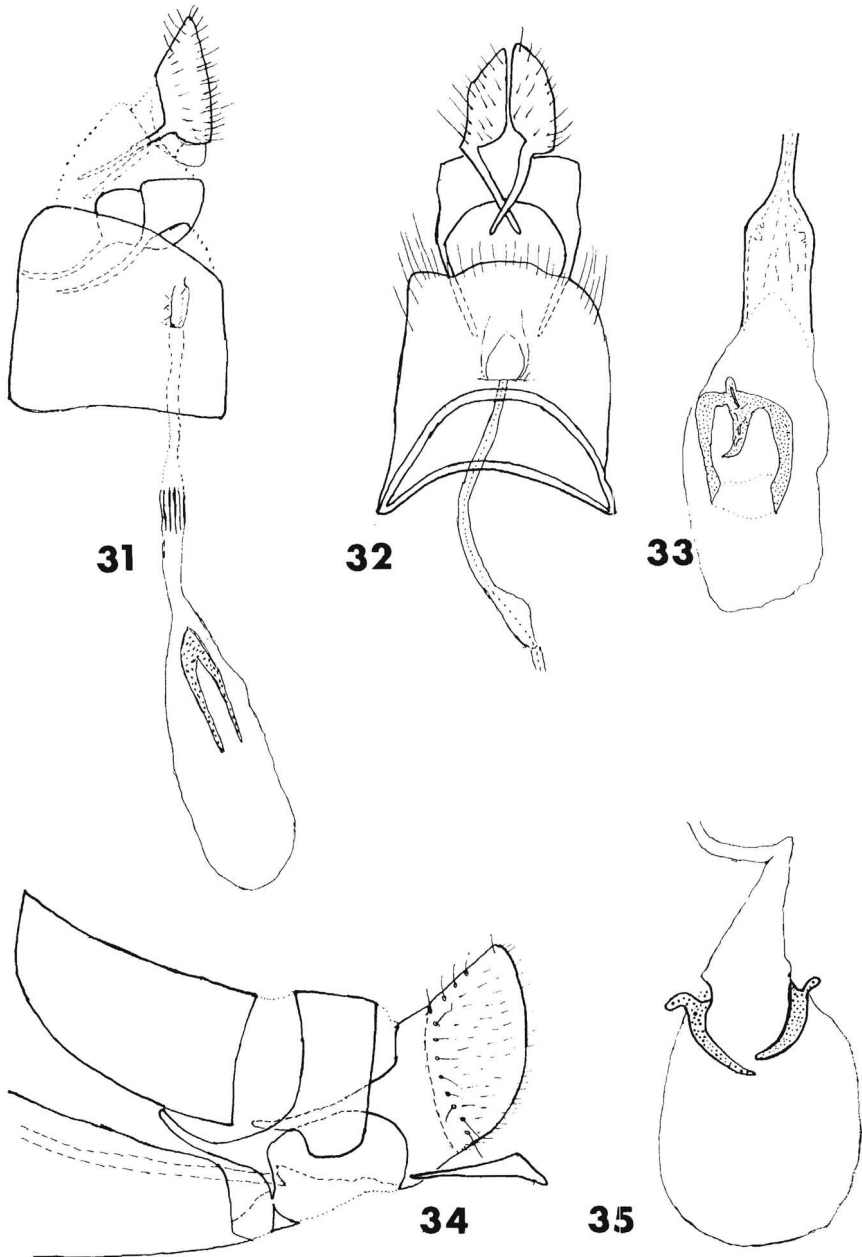
The male genitalia of *L. antiochella* have a well sclerotized diaphragma, asymmetrical valvae which are broader distally than basally. The eighth abdominal segment of the female is completely membranous.

The larvae feed on young foliage in the spring and then undergo a pupal diapause of about ten months.

***Lithocolletis sandraella* Opler, new species**

Male. Length of forewing 2.9 to 4.7 mm (reared).

HOLOTYPE MALE. Length of forewing 3.8 mm. **Head:** Maxillary palpus white scaled. Antenna tan, slightly longer than .5 costal length. Vestiture of front shining white; vestiture of vertex light orange-tan with a few scattered white scales latero-dorsally. **Thorax:** Pronotal scaling and tegulae orange-tan with two narrow white



Figs. 31-35. Female genitalia. 31, *Acrocercops insulariella* Opler, latero-ventral aspect; 32-33, *Neurobathra bohartiella* Opler, ventral aspect; 34, *Caloptilia agrifoliella* Opler, lateral aspect, corpus bursae removed; 35, *C. agrifoliella* corpus bursae.

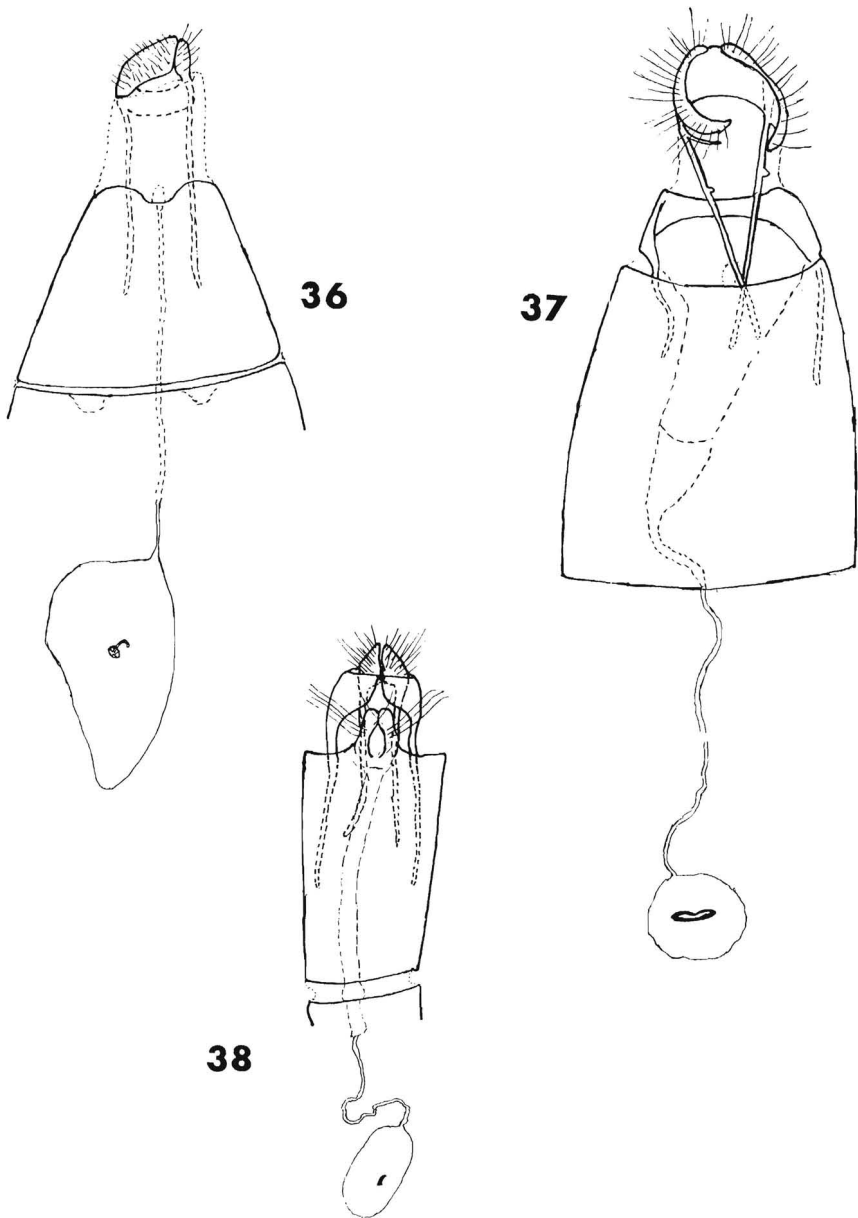
streaks along junction of inner margin of tegulae with dorsum of thorax. Pleural and ventral areas with white scaling. Legs white-scaled except dorsal halves of pro-femur and protibia fuscous scaled. *Forewing*: Ground orange-tan, a thin white stripe from base through median portion of wing for .35 length, a white mark at middle of costal margin directed postero-apically and terminating at point on median of width and .66 length from base, a patch of black-tipped scales running from inner termination of costal white mark to subapical area; at apex fringe with basal row of black-tipped scales. Underside dark tan. Fringe tan with long tuft of black scales at apex. *Hind wing*: Upperside white. Underside tan. Fringe white. *Abdomen*: Black dorsally, white ventrally. Genital segments with tan scaling externally. *Genitalia*: As in Fig. 26 (photograph from Paratype, PAO prep. no. 250); valvae symmetrical, broad at base (width about .33 length), narrowing distally with tip bluntly acuminate, a crescentic hollow area on ventral margin near apex containing patch of short, stout setae, a stout filament-like seta .25 length of valva at inner edge of hollow area directed ventrodistally; flap of ninth sternite long, parallel-sided, gradually rounded apically.

Female. Length of forewing 3.5 to 5.5 mm (reared).

ALLOTYPE FEMALE. Length of forewing 4.3 mm. External features as described for male except dorsum of abdomen pale tan-scaled. *Genitalia*: As in Fig. 37. Apophyses posteriores with small triangulate projections .33 from base; apophyses anteriores short. Genital plate enlarged, heavily sclerotized, inserted into seventh segment. Signum bursa an elongate lip-like sclerotization.

Type Material. *Holotype male*: California, Descanso Ranger Station, San Diego County, 31 March 1961, reared from *Quercus agrifolia* Neé, J. Powell lot 61C24, emerged 5 April 1961, collected by J. Powell. *Allotype female*: same data. *Paratypes*: 13♂♂, 20♀♀ as follows: Alameda Co.: Berkeley, 1♂, III-7-69, r.f. *Q. agrifolia*, J. Powell lot 69C5, emgd. III-20-69 (P. Opler); Berkeley Hills, above Old Tunnel, 1♀, VIII-25-68, r.f. *Q. agrifolia*, J. Powell lot 68H16, emgd. IX-3-68 (P. Opler). Contra Costa Co.: Cowell, 1♂, II-28-68, r.f. *Q. agrifolia*, J. Powell lot 68B194, emgd. IV-5-68 (P. Opler); Tilden Park, 1♂, IV-16-69, r.f. *Q. agrifolia*, J. Powell lot 69D31, emgd. IV-27-69 (P. Opler). Kern Co.: Keene, 2♀♀, X-1-67, r.f. *Q. wislizenii*, J. Powell lot 67K9, emgd. X-7/20-67 (P. Opler). Los Angeles Co.: Malibu Cyn., 5 mi. N. Malibu, 1♀, III-17-69, r.f. *Q. agrifolia*, J. Powell lot 69C59, emgd. III-2-69 (P. Opler); Topanga Cyn., 1♂, III-17-69 r.f. *Q. agrifolia*, J. Powell lot 69C58, emgd. III-31-69 (P. Opler). Monterey Co.: Carmel, 1♀, X-2-27 (L. S. Slevin); Jolon, 17.5 mi. W, 3♂♂, 1♀, III-19-69, r.f. *Q. wislizenii*, J. Powell lot 69C87, emgd. IV-6-69 (P. Opler). Orange Co.: Silverado, 1♂, III-30-68 (P. Opler). San Benito Co.: Limekiln Cyn., SW Paicines, 1♀, IV-23-69, r.f. *Q. agrifolia*, J. Powell lot 69D55, emgd. V-7-69 (P. Opler). San Diego Co.: Descanso Rgr. Sta., 2♂♂, 2♀♀, III-31-61, r.f. *Q. agrifolia*, J. Powell lot 61C24, IV-7/14-61 (J. Powell), 1♀, III-31-61 (R. L. Langston); Guatay, 1 mi. W, 2♀♀, IX-13-68, r.f. *Q. agrifolia* var. *oxyadenia*, J. Powell lot 68J73, emgd. IX-21/24-68 (P. Opler); Honey Spgs. Rd., 1♂, X-4-67, r.f. *Q. agrifolia*, J. Powell lot 67K51, emgd. X-31-67 (P. Opler). San Francisco Co.: Golden Gate Park, 1♀, IV-5-68, r.f. *Q. agrifolia*, J. Powell lot 68D49, emgd. IV-23-68 (P. Opler). San Luis Obispo Co.: La Panza Camp, 1♀, IV-25-68, r.f. *Q. agrifolia*, J. Powell lot 68D131, emgd. V-7-68 (P. Opler). Santa Barbara Co.: Santa Cruz Island, Prisoner's Harbor, 2♀♀, III-14-69, r.f. *Q. agrifolia*, J. Powell lot 69C23, emgd. III-31-69 (P. Opler). Santa Clara Co.: Herbert Crk., 3 mi. W New Almaden, 1♀, IV-25-69, r.f. *Q. agrifolia*, J. Powell lot 69D71.1, emgd. V-7-69 (P. Opler). Ventura Co.: Newbury Park, 2♂♂, 3♀♀, IX-5-69, r.f. *Q. agrifolia*, J. Powell lot 69J27, emgd. IX-6/11-69 (P. Opler).

Lithocolletis sandraella is quite unlike any other North American species of the genus. Perhaps *Lithocolletis inusitatella* Braun is the species



Figs. 36-38. Female genitalia, ventral aspect. 36, *Lithocolletis antiochella* Opler; 37, *Lithocolletis sandraella* Opler; 38, *Cameraria wislizeniella* Opler.

with which *L. sandraella* should be compared. Both *L. sandraella* and *L. inusitatella* have *Quercus agrifolia* and *Q. wislizenii* as their only hosts. *L. sandraella* lacks the metallic bronze sheen and apical black spot displayed by the forewings of *L. inusitatella*. *L. sandraella* differs strikingly from *L. inusitatella* in genitalic features as well. The valvae of *L. sandraella* are symmetrical while those of *L. inusitatella* are asymmetrical. Additionally, *L. sandraella* is bivoltine, while *L. inusitatella* is univoltine.

***Cameraria wislizeniella* Opler, new species**

Male. Length of forewing 3.1 to 4.7 mm (reared).

HOLOTYPE MALE. Length of forewing 3.8 mm. *Head:* Maxillary palpus white scaled. Antenna as long as costal length; scape white ventrally, brownish orange dorsally, flagellum fuscous scaled dorsally, tan ventrally. Vestiture of front shining white; vertex white mesally, narrowly margined with brownish orange laterally. *Thorax:* Scaling of dorsum broadly white mesally, brownish-orange laterally; tegulae brownish-orange; pleural and ventral areas with shining white scaling. Prothoracic leg black dorsally, white ventrally, tarsomeres ringed with white; mesothoracic leg white, tarsomeres black, ringed with white; metathoracic leg with femur white, tibia white ventrally, brownish-orange dorsally, tibia and tarsi predominantly white, with small black mark on dorsal surface at junction of tibia and tarsus and junction of first and second tarsomeres. *Forewing:* Ground bronzy brownish-orange; an outwardly directed narrow white streak on costa at .5 forewing length from base, narrowly edged at outer margin with black, a broken narrow white stripe extending from tornus to wing tip edged anteriorly with white. Underside blackish fuscous. Fringe brownish-orange apically, gray white posteriorly. *Hind wing:* Upperside shining gray white. Underside gray. Fringe gray white. *Abdomen:* Gray black dorsally and laterally, white ventrally. *Genitalia:* As in Fig. 27 (photograph from Paratype, PAO prep. no. 231); valvae symmetrical, narrow, broadest basally, sinuous, falcate apically; a single row of setae on inner face of valva extending from base to .5 length; a patch of longer setae on inner face of valva at ventral margin .66 from base, uncus long, acuminate, two slender setae at distal tip; flap of ninth sternite long, distal half triangulate, deeply cleft distally to separate two truncate lobations.

Female. Length of forewing 2.4 to 4.3 mm (reared).

ALLOTYPE FEMALE. Length of forewing 3.4 mm. As described for male except: inner margin of forewing narrowly edged with white on basal half (this characteristic present on many males). Dorsal scaling of abdomen pale tan. *Genitalia:* As in Fig. 38 (drawing from Paratype, PAO prep. no. 338); opening of ductus bursae surrounded by posterad bilobed projection. Signum bursae consisting of a small triangular sclerotization.

Type Material. *Holotype male:* California, Knight's Ferry, Stanislaus County, 20 March 1968, reared from *Quercus wislizenii* A. D. C., J. Powell lot 68C46, emerged 24 March 1968, collected by J. T. Doyen. *Allotype female:* California, Woodacre, Marin County, 15 March 1968, reared from *Quercus wislizenii* var. *frutescens* Engelm., J. Powell lot 68C23.1, emerged 8 April 1968, collected by P. Opler. *Paratypes:* 37 ♂♂, 26 ♀♀ as follows: **California.**—Contra Costa Co.: Antioch, 2 mi. E, 30 ♂♂, 21 ♀♀, II-2-68, II-28-68, IV-7-68, V-26-68, r.f. *Q. agrifolia*, J. Powell lots 68B4, 68B199, 68D56, 68E47, emgd. II-14/19, III-7/26, IV-13/25, VI-6/14 (P. Opler); Clayton, 4 mi. SE, 1 ♀, V-26-68, r.f. *Q. wislizenii*, J. Powell lot 68E65, emgd. by II-11-69 (P. Opler); Clayton, 8 mi. SE, 1 ♂, II-2-68, r.f. *Q. wislizenii*, J. Powell lot 68B13, emgd. II-20-68 (P. Opler); Mt. Diablo, summit, 3849', 1 ♀, IV-13-69, r.f. *Q. wislizenii* var. *frutescens*, J. Powell lot 69D141, emgd. IV-24-69

(P. Opler). Marin Co.: Woodacre, 3 ♂ ♂, III-15-68, r.f. *Q. wislizenii* var. *frutescens*, J. Powell lot 68C23.1, emgd. IV-5/8-68 (P. Opler). Monterey Co.: Jolon, 17.5 mi. W, 1 ♂, III-19-69, r.f. *Q. wislizenii*, J. Powell lot 69C86, emgd. III-31-69 (P. Opler). Placer Co.: Penryn, 1 ♂, 2 ♀ ♀, III-13-68, r.f. *Q. wislizenii*, J. Powell lot 68C15, emgd. III-23/IV-8-68 (P. Opler). San Bernardino Co.: Forest Home, 1 mi. W, 1 ♀, III-29-68, r.f. *Q. wislizenii* var. *frutescens*, J. Powell lot 68C79, emgd. IV-23/V-1-68 (P. Opler). Stanislaus Co.: Knight's Ferry, 1 ♂, III-29-68, r.f. *Q. wislizenii*, J. Powell lot 68C46, emgd. IV-10-68 (J. T. Doyen).

Among described species of the genus, the closest relative of *Cameraria wislizeniella* is *Cameraria mediodorsella* (Braun). These moths are very similar in maculation and are difficult to separate on that basis, but the two have distinctive male genitalia. The male genitalia of *C. wislizeniella* differs by the distally expanded valvae, the relatively uncurved aedeagus, and the attenuate flap of the ninth sternite.

The life cycle of *C. wislizeniella* is typified by the absence of diapause while that of *C. mediodorsella* has a pupal diapause over the winter months.

Acknowledgments

I wish to thank the following for the loan of material from their private or institutional collections: P. H. Arnaud, Jr., California Academy of Sciences, San Francisco; A. F. Braun, Cincinnati, Ohio; D. R. Davis, U.S. National Museum, Washington, D.C.; J. A. Powell, California Insect Survey, Berkeley; R. O. Schuster, University of California, Davis; J. W. Tilden, San Jose, California.

J. A. Powell provided helpful suggestions and reviewed the manuscript of this paper. Miss Susan McDonald made the illustrations of adult *Lithocolletis antiochella* and *Cameraria wislizeniella*. My wife Sandra provide secretarial assistance.

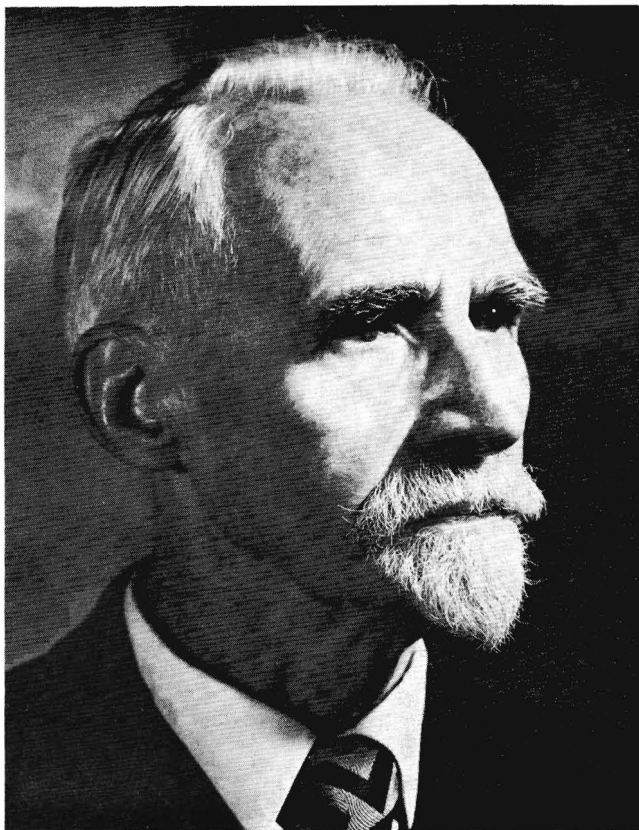
Funds supporting field and laboratory work during this study were provided by National Science Foundation grants GB4014 and GB6813X under the direction of J. A. Powell.

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OBITUARY



ANTONIE JOHANNES THEODORUS JANSE
1877-1970

On June 12th, 1970, at the age of ninety-three, Dr. A. J. T. Janse, a great Lepidopterist and a man of remarkable learning and ability, passed away. For almost seventy years he collected, reared, studied, and described Lepidoptera, a privilege given to very few. All by himself, he built up a unique collection of the Heterocera of southern Africa.