

# JOURNAL OF THE LEPIDOPTERISTS' SOCIETY

Volume 59

2005

Number 3

*Journal of the Lepidopterists' Society*  
59(3), 2005, 121–133

## SOME EUCOSMINI (TORTRICIDAE) ASSOCIATED WITH *EUCOSMA EMACIATANA* (WALSINGHAM) AND *EUCOSMA TOTANA* KEARFOTT; FOUR NEW SPECIES, A NEW COMBINATION, AND A NEW SYNONYMY

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**ABSTRACT.** *Eucosma emaciatana* (Walsingham) is transferred to *Pelochrista* Lederer, and *Pelochrista perpropinqua* (Heinrich) is recognized as a junior synonym of *P. emaciatana*. Three species considered by previous authors to be superficially similar to *emaciatana* are reviewed: *Eucosma larana* (Walsingham), *Eucosma totana* Kearfott and *Pelochrista popana* (Kearfott). Four previously unrecognized species are described: ***Eucosma piperata*, new species, *Eucosma nordini*, new species, *Eucosma taosana*, new species, and *Pelochrista powelli*, new species.** Lectotypes are designated for *emaciatana* and *larana*. Adults and genitalia of these species are illustrated, and new distributional records are presented.

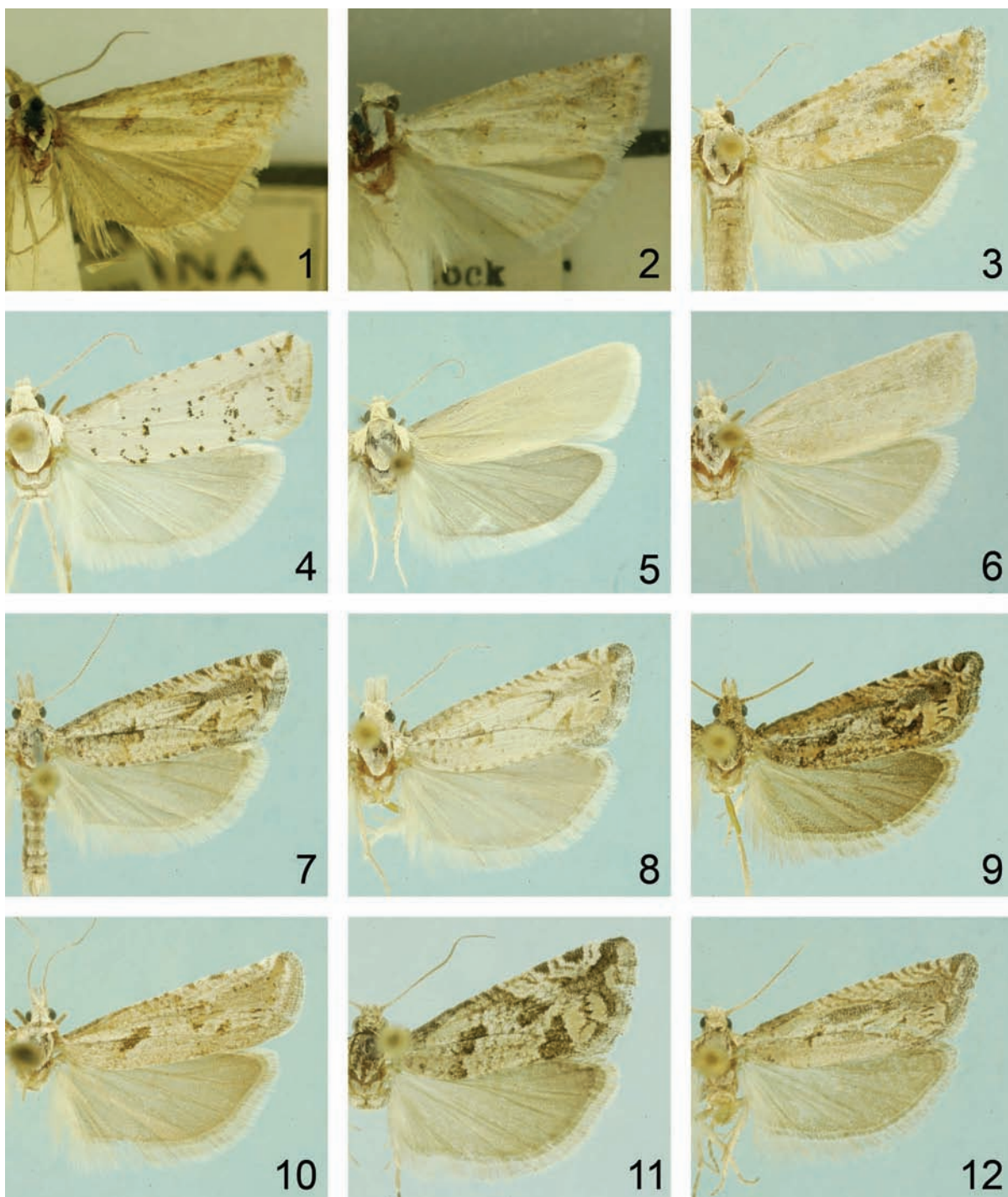
**Additional key words:** Oletreutinae, *Pelochrista*, Nearctic.

The Rocky Mountain and Great Basin regions of western United States are home to many similar looking species of Eucosmini, some of which were named by Walsingham in the last quarter of the nineteenth century. Lacking access to the Walsingham types, early North American tortricid specialists often had difficulty applying those names, and in some instances the confusion that resulted has persisted to the present day. One such case involves *Eucosma emaciatana* (Walsingham), *Eucosma larana* (Walsingham), and *Pelochrista perpropinqua* (Heinrich). Heinrich (1923) confused *emaciatana* with *larana* (see discussion below) and later (1929) described *perpropinqua* based on a series of specimens of *emaciatana*. I confirmed that *emaciatana* and *perpropinqua* refer to a single taxon by examining the types. Based on male genitalia, the appropriate generic assignment for this species is *Pelochrista* Lederer, a conclusion reached by Powell (1983) in his placement of *perpropinqua*, so I propose to resolve this situation by transferring *emaciatana* to *Pelochrista* and treating *perpropinqua* as a junior synonym.

In examining specimens from various institutional and private collections I encountered two previously unrecognized species of *Eucosma* Hübner that have been confused with *larana*. They are described below as *E. piperata*, new species, and *E. nordini*, new species. Also included are reviews of *E. totana* Kearfott and *P. popana* (Kearfott), two species considered by previous

authors to be similar in appearance to *larana* and/or *emaciatana*. Finally, descriptions are provided for two additional new taxa, *Eucosma taosana*, new species, and *Pelochrista powelli*, new species. The former has previously been misidentified as *totana*; the latter is superficially similar to *totana* and *taosana*.

Walsingham (1884) described *Paedisca emaciatana* from three male specimens collected by H. K. Morrison in Arizona. Fernald [1903] placed this species in *Eucosma*, and there it has resided ever since. The Fernald collection, acquired by the United States National Museum (USNM) in 1924–25, included two male specimens determined by Walsingham as *emaciatana*. Neither has an abdomen. One was collected by Morrison in Arizona in 1883 and agrees with the description of *emaciatana*, the other is lacking collection data and is in such poor condition that I cannot confirm the accuracy of its determination. Heinrich's review (1923) of *emaciatana* makes no mention of these two specimens, so I assume he did not examine them. His treatment was based on a series of specimens from Utah, and he illustrated the genitalia (Fig. 193) of a male collected by Tom Spalding at Eureka, Utah, on 27 July 1911. I examined that specimen and a number of other USNM specimens determined by Heinrich as *emaciatana* and concluded (see discussion below) that they represent *E. larana*. This explains why Heinrich, when presented with specimens of *emaciatana* collected in Arizona by O. C.



FIGS. 1-12. 1, *P. emaciatana*, lectotype male. 2, *E. larana*, lectotype male. 3, *E. larana*, male, Albany Co., Wyoming. 4, *E. piperata*, male, Oneida Co., Idaho. 5, *E. nordini*, holotype male. 6, *E. larana*, female, Oneida Co., Idaho. 7, *E. totana*, male, Grand Co., Colorado. 8, *E. totana*, male, Oneida Co., Idaho. 9, *E. taosana*, holotype male. 10, *P. emaciatana*, male, Cochise Co., Arizona. 11, *P. popana*, male, Larimer Co., Colorado. 12, *P. powelli*, holotype male.

Poling, interpreted them as representing a new species, which he described (1929) as *E. perpropinqua*.

Walsingham (1879) described *E. larana* from three specimens (2 ♂, 1 ♀) collected in Siskiyou County, California. The forewing (Fig. 2) of the lectotype (designated below) is white with pale brownish-orange markings; that of the female paralectotype is white with a few black specks and only a hint of brownish-orange markings. The specimens misidentified by Heinrich as *emaciatana* have pale yellowish-white forewings that are generously overlaid with pale brownish-orange coloration. They also have brownish-gray markings (as in Fig. 3). Specimens I collected in southeastern Idaho (Fig. 6) have very pale yellowish-white forewings with just a trace of brownish-orange coloration. I found no substantial differences in the male and female genitalia of these various specimens, and lacking any distinguishing biological information, I concluded that they all represent a single variable species. Curiously, Heinrich (1923) did correctly identify the male that he illustrated (Fig. 197) as *larana*. Two of the new species described below are similar to *larana* in forewing color, and each is sympatric with *larana* in at least a portion of the latter species' range: *piperata* in Utah and southeastern Idaho, *nordini* in southeastern Wyoming.

Kearfott (1907) reported a type series for *totana* consisting of five specimens collected by Tom Spalding and O. C. Poling in Stockton, Utah, and South Utah, respectively. The American Museum of Natural History (AMNH) has a male collected in So. Utah labeled LECTOTYPE, a designation Klots (1942) attributed to Heinrich (1923). I assume from Kearfott's remarks that the collector was Poling, but there is no such indication on the pin labels. I located four Spalding specimens from Stockton, Utah, that are likely to be the other syntypes. Only one is actually *totana*, a male in the USNM with no capture date. Both it and the lectotype bear the handwritten label "*Eucosma totana* Cotype Kearf." and Kearfott's printed red label "TYPE Collection of W. D. Kearfott". A female in the AMNH collected VIII-4-4 and bearing the red Kearfott "TYPE" label is no doubt the specimen referred to by Klots (1942) as a paralectotype, but its genitalia indicates it is not *totana*. The remaining two, a USNM specimen dated VIII-30-4 and an AMNH specimen dated VIII-1-4, are conspecific with a series of USNM specimens determined by Heinrich as *totana* but bearing a hand written label with the notation "dark var." They agree with specimens I collected in New Mexico that are sufficiently distinct in maculation and genitalic details to justify separate species status. Although I was unable to locate females of this taxon, the likelihood of it being confused with *totana* prompted me to describe it here

as *E. taosana*. This investigation also brought to my attention the previously unrecognized *P. powelli*, which can be confused with *totana* and *taosana*.

Finally, Kearfott (1907) based his description of *popana* on 27 syntypes collected by Tom Spalding at Stockton, Utah, with capture dates between 1 June and 8 August. Klots (1942) reported thirteen specimens in the AMNH as belonging to the type series, including one labeled LECTOTYPE. The lectotype designation should be credited to Klots (1942), even though he attributes it to Heinrich (1923). I examined this material and found the lectotype to be a female, rather than a male as stated by Klots. I believe nine of the other twelve specimens are *popana*, but one has a capture date of 9 August, which is inconsistent with Kearfott's remarks. Of the remaining three, two are males of *Epiblema sosana* (Kearfott), and one is a female of uncertain identity. Listed below as paralectotypes are the eight AMNH *popana* specimens whose capture dates agree with Kearfott's statements and seven USNM specimens that I judge to belong to the *popana* type series.

I am designating lectotypes for *emaciatana* and *larana* and have attached designation labels to those specimens. The specimens chosen for this purpose were originally selected by Obraztsov, but his designations were never published.

#### MATERIALS AND METHODS

This study is based on 607 adult specimens and 111 associated genitalia preparations. I examined the types of the five previously described species. Material was borrowed from the following institutional and private collections: AMNH, George J. Balogh (GJB), Canadian National Collection (CNC), Colorado State University (CSU), Essig Museum of Entomology (EME), Clifford D. Ferris (CDF), Los Angeles County Museum of Natural History (LACM), Museum of Comparative Zoology (MCZ), John S. Nordin (JSN), The Natural History Museum, London (BMNH), USNM, Donald J. Wright (DJW), and University of Wyoming (UWY). The line drawings were based on images generated by a Ken-A-Vision microprojector (Model X1000-1), and each associated scale bar represents 0.5 mm. Images of the genitalia of the lectotypes of *larana* and *emaciatana* were obtained by scanning negatives of photographs taken by Obraztsov of slides he had prepared. All measurements were estimated to the nearest tenth of a millimeter with the aid of a reticule mounted in a Leica MZ95 stereomicroscope. Ratios of measurements were rounded to two decimal places. Forewing length (FWL) indicates the distance from base to apex, including fringe. Aspect ratio (AR) refers to the ratio of FWL to



forewing width, the latter quantity being measured midway between base and apex. In males, the ratio of forewing costal fold length to FWL is denoted by CFR (costal fold ratio), and the ratio of valval neck width to width of basal portion of valva by NR (neck ratio). Reported values of AR, CFR and NR are averages of such values calculated for a small sample of specimens. The number of items supporting a particular statistic is indicated by n.

Some species discussed here only vaguely display the putative, ancestral, fasciate forewing pattern for the Tortricidae discussed by Brown and Powell (1991) and Baixeras (2002), but their terminology is used when possible in the forewing descriptions.

### SPECIES ACCOUNTS

#### *Eucosma larana* (Walsingham)

(Figs. 2, 3, 6, 14, 15, 25, 36)

*Paedisca larana* Walsingham 1879:43.

*Eucosma larana*: Fernald [1903]:456; Barnes and McDunnough 1917:169; Heinrich 1923:110; McDunnough 1939:47; Powell 1983:34.

*Eucosma emaciatana*: (not Walsingham 1884) Heinrich 1923:108; McDunnough 1939:46; Powell 1983:34.

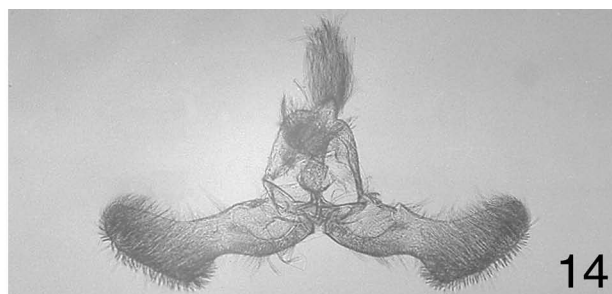
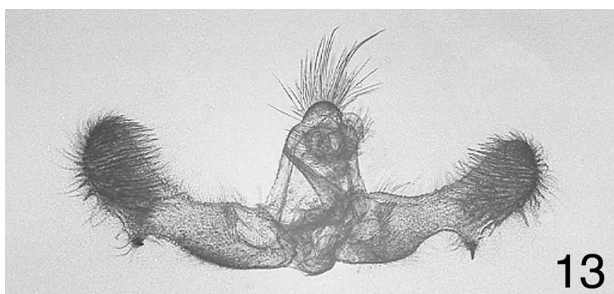
**Types.** Lectotype here designated (Figs. 2, 14): ♂, Sheep Rock, Siskiyou Co., California, Walsingham, 3 Sept. 1871, genitalia slide 11502, BMNH. Paralectotypes: same data as lectotype (1 ♂, 1 ♀, ♀ genitalia slide 11759, BMNH).

**Diagnosis.** Darkly marked specimens of *larana* can be recognized by forewing pattern (Fig. 3), but pale specimens (Fig. 6) might be confused with *nordini* or *piperata*. The forewing of *nordini* (Fig. 5) is pale yellowish white, has a gray streak on the costal fold, and shows no indication of brownish-orange mottling. The combination of white forewing color, black speckling, and brown costal marks distinguishes *piperata* (Fig. 4). One can also separate *larana*, *piperata*, and *nordini* by the shapes of the sterigmata (Figs. 36, 35, 31) and by

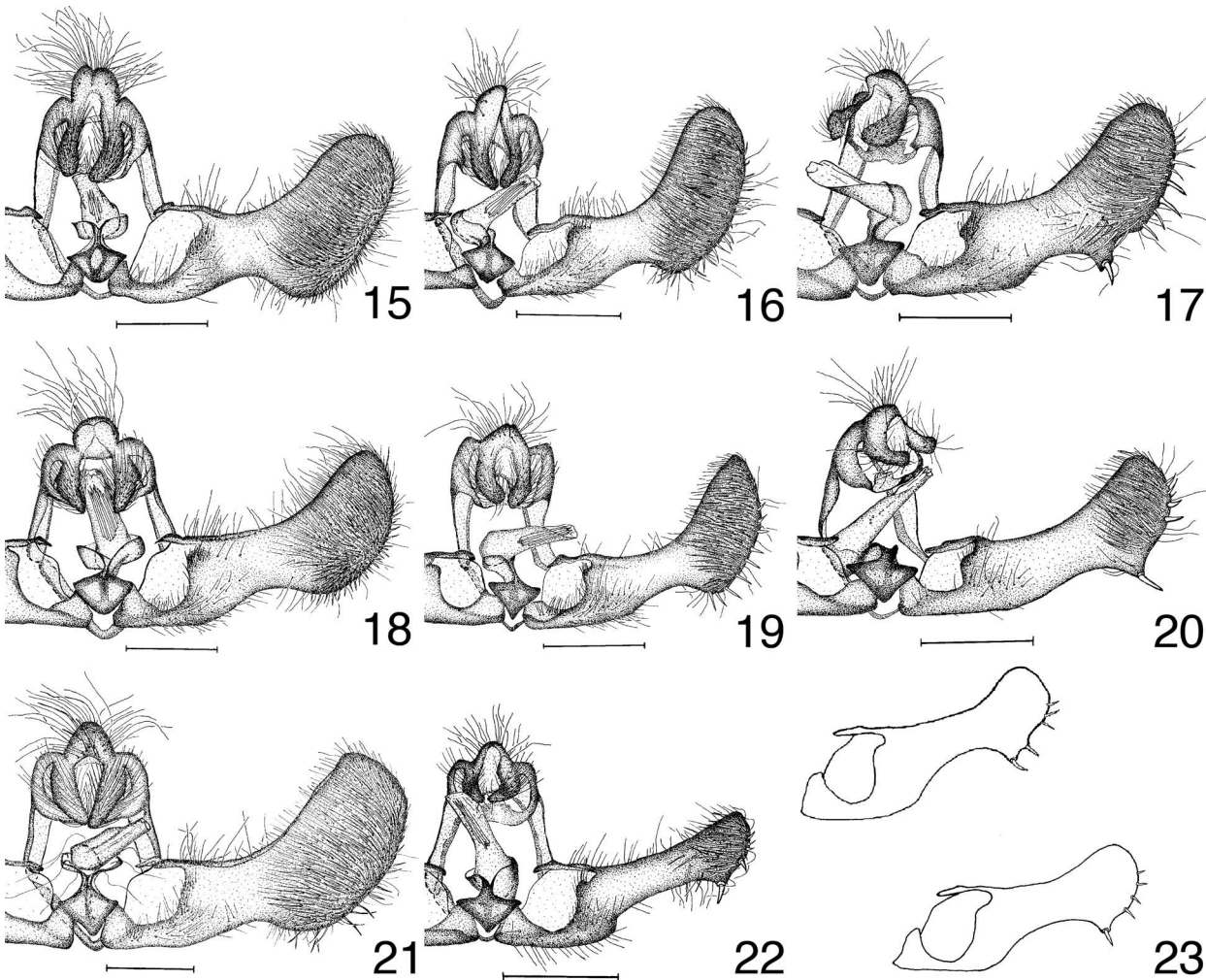
subtle but consistent differences in valval shape (Figs. 15, 18, 21).

**Description.** **Head:** Very pale yellowish white, long scales of upper frons and vertex often with pale gray shading preceding whiter apices; labial palpus with pale-gray lateral surface, third segment enclosed by long narrow scales of second segment; antenna yellowish white. **Thorax:** Dorsal and ventral surfaces concolorous with head, legs yellowish white to pale yellowish brown. **Forewing** (Figs. 2, 3, 6): ♂ FWL 8.5-12 mm (mean = 10.5, n = 13), AR = 3.16, CFR = 0.3, ♀ FWL 8.5-11.1 mm (mean = 10, n = 10), AR = 3.05; costa nearly straight, apex mildly acute, termen straight; dorsal surface white to pale yellowish white and variably overlaid with pale brownish-orange mottling, darker specimens with four brownish-gray marks, the first a triangular pretornal mark on dorsum, often with a few black scales at its anterior extremity, the second a subbasal mark on fold that is usually connected to dorsum by brownish-orange scaling, the third at distal end of cell, often divided longitudinally by a brownish-orange streak, the fourth anterior to ocellus; ocellus obscure, variably overlaid with brownish-orange scales and crossed longitudinally by up to four black dashes; distal one-half of costa with four, obscure, paired, white strigulae; male costal fold usually grayer than adjacent portion of wing, fringe white to yellowish white, with gray shading near apex and brownish-orange suffusion near tornus. **Hindwing:** Uniformly pale brownish gray with lighter fringe. **Male genitalia** (Fig. 14, 15): Uncus divided medially into two variably developed setose lobes with convex lateral margins; dorsolateral shoulders of tegumen well developed, often rounded and hunched, sometimes with angular corners; socii long, flat, and densely setose; vesica with 2-7 deciduous cornuti (n = 10); valva with costal margin concave, apex and ventral angle evenly rounded, distal margin very weakly convex, ventral invagination moderate, NR = 0.61, cucullus of nearly uniform width, medial surface densely setose, sacculus sparsely setose, margin of basal opening with patch of short slender spines. **Female genitalia** (Fig. 25): Papillae anales facing ventrolaterally and densely setose, medial margins very weakly sinuate, surfaces finely ridged transversely, long setae on lateral margins curving ventrally, remaining setae shorter with hooked apices; tergum VIII sparsely setose; lamella antevaginalis (Fig. 36) ringlike and weakly sclerotized, lamella postvaginalis with semitriangular posterolateral corners; membrane between sterigma and ventral extremities of tergum VIII setose; sternum VII with posterior margin approximate to sterigma and roundly invaginated to depth of one-half length of sterigma; ductus bursae strongly constricted anterior to ostium, widening anteriorly; corpus bursae with large signum near juncture with ductus bursae and small spike-shaped signum on opposite wall.

**Distribution and biology.** I examined 53 specimens (40 ♂, 13 ♀) from the following states and counties: CALIFORNIA: Siskiyou, Tulare; IDAHO: Oneida; UTAH: Juab; WYOMING: Albany. The flight period extends from early July to the beginning of September, and capture sites range in elevation from 5000' to 8000'.



FIGS. 13-14. Genitalia of lectotypes. 13, *P. emaciatana*, slide BMNH 11571. 14, *E. larana*, slide BMNH 11502.



FIGS. 15-23. Male genitalia. 15, *E. larana*, slide DJW 763. 16, *E. totana*, slide DJW 1022. 17, *P. emaciatana*, slide DJW 952. 18, *E. piperata*, slide DJW 762. 19, *E. taosana*, slide DJW 1035. 20, *P. popana*, slide DJW 1068. 21, *E. nordini*, slide DJW 760. 22, *P. powelli*, slide DJW 1027. 23, *P. powelli*, slides DJW 1032 and 705

This moth has been collected in open sage brush habitat in Idaho and Wyoming. No larval host has been reported.

**Comments.** The variation in forewing color appears to have a geographic component. Specimens from northern California and southeastern Idaho have very pale yellowish-white forewings with pale to nearly obsolescent brownish-orange markings, those from Wyoming tend to be darker, with brownish-gray markings and extensive brownish-orange mottling, and those from Utah and central California appear to be intermediate. The medial division of the uncus varies from an inconspicuous line to the pronounced indentation illustrated in Figure 15.

*Eucosma totana* Kearfott  
(Figs. 7, 8, 16, 28, 32)

*Eucosma totana* Kearfott 1907:32; Barnes and McDunnough 1917:169; Heinrich 1923:108; McDunnough 1939:46; Powell 1983:34.

*Eucosma spodias*: Meyrick 1912:35.

**Types.** Lectotype designated by Heinrich (1923): ♂, South Utah, July 1900, genitalia slide CH, 2 Dec 1919, AMNH. Paralectotype ♂: Stockton, Utah, Tom Spalding, USNM.

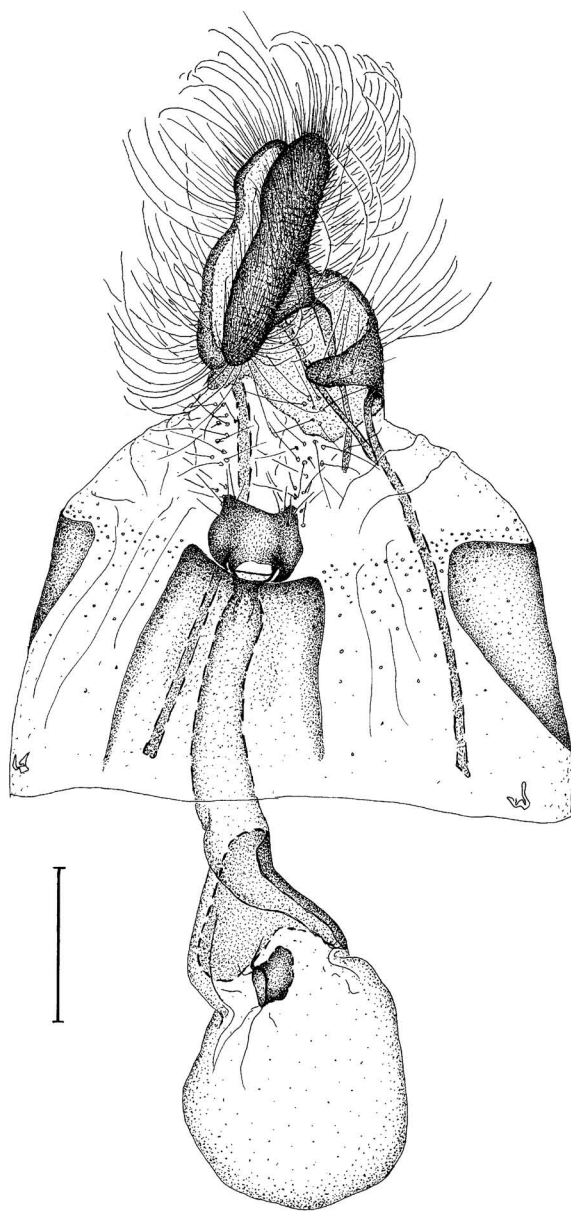
**Diagnosis.** This species can be confused with *taosana*, *popana* and *powelli*, but the following combination of dark brown forewing markings usually suffices for diagnosis: a subbasal mark on fold, a thin line along fold from subbasal mark to tornus, a pretornal triangular mark based on fold, and a chevron shaped mark at distal end of cell. Some specimens do not show the line on the fold. Superficially, *totana* is most similar to *taosana* (Fig. 9), but the latter species does not have



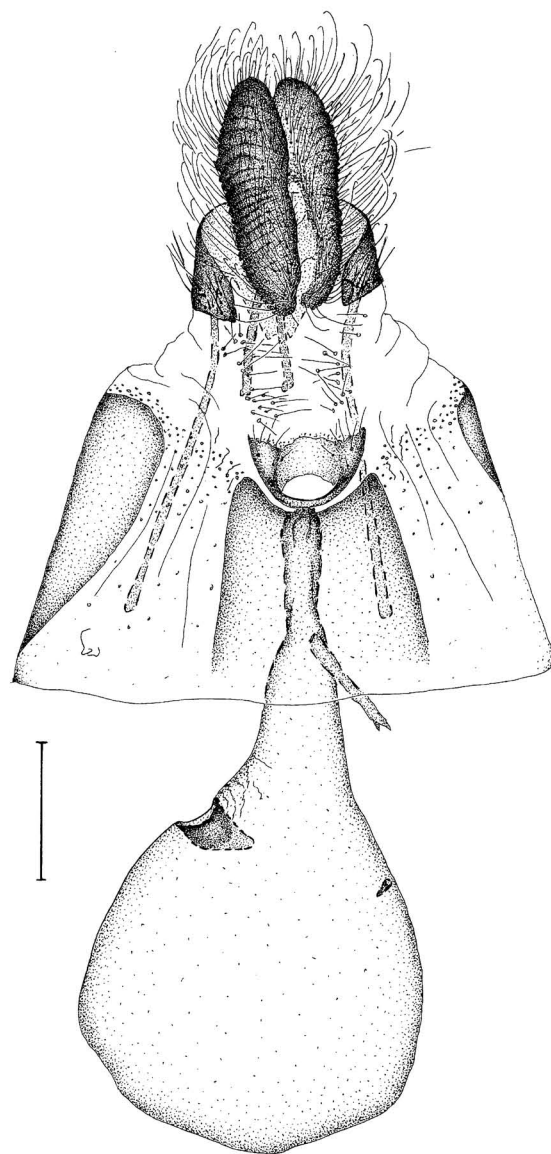
a dark line on the fold or a chevron shaped mark at the end of the cell. Male genitalic characters separating *totana* and *taosana* include: subtle differences in shape of cucullus (Figs. 16, 19), distinctly different shape of uncus, and number of cornuti in vesica (10 for *totana* vs. 5 for *taosana*). *Eucosma totana* is easily separated from *popana* and *powelli* by the presence in the latter two species of a stout spine at the ventral angle of the cucullus. Females of *taosana* are not known, but the sterigmata (Figs. 32, 37, 34) of *totana*, *popana* and

*powelli* are easily distinguished from one another.

**Description. Head:** Scales of frons and vertex white, sparsely marked with pale gray; labial palpus porrect, length ca.  $3\times$  eye diameter, second segment with medial surface and dorsal margin white, lateral surface pale brownish gray, scales of ventral and dorsal margins long and slender, concealing third segment; antenna white. **Thorax:** Scales of dorsal surface and tegulae white basally and apically, brownish gray medially, producing a speckled effect; ventral surface and hindlegs white, fore and midlegs white posteriorly, brown to pale brown anteriorly, with white annular markings on tarsus and tibia. **Forewing** (Figs. 7, 8): ♂ FWL 8.7-12 mm (mean = 10.1,  $n = 68$ ), AR = 3.2, CFR = 0.27, ♀ FWL 7.4-10.5 mm (mean = 8.9,  $n = 18$ ), AR = 3.11; costa nearly straight, apex acute, termen weakly convex; dorsal

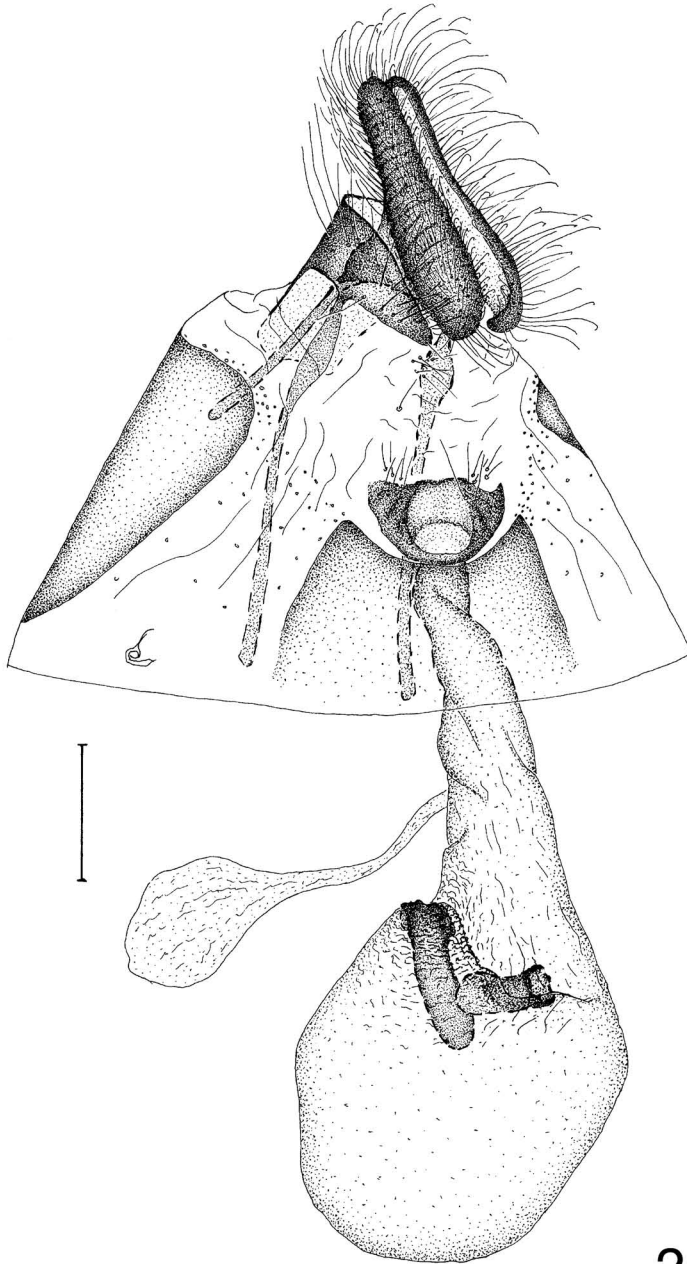


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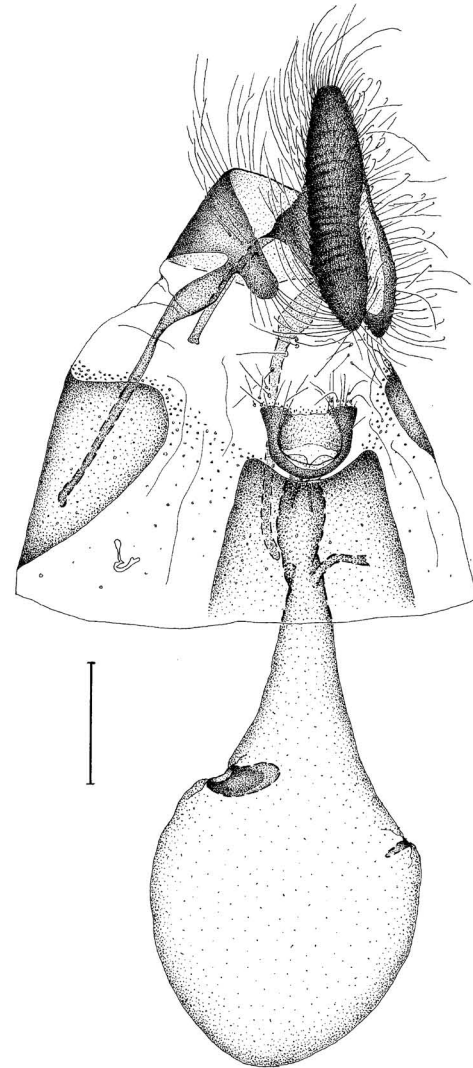


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FIGS. 24-25. Female genitalia. 24, *P. emaciatana*, slide DJW 989. 25, *E. larana*, slide DJW 789.



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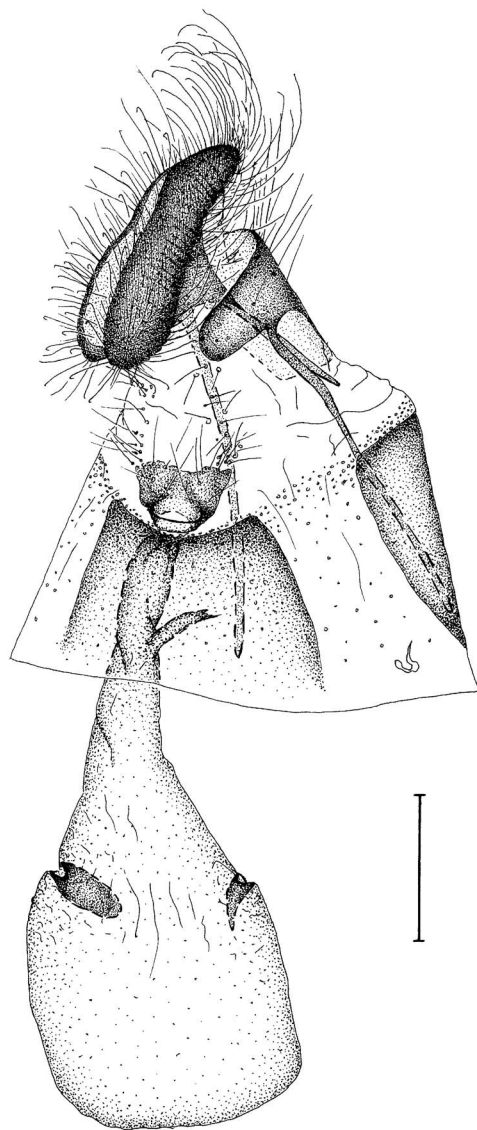
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FIGS. 26-27. Female genitalia. 26, *E. piperata*, slide DJW 1061. 27, *E. nordini*, slide DJW 1073

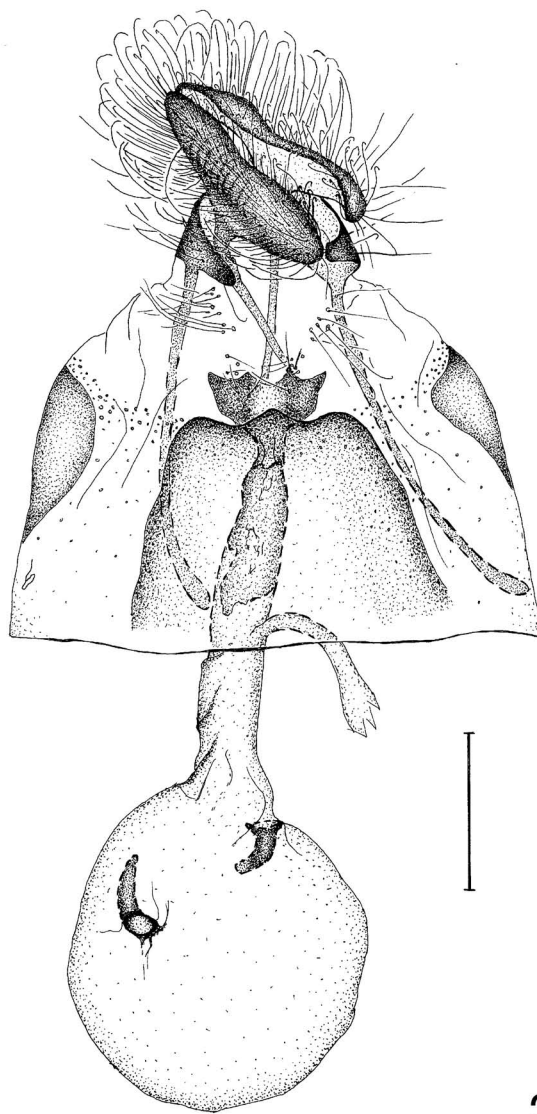
surface white with brown to brownish-black irrorations on basal two-thirds and five brownish-black marks, the first a subbasal mark on fold, sometimes extending weakly to dorsum, often bordered distally by a thin line of black scales, the second a very thin line along fold from subbasal mark to tornus, the third a triangular mark based on fold and projecting anteriorly along basal margin of ocellus, the fourth a longitudinally elongate mark anterior to ocellus, narrowing basally and extending into cell, the fifth a chevron on distal margin of cell, sometimes connecting anteriorly to mid costa and posteriorly to line on fold, often divided medially by aforementioned longitudinal mark; ocellus bordered on basal, distal and tornal margins with lustrous, pale, yellow-brown to yellow-gray bars, white central field crossed by up to four, black, longitudinal dashes; costal margin brownish black,

crossed by numerous paired white strigulae, numbers four through nine usually sharply delineated; dorsal margin with 10-12, small, evenly spaced, brownish-black marks; scales along terminal margin white with subapical black markings, fringe usually whiter with more extensive dark markings between M1 and M3. **Abdomen:** Scales on posterior margin of eighth segment in females brownish black with white apices. **Hindwing:** Uniformly pale brownish gray with lighter fringe. **Male genitalia** (Fig. 16): Uncus triangular, dorsal surface setose, posterior surface developed into medial wedge-shaped ridge, dorsolateral shoulders of tegumen well developed; socii long, flat, and densely setose; aedeagus tapered distally, vesica with ca. 10 deciduous cornuti ( $n = 13$ ); valva with costal margin concave, apex and ventral angle evenly rounded, distal margin convex, invagination of ventral





28



29

FIGS. 28-29. Female genitalia. 28, *E. totana*, slide DJW 1028. 29, *P. popana*, lectotype, slide DJW 1085.

margin moderate, NR = 0.6, cucullus with densely setose medial surface, sacculus and margin of basal opening moderately setose.

**Female genitalia** (Fig. 28): Papillae anales facing laterally and densely setose, surfaces finely ridged transversely, setae on medial margins with hooked apices, those on lateral margins twice as long and curving ventrally; posterior margin of tergum VIII with 3-4 rows of setae; lamella antevaginalis (Fig. 32) ringlike and very weakly sclerotized, lamella postvaginalis well developed, width of posterior margin ca. 2× ostium diameter, posterolateral corners acute, a depressed trough from mid posterior margin to ostium; membrane between sterigma and ventral extremities of tergum VIII setose; sternum VII with length of posterior margin ca. 3× ostium diameter, roundly invaginated to depth of one-third length of sterigma, approximate to sterigma medially; ductus bursae constricted anterior to ostium; corpus bursae with two signa.

**Distribution and biology.** My study sample included 128 specimens (105 ♂, 23 ♀) from the following states and counties: ARIZONA: Coconino;

COLORADO: Chaffee, Fremont, El Paso, Grand; IDAHO: Lincoln, Oneida; MONTANA: Jefferson; NEW MEXICO: Santa Fe; OREGON: Harney; UTAH: Juab, Sanpete; WYOMING: Albany. I have occasionally found this species to be abundant in sagebrush habitat at elevations between 5000' and 8000'. Brown et. al. (1983) reported *Chrysothamnus nauseosus* (Pall.) Britt. (Asteraceae) as a larval host in Idaho.

**Comments.** The forewing markings are stable, but the overall appearance of *totana* varies from very pale tan to medium brown. In lighter specimens the brown irrorations are restricted to the basal one-third of the wing, the median area is mostly pale yellowish white to white, and the markings are orangish brown. Darker



specimens are much more densely irrorated and have dark brownish-black markings.

***Eucosma piperata* Wright, new species**

(Figs. 4, 18, 26, 35)

**Diagnosis.** Reasonably fresh specimens of this species are readily identified by forewing pattern: white, peppered with minute black specks, with brown marks on distal one-half of costa.

**Description.** **Head:** Frons and vertex white, a small patch of pale-brown scales anterior to eye; labial palpus with medial surface white, lateral surface pale brown; antenna white, scape sometimes pale brown dorsally. **Thorax:** Dorsal and ventral surfaces white; legs with anterior surfaces pale brown, posterior surfaces white, and distal ends of tarsal segments lightly ringed with white. **Forewing** (Fig. 4): ♂ FWL 10.8–11.5 mm (mean = 11.2, n = 6), AR = 3.11, CFR = 0.32, ♀ FWL 11.5–13.5 mm (mean = 12.6, n = 8), AR = 2.99; distal three-fourths of costa straight, apex mildly acute, termen weakly convex; dorsal surface white, sparsely speckled with black scales between radial vein and dorsum, costal strigulae delimited by narrow, brown, costal marks but otherwise not distinguishable from ground color, a conspicuous, oblique, brown mark at apex; ocellus obscure, variably marked on basal and distal margins by a few black and brown scales, respectively, ca. three, black, weakly expressed, longitudinal dashes in central field; costal fold of male pale grayish brown along costal margin; fringe scales white basally, very pale orange brown distally. **Hindwing:** White, a shade grayer than forewing, fringe white. **Male genitalia** (Fig. 18): Uncus a semicircular dorsally setose lobe, supported laterally by well developed and mildly hunched shoulders; socii densely setose, tapered distally, with lateral margins variably serrate; gnathos a narrow band; vesica with ca. 14 deciduous cornuti (n = 4); valva with costal margin concave, apex rounded but moderately acute, distal margin convex, ventral angle gently rounded, ventral invagination shallow, NR = 0.7, cucullus with medial surface densely setose, sacculus sparsely setose, a patch of setae on margin of basal opening. **Female genitalia** (Fig. 26): Papillae anales facing laterally and densely setose, medial margins weakly sinuate, surfaces finely ridged transversely, setae toward lateral margins strongly curved ventrally, those near anal opening with hooked apices; posterior one-half of tergum VIII with ca. four rows of setae; lamella antevaginalis (Fig. 35) ringlike; lamella postvaginalis widening posteriorly to ca. 2× ostium diameter, with triangular, mildly setose, posterolateral corners; sternum VII with posterior margin roundly invaginated to three-fourths length of sterigma and approximate to sterigma; ductus bursae weakly constricted anterior to ostium, gradually widening anteriorly; corpus bursae with two similarly shaped signa, membrane finely wrinkled near signa, interior surface of bursa minutely microtrichiate.

**Holotype.** ♂, Vineyard, Utah, 9 July 1912, Tom Spalding, genitalia slide USNM 70391, USNM.

**Paratypes.** **ARIZONA:** Lupton, A. K. Wyatt, 3 July 1951 (1 ♀, genitalia slide DJW 1061). **CALIFORNIA:** Inyo Co., 9 mi. W. Lone Pine, P. D. Hurd & J. A. Powell, 19 July 1961 (1 ♀); Westguard Pass, White Mts., P. Opler & J. A. Powell, 19 July 1968 (1 ♀). **COLORADO:** Mesa Co., Colo. N. Monument, Head of Red Canyon, J. Moore, 3 July 2001 (3 ♂, 1 ♀, ♂ genitalia slide DJW 1132, ♀ genitalia slide DJW1133). **IDAHO:** Oneida Co., Curlew NC, 4 mi ENE of Holbrook, 5050', D. J. Wright, 18 July 2001 (1 ♂, genitalia slide DJW 762). **NEVADA:** Nye, Co., Curren Cr. Cpgd., J. Scott, 20 July 1968 (1 ♀), P. Opler & J. A. Powell, 20 July 1968 (2 ♀, genitalia slides T. Gilligan 265, DJW 1288); Lincoln Co., Cathedral Gorge St. Pk., J. Doyen, 12/13 July 1971 (1 ♀). **OREGON:** Baker Co., Burnt River Cyn., 3200', 44E 33.08' N, 117E 39.75' W, C. D. Ferris (1 ♀, genitalia slide DJW 1134). **UTAH:** Vineyard, 4 July 1912 (1 ♀); Vineyard, Tom Spalding, 14 July 1912 (1 ♂, genitalia slide DJW 1058); Juab Co., Eureka, Tom Spalding, 20 July 1911 (1 ♂); Sevier Co., Richfield, 15 June 1930 (1 ♂), 15 July 1930 (1 ♂, genitalia slide DJW 1060). Paratype depositories: CDF, CSU, EME, LACM, USNM, DJW.

**Etymology.** The specific epithet, deriving from the Latin word for

pepper, refers to the minute black speckling on an otherwise white forewing.

**Distribution and biology.** The 20 specimens (9 ♂, 11 ♀) reported above suggest that the range of this moth may be restricted to the Great Basin. The flight period extends from mid June through July. The larval host is unknown.

**Comments.** In some specimens the black speckling is barely discernable, but the brown costal marks, particularly the apical one, are usually conspicuous. The wrinkling of the membrane of the corpus bursae in the vicinity of the signa is variable.

***Eucosma nordini* Wright, new species**

(Figs. 5, 21, 27, 31)

**Diagnosis.** The immaculate pale yellowish-white forewing is diagnostic for this species. Males have a blackish-gray streak along the anterior edge of the costal fold.

**Description.** **Head:** Upper frons and vertex very pale yellowish white, labial palpus white, lateral surface of second segment with pale gray shading; antenna white. **Thorax:** Dorsal surface pale yellowish white, ventral surface white, legs pale yellowish white, anterior surfaces sometimes darker. **Forewing** (Fig. 5): ♂ FWL 10–13.7 mm (mean = 11.9, n = 14), AR = 3.35, CFR = 0.29, ♀ FWL 10.8–13 mm (mean = 11.5, n = 5), AR = 3.13; costa straight, apex acute, terminal margin weakly convex; dorsal surface very pale yellowish white, without markings, fringe white, males with blackish-gray streak along costal edge of fold. **Hindwing:** Pale brownish gray, fringe white. **Male genitalia** (Fig. 21): Uncus semitriangular, apex rounded, lateral margins weakly convex, dorsal surface setose, shoulders of tegumen well developed; socii long, flat, tapering distally, and densely setose; gnathos a narrow band; aedeagus tapering distally, vesica with 4–10 deciduous cornuti (n = 5); valva with costal margin concave except for slight, elongate, convex protrusion on cucullus, apex semirectangular, distal margin convex, ventral angle gently rounded, ventral invagination shallow, NR = 0.75, cucullus with medial surface densely setose, sacculus and margin of basal opening moderately setose. **Female genitalia** (Fig. 27): Papillae anales facing laterally and densely setose, surfaces finely ridged transversely, medial margins mildly sinuate, long setae on lateral margins curving ventrally, setae near anal opening shorter with hooked apices; three to four rows of setae on posterior one-third of tergum VIII; lamella antevaginalis (Fig. 31) ringlike; lamella postvaginalis with triangular, setose, posterolateral, corners, posterior margin weakly invaginated medially; sternum VII with posterior margin slightly wider than sterigma, roundly invaginated to one-third length of sterigma and approximate thereto; ductus bursae strongly constricted anterior to ostium, gradually widening toward corpus bursae, corpus bursae with large signum near juncture with ductus bursae and smaller spike-like signum on opposite wall posterior to mid bursa, inner surface minutely microtrichiate.

**Holotype.** ♂, Wyoming, Albany Co., Medicine Bow NF, 11.5 mi SE Laramie, Jctn. Forest Rds 707 and 705, 4 August 2001, D. J. Wright, 8220', genitalia slide DJW 760, deposited in USNM. Type locality at 41° 11.75' N, 105° 23.7' W.

**Paratypes.** **COLORADO:** Chaffee Co., Salida, G. M. and J. L. Sperry, 24 August 1938 (1 ♀, genitalia slide DJW1165). **WYOMING:** Albany Co., T15N S73W Sec. 1, 7450', C. D. Ferris, 25 July 2000 (1 ♂), 28 July 2000 (1 ♂, genitalia slide USNM 91928), 30 July 2003 (1 ♂), 5 August 2003 (2 ♂), 9 August 2002 (1 ♂), 9 August 2003 (1 ♂), 10 August 2002 (3 ♂, genitalia slide DJW1077), 10 August 2003 (1 ♂), 11 August 2003 (1 ♂), 13 August 2002 (1 ♂), 14 August 2002 (1 ♂), 15 August 2002 (3 ♂), 15 August 2003 (2 ♂), 16 August 2002 (5 ♂), 17 August 2002 (1 ♂, 1 ♀), 18 August 2002 (1 ♂), 18 August 2003 (2 ♂), 19

August 2002 (5 ♂, 1 ♀), 19 August 2003 (1 ♂, genitalia slide DJW 1078), 22 August 1999 (1 ♀), 22 August 2002 (1 ♀, genitalia slide DJW 1073), 24 August 2002 (1 ♂), 25 August 2002 (1 ♀, genitalia slide DJW 1074); Albany Co., T15N S73W Sec. 1, 2217 Sky View Ln., 7468', J. S. Nordin, 27 July 1994 (1 ♀, genitalia slide DJW 312), 11 August 1995 (1 ♂, genitalia slide DJW 271), 14 August 2001 (1 ♂), 16 August 1999 (1 ♂), 17 August 2002 (1 ♂), 19 August 1995 (1 ♂), 20 August 1998 (1 ♂), 21 August 1998 (1 ♂, genitalia slide J. W. Brown 1173), 28 August 1998 (1 ♂); Albany Co., T15N S71W Sec. 14, E of Pilot Hill Road, 8600', J. S. Nordin, 25 August 1998 (2 ♂); Albany Co., Upper Blair PG, N. of Rd. 705, J. S. Nordin, 8200', 12 August 2003 (1 ♀); Albany Co., NE of Pole Mtn., S. of Happy Jack Rd., 8320', J. S. Nordin, 12 August 2001 (1 ♂); Albany Co., 1.5 mi NW Woods Landing, Fox Creek, J. S. Nordin, 7600', 31 July 2002 (1 ♂); Albany Co., 8 mi. NE Laramie, Rogers Canyon, M. Pogue, 22 August 1980 (3 ♀, genitalia slide DJW 1135); Albany Co., Medicine Bow NF, 10.5 mi SE Laramie, 8300', D. J. Wright, 4 August 2001 (2 ♂); Albany Co., Medicine Bow NF, 11.5 mi SE Laramie, 8220', D. J. Wright, 4 August 2001 (1 ♂); Teton Co., Grand Teton NP, Teton Sciences School, P. A. Opler, 3 August 2001 (1 ♂); Washakie Co., Tensleep Preserve, T47N R86W S32, 6400', 8 August 1999, C. D. Ferris (3 ♂). Paratype depositories: AMNH, BMNH, CNC, CDF, CSU, EME, JSN, LACM, USNM, DJW, UWY.

**Etymology.** It is a pleasure to name this species after John S. Nordin, whose extensive collecting around Laramie, Wyoming, has made a significant contribution to our knowledge of the lepidopteran fauna of that region.

**Distribution and biology.** I examined 115 specimens (104 ♂, 11 ♀) from the following states and counties: COLORADO: Chaffee; WYOMING: Albany, Teton, Washakie. Capture sites range in elevation from 6400' to 8300'. Flight occurs from late July to the end of August. The larval host is unknown.

### *Eucosma taosana* Wright, new species

(Figs. 9, 19)

**Diagnosis.** The forewing of *taosana* has a conspicuous band of orange-brown scales along the costa and a line of similarly colored scales along 1A+2A. The male genitalia of *taosana* is similar to that of *totana* (Figs. 16, 19), but the apex of the cucullus is more angular and the uncus lacks a wedge shaped posterior projection.

**Description. Head:** Lower frons white, scales of vertex brownish gray medially, lighter toward base and apex; labial palpus with medial surface white, lateral surface brown; antenna brown. **Thorax:** Dorsal surface brown, scales on apex of tegulae brownish black with white apices, ventral surface pale tan, legs with anterior surfaces dark gray-brown, posterior surfaces pale tan, distal extremities of tarsal segments ringed with pale tan. **Forewing** (Fig. 9): ♂ FWL 7.5-9.5 mm (mean = 8.5, n = 12), AR = 3.19, CFR = 0.31; costa and termen nearly straight, apex acute; dorsal surface brown with brownish-black markings, a band of orange-brown coloration from base to apex between costa and radial vein, a narrow similarly colored band from base to tornus along 1A+2A, a brownish-black, outwardly oblique, subbasal mark on dorsum extending forward into cell, a triangular, brownish-black, subternal mark on dorsum projecting anteriorly along basal margin of ocellus, both marks divided by orange-brown line along 1A+2A, a narrow elongate patch of white-tipped, dark grayish-brown scales anterior to ocellus, extending and tapering basally to middle of cell, mildly constricted at distal end of cell; ocellus with basal, distal and tornal margins pale yellowish brown to yellowish gray, central field white to pale brown, crossed longitudinally by 3-4 brownish-black dashes, the latter often connected in zig-zag pattern; distal one-half of costa usually with four, sharply defined, paired, white strigulae, costal fold on male brownish black; termen with band of white-tipped

brownish-black scales from apex to tornus, fringe scales similarly marked near apex, lighter and more uniformly brownish gray toward tornus. **Male genitalia** (Fig. 19): Uncus triangular and dorsally setose, divided medially by shallow indentation; dorsolateral shoulders of tegumen well developed and hunched; aedeagus long, slender, and tapering distally, vesica with 4-5 deciduous cornuti (n = 9); gnathos a narrow band; valva with costal margin concave, apex rounded but moderately acute, distal margin convex, with ca. 8 stout setae along ventral two-thirds, ventral angle rounded, ventral invagination moderate, NR = 0.61, cucullus with distal one-half of medial surface densely setose, sacculus moderately setose, margin of basal opening with setose medial projection.

**Holotype.** ♂, New Mexico, Taos Co., S. Side US 64, 10 mi. SE Tres Piedras, 7550', 11 August 1999, D. J. Wright, genitalia slide DJW 1035, deposited in USNM. Type locality at 36° 34.5' N, 105° 48.2' W.

**Paratypes. NEW MEXICO:** Same data as holotype (17 ♂, genitalia slides DJW 528, 1034); Luma Co., Deming, 16-23 August (2 ♂, genitalia slides USNM 70399, DJW 1070); Fort Wingate, 24-30 June (1 ♂, genitalia slide USNM 70396), 24-31 July (3 ♂, genitalia slide USNM 70398). **UTAH:** Tooele Co., Stockton, Tom Spalding, 30 August 1904 (1 ♂, genitalia slide DJW 1064). Paratype depositories: AMNH, BMNH, CNC, CSU, EME, LACM, USNM, DJW.

**Etymology.** The specific epithet refers to Taos County, New Mexico.

**Distribution and biology.** Of the 29 specimens examined, one is from central Utah and the rest are from New Mexico. Capture dates range from late June through August. The type locality is open sagebrush habitat at an altitude of 7550 feet. The larval host is unknown.

### *Pelochrista emaciatana* (Walsingham), new combination

(Figs. 1, 10, 13, 17, 24, 33)

*Paedisca emaciatana* Walsingham 1884:137, pl. IV, Fig. 7.

*Eucosma emaciatana*: Fernald [1903]:460; Barnes and McDunnough 1917:171; McDunnough 1939:46; Powell 1983:34.

*Eucosma perpropinqua*: Heinrich 1929:8; McDunnough 1939:47, **new synonymy**.

*Pelochrista perpropinqua*: Powell 1983:35.

**Types.** *Paedisca emaciatana*. Lectotype here designated (Figs. 1, 13): ♂, Arizona, Morrison, 1882, genitalia slide 11571, BMNH. Paralectotypes: same data as lectotype, (2 ♂, BMNH). *Eucosma perpropinqua*. Holotype: ♂, Arizona, Pima Co., Indian Oasis, Sells Post Office, 15-30 April 1923, O. C. Poling, genitalia slide 72797, USNM. Paratypes: same site and collector as holotype, 1-15 April 1923 (3 ♀, genitalia slides DJW 809, 955, USNM; 1 ♀, CNC), 15-30 April 1923 (1 ♀, USNM; 1 ♀, AMNH).

**Diagnosis.** Reasonably fresh specimens can be identified on the basis of forewing pattern (Fig. 10), but dissection is recommended for positive determination. Males are distinguished by the general shape of the valva and the size and position of the ventral spike (Fig. 17), females by the sclerotized plate on the dorsolateral surface of the corpus bursae, the presence of only one

signum, and the shape of the sterigma (Figs. 24, 33).

**Description. Head:** Frons and vertex white, scales anterior to eye light brown; labial palpus elongate, lateral profile triangular, length more than 2× eye diameter, first segment and medial surface of second segment white, scales on lateral surface and dorsal margin of second segment concealed by white apices, scales of second segment concealing third segment; antenna white. **Thorax:** Dorsal surface white with pale-brown shading, scales of tegulae light brown with white apices, ventral surface white, legs light brown with white tarsal annulations. **Forewing** (Figs. 1, 10): ♂ FWL 10.8–13 mm (mean = 11.5, n = 7), AR = 3.1, CFR = 0.27, ♀ FWL 7.9–9.9 mm (mean = 9.4, n = 6), AR = 3.3; costa straight, vertex acute; dorsal surface white with brown markings, appearing streaked longitudinally, a dark-brown, outwardly oblique, subbasal mark on fold, a brown pretornal mark on dorsum, often one or more variably expressed, disjunct, brown marks between mid costa and pretornal mark, and an elongate patch of pale brown scales with white apices anterior to ocellus and connected by oblique spur of similar scaling to brown apical mark; ocellus obscure, white to pale brown, crossed longitudinally by three light-brown streaks, the latter often marked medially by a few brownish-black scales; termen with several rows of pale brown scales with white apices, the latter preceded basally by a streak of white scales from distal margin of ocellus to apex; distal one-half of costa with four indistinct, white, paired strigulae, merging into light post-costal streak from mid costa to apical mark; male costal fold darker than adjacent forewing scaling. **Hindwing:** Uniformly brownish gray with pale white fringe. **Male genitalia** (Figs. 13, 17): Uncus a dorsally setose convex lobe, shoulders of tegumen moderately developed; socii curving dorsally and moderately setose; aedeagus tapered distally, vesica with no indication of cornuti (n = 10); valva with costal margin concave, apex evenly rounded, outer margin convex, ventral angle with well developed projection supporting a stout spine, usually a spine of similar size and several smaller spines on distal margin of cucullus, ventral invagination moderate, NR = 0.7, cucullus with distal two-thirds of medial surface densely setose, sacculus moderately setose. **Female genitalia** (Fig. 24): Papillae anales facing laterally and densely setose, medial margins mildly sinuate, surfaces finely ridged transversely, long setae on lateral margins strongly curved ventrally; lamella antevaginalis (Fig. 33) ringlike and very weakly sclerotized; lamella postvaginalis well developed, depressed medially, with variably invaginated posterior margin and sharply acute anterolateral projections; sternum VII with posterior margin weakly invaginated and closely approximate to sterigma; ductus bursae uniformly narrow, constricted anterior to ostium; corpus bursae with large sclerotized patch on dorsolateral surface at juncture with ductus bursae, a large signum on ventral surface, and a faint indication of a reduced signum at center of anterior margin of sclerotized patch.

**Distribution and biology.** I examined 96 specimens (66 ♂, 30 ♀): one each from San Bernadino Co., California, Clark Co., Nevada, and Kimble Co., Texas; the rest (to the extent determinable by specimen data) from Cochise, Pima, Pinal, and Santa Cruz Counties in Arizona. Three specimens had capture dates in September or October; the others were collected between early March and mid June. Ninety percent of the records were dated between 1 April and 31 May. No larval host information has been reported.

### *Pelochrista popana* (Kearfott)

(Figs. 11, 20, 29, 37)

*Eucosma popana* Kearfott 1907:31; Barnes & McDunnough 1917:169; Heinrich 1923:109; McDunnough 1939:47.

*Eucosma carcharias*: Meyrick 1912:35.

*Pelochrista popana*: Powell 1983:35.

**Types.** Lectotype designated by Klots (1942): ♀, Stockton, Utah, Tom Spalding, 3 July 1904, genitalia slide DJW 1085, AMNH. Paralectotypes: UTAH: Stockton, Tom Spalding, 1 June 1904 (3 ♂, AMNH; 1 ♂, USNM), 8 June 1904 (2 ♂, USNM), 10 June 1904 (2 ♂, USNM), 14 June 1904 (2 ♂, AMNH; 1 ♂, USNM), 15 June 1904 (1 ♂, USNM), 28 June 1904 (1 ♀, AMNH), 3 July 1904 (2 ♀, AMNH).

**Diagnosis.** The forewing maculation of *popana* is grayish-black, as opposed to brown in *totana*, *taosana*, and *powelli*. The dark mark anterior to the ocellus nearly always connects to an apical dash of the same color, often connects to costa, and frequently extends along distal edge of ocellus toward tornus, forming a distinctive Y-shaped mark. The shapes of the valva (Fig. 20) and sterigma (Fig. 37) separate *popana* from the other species considered here.

**Description. Head:** Lower frons white, scales of upper frons and vertex long, gray to brownish gray medially, with lighter apices; labial palpus with basal segment and medial surface of second segment white, lateral surface of second segment gray to brownish gray, third segment concealed by scales of second segment; antenna grayish white, often darker distally. **Thorax:** Dorsal surface and tegulae with brownish-gray, white-tipped scales, ventral surface white, legs with anterior surfaces brownish gray, posterior surfaces white, tarsal segments with white distal annulations. **Forewing** (Fig. 11): ♂ FWL 8–9.8 mm (mean = 8.6, n = 12), AR = 3.21, CFR = 0.31, ♀ FWL 6.7–8.3 mm (mean = 7.4, n = 19), AR = 3.21; costa weakly convex, apex acute, termen weakly convex; dorsal surface white with brownish-black to brownish-gray markings, basal and median areas white and variably irrorated with brownish gray, an outwardly oblique subbasal mark extending from dorsum to cell, a broken median fascia consisting of three marks, the first at mid costa, the second at distal end of cell, the third semitriangular and projecting anteriorly from pretornal portion of dorsum along basal margin of ocellus, the first two median marks often connected, the latter two usually separated by narrow band of white scales, an elongate patch of white-tipped, black to brownish-gray scales anterior to ocellus, usually connected to apex by oblique dash of similar coloration; ocellus with basal, distal and tornal margins pale pinkish brown, central field a narrow, vertical, light brown streak, crossed longitudinally by ca. 4 black dashes; distal one half of costa with four paired white strigulae, costal fold of male dark gray, fringe scales white basally and apically, black to brownish-gray medially. **Abdomen:** Females with dark gray scales on posterior margin of eighth segment. **Hindwing:** Uniformly brownish gray, fringe lighter. **Male genitalia** (Fig. 20): Uncus dorsally setose and semitriangular, apex sometimes weakly indented; socii long and setose, curving dorsally; aedeagus long, tapering distally, vesica with 3–6 deciduous cornuti (n = 4); valva with costal margin concave, apex nearly right angled but rounded, distal margin convex with 2–3 stout spines, ventral angle developed into triangular lobe supporting 1 or 2 stout spines, ventral invagination broad and shallow, NR = 0.7, cucullus with medial surface moderately setose, sacculus sparsely setose, margin of basal opening with weakly developed setose projection. **Female genitalia** (Fig. 29): Papillae anales facing ventrolaterally and densely setose, surfaces finely ridged transversely, medial margins sinuate, setae on lateral margins long, curving ventrally, those near anal opening shorter, with hooked apices; sterigma (Fig. 37) with anterior margin very weakly sclerotized, lamella postvaginalis extending laterally to width of ca. 3× ostium diameter, widening posteriorly, length ca. 0.5× width, posterior margin with scalloped appearance due to sharply acute posterolateral corners and concave medial invagination, a very shallow trough from mid



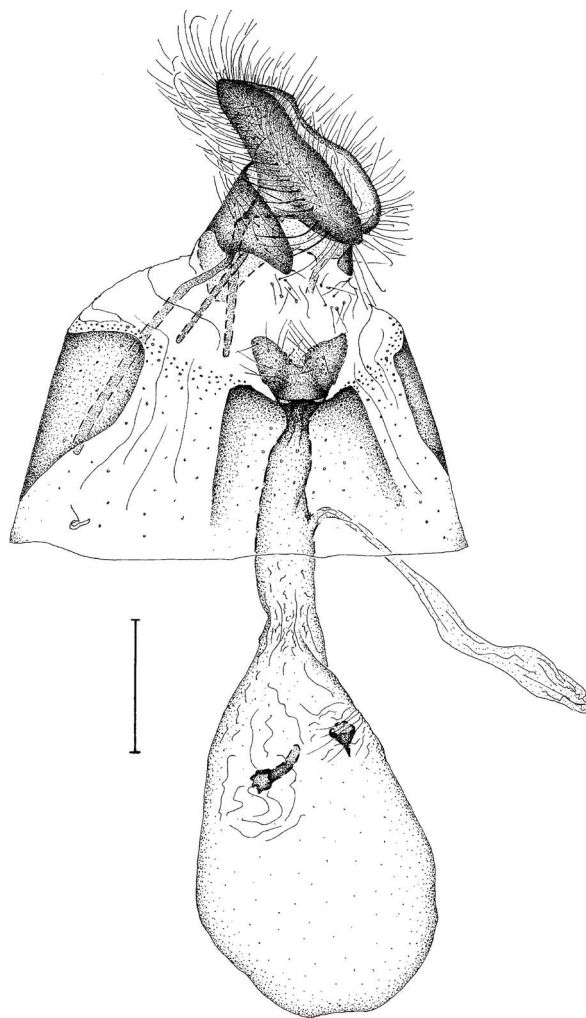
posterior margin to ostium, surface finely microtrichiate; sternum VII with posterior and lateral margins strongly sclerotized, posterior margin with medial triangular projection overlapping ostium; ductus bursae of nearly uniform width, sclerotized from constriction anterior to ostium to ductus seminalis; corpus bursae with two similarly sized signa, membrane variably crinkled around signa, interior surface minutely microtrichiate.

**Distribution and biology.** I examined 167 specimens (146 ♂, 21 ♀) from the following states and counties: COLORADO: Chaffee, Grand, Larimer, Mesa; IDAHO: Blaine; MONTANA; NEVADA: Lander, White Pine; NEW MEXICO: Taos; UTAH: Cache, Garfield, San Juan, Tooele, Uintah; WYOMING: Albany, Carbon, Fremont, Park, Sublette, Teton. They document a flight period from early June to late August. No larval host has been reported.

*Pelochrista powelli* Wright, new species  
(Figs. 12, 22, 23, 30, 34)

**Diagnosis.** This moth has a pale brown appearance. By contrast, *popana* is brownish-black to gray, with considerable contrast between markings and ground color. The forewing pattern of *powelli* lacks the chevron shaped mark at the end of the cell in *totana* and the orange-brown scaling along the costa and along 1A+2A in *taosana*. In females of *powelli*, the scales on the posterior margin of the eighth abdominal segment are brown and inconspicuous, they are brownish-black to gray in *popana*. The v-shaped posterior margin of the sterigma separates *powelli* from the other species considered here.

**Description. Head:** Lower frons pale tan, scales of vertex white distally, shading to tan basally; labial palpus tan to pale brown; antenna pale tan. **Thorax:** Dorsal surface pale brown, ventral surface pale tan, legs with anterior surfaces pale brown, posterior surfaces white to tan, distal ends of tarsal segments ringed with pale tan. **Forewing** (Fig. 12): ♂ FWL 7.1-10.5 mm (mean = 8.7, n = 10), AR = 3.3, CFR = 0.26, ♀ FWL 8.2-9.2 mm (mean = 8.8, n = 5), AR = 3.11; costa weakly convex, apex acute, termen straight to weakly convex; dorsal surface pale tan with brown markings, a brownish-black subbasal mark on fold, a thin brown line along fold from subbasal mark to tornus, a narrow, triangulate, brown mark based on fold and projecting toward apex along basal margin of ocellus, an elongate patch of white-tipped brownish-black scales anterior to ocellus, extending basally through distal one-half of cell, usually constricted and darker at distal end of cell; ocellus obscure, variably bordered on basal, distal and tornal margins with pale pinkish-tan bars, central field white, crossed by 4-6 brownish-black dashes that are often joined in zig-zag pattern; distal two-thirds of costa with numerous white strigulae, delineated by brown costal marks and thin brown striae, male costal fold brownish black; termen with band of white-tipped brownish-black scales extending from apex to tornus, fringe scales lighter with pale-brown medial markings. **Hindwing:** Pale gray-brown with paler fringe. **Male genitalia** (Figs. 22, 23): Uncus semitriangular with rounded apex, dorsal surface setose; tegumen long, dorsolateral shoulders well developed and hunched; socii long, flat, tapering distally, and moderately setose; gnathos a narrow band; aedeagus long, tapered distally, vesica with 4-9 deciduous cornuti (n = 7); valva with costal margin weakly concave, apex rounded to angular, distal margin convex, ventral angle with triangular projection supporting stout spine, neck long and narrow, NR = 0.5, ventral invagination broad and moderate, cucullus with densely setose medial surface and 3-5 stout spines on distal margin, sacculus moderately setose, margin of basal



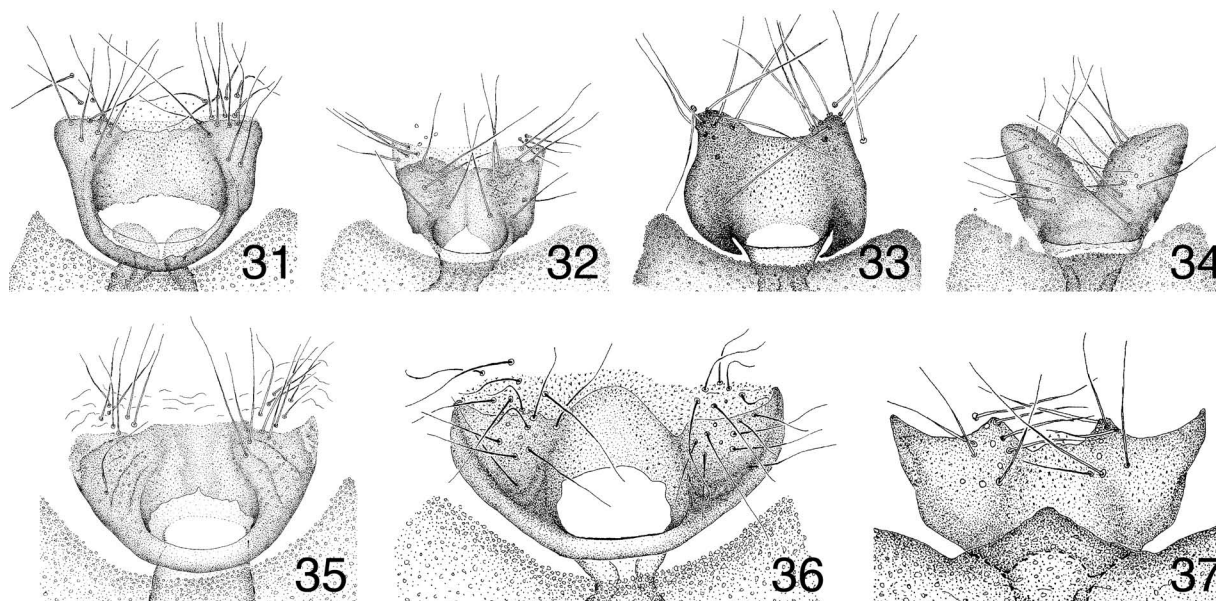
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FIG. 30. Female genitalia. 30, *P. powelli*, slide DJW 1024.

opening with weakly developed setose projection. **Female genitalia** (Fig. 30): Papillae anales facing ventrolaterally and densely setose, medial margins sinuate, surfaces very finely ridged transversely, setae on lateral margins long and curving ventrally, those near anal opening shorter with hooked apices; posterior one-half of tergum VIII with 4-5 rows of setae; sterigma (Fig. 34) with anterior margin very weakly sclerotized, lamella postvaginalis developed posterolaterally into triangular projections, posterior margin with v-shaped medial invagination, surface finely microtrichiate; sternum VII with posterior margin concavely invaginated except for mild, convex, medial, projection overlapping ostium; ductus bursae narrow, constricted anterior to ostium; corpus bursae with two signa, inner surface minutely microtrichiate.

**Holotype.** ♂, Idaho, Oneida Co., Curlew NG, 4 mi. ENE of Holbrook, Jctn. Forest Rds. 056 and 057, 5050', 7 July 2001, D. J. Wright, genitalia slide DJW 1032, deposited in USNM. Type locality at 42° 11.35' N, 112° 34.92' W.

**Paratypes.** IDAHO: Oneida Co., Curlew NG, 4 mi. ENE of Holbrook, 5050', D. J. Wright, 25 July 2003 (2 ♂, genitalia slide DJW1027), 26 July 2003 (2 ♂, 1 ♀); Oneida Co., Curlew NG, T14S R32E S30, D. J. Wright, 28 July 2003 (4 ♀, genitalia slides DJW1024, 1029). UTAH: Daggett Co., 4 mi. S. of Manila, G. J. Balogh, 20 July



FIGS. 31-37. Sterigmata of specimens illustrated in Figs. 24-30. 31, *E. nordini*. 32, *E. totana*. 33, *P. emaciatana*. 34, *P. powelli*. 35, *E. piperata*. 36, *E. larana*. 37, *P. popana*.

1994 (5 ♂, genitalia slides DJW 697, 705, 707); Juab Co., Eureka, Tom Spalding, 18 August 1911 (1 ♂, genitalia slide DJW1069); Garfield Co., 3 mi. W. Bryce Jct., 2300m, J. A. Powell, 28/29 June 1992 (1 ♂, genitalia slide EME 5755); Garfield Co., Kings Cr. campgr., 15 km SW Bryce Jct., 2300m, J. A. Powell, 18 July 1993 (12 ♂, genitalia slide EME 5756). Paratype depositories: BMNH, CNC, EME, GJB, USNM, DJW.

**Etymology.** This species is named after J. A. Powell, who collected nearly half of the specimens in the type series.

**Distribution and biology.** The 29 specimens (24 ♂, 5 ♀) reported above were collected in southeastern Idaho and Utah, suggesting a Great Basin distribution for this insect. The type locality is open sage brush habitat. The larval host is unknown.

**Comments.** The shape of the male valva is variable (Figs. 22, 23), the cucullus illustrated in Fig. 22 being the most angular of the nine I examined. Forewing color also varies from very light tan in the specimens from Idaho to a pale brown in those from Utah.

#### ACKNOWLEDGEMENTS

I thank B. Brown, J. W. Brown, J. D. Lafontaine, P. A. Opler, P. D. Perkins, J. A. Powell, E. Quinter, S. Shaw and K. R. Tuck for the loan of specimens under their care. I particularly appreciate the efforts of J. S. Nordin and C. D. Ferris, who supplied me with many study specimens from southeastern Wyoming. Finally, thanks to T. Gilligan for his help in producing the electronic files for the illustrations and to the reviewers, R. L. Brown and W. E. Miller, for many helpful suggestions.

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Received for publication 20 October 2004, revised and accepted 5 May 2005