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Biological Records and Descriptions of Some Little Known *Epiblema* in the Southwestern United States

(Lepidoptera: Tortricidae)

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The genus *Epiblema* Hübner is widespread in the northern Hemisphere, comprising nearly 100 described species in the Holarctic Region. The group extends into southern continents evidently by a depauperate representation, such as in South Africa, although the fauna of southern regions probably is largely unworked. Primarily on the basis of male genitalia Obraztsov (1965a) assigned the Palearctic species to three subgenera, *Epiblema s. str.*, *Cacochroea* Lederer, and *Notocelia* Hübner. These taxa had been treated at the generic level by some previous authors (e.g., Bradley, 1959). Larvae of the members of the first two of these subgenera feed in roots or stems of Compositae, sometimes creating a gall-forming reaction by the host, while larvae of *Notocelia* are leaf-rollers on Rosaceae (e.g., Ford, 1949).

MacKay (1959) placed Nearctic species currently assigned to *Epiblema* and a related genus, *Sonia* Heinrich, in three groups on the basis of larval structures and indicated that these are generic level categories. Her group 1 included *E. praesumptiosa* Heinrich and *Sonia canadana* McDunnough, and MacKay suggested on the basis of Heinrich's (1923) figures of male genitalia that *Epiblema abruptana*, *numerosana*, *grossbecki*, *praesumptiosa*, *deflexana*, *insidiosana* and *exerbatricana* should be combined with *Sonia* to form a single genus. Her group 2 corresponds to the remainder of Nearctic *Epiblema s. str.* for which larvae were available, that is *strenuana* Walker, *otiosana* Clemens, and in essence the species #7024–7032 of McDunnough's list (1939), nearly all of which are known to be stem borers and/or gall makers. Finally, group 3 of MacKay is equivalent to *Notocelia* including the introduced European species *suffusana* Zeller and the indigenous *culminana* Walsingham (probably = #7040–7043 of McDunnough).

I have reared the 3 species of *Sonia* that occur in California, each

at a number of localities. All are root borers in woody Compositae (*vovana* Kearfott in *Gutierrezia*, *filiana* Busck and *comstocki* Clarke in *Haplopappus*). This suggests that the other members of MacKay's group 1 are root-borers and that biologies and larvae of this assemblage (#7015–7023 of McDunnough) have escaped discovery because American microlepidopterists have not much dug into this ecological horizon yet. This supposition may apply to the other biologically unknown *Epiblema* complex (#7033–7039 of McDunnough), as well as most *Eucosma.*

Whether larval characteristics ought to be weighted heavily enough to provide the basis for generic delineation is debatable, but MacKay's opinion should encourage a more comprehensive study of *Epiblema* and allies. In this group, as in many Microlepidoptera, too much emphasis has been placed on male genitalia and secondary male characters to the exclusion of other lines of evidence. The rainbow that was represented by the discovery of male genital characters led microlepidopterists out of the stormy taxonomic chaos of the turn of the century, but its pot of gold was so doggedly sought that many workers made the mistake of attempting to force male genitalia to serve a dual role as species diagnostic characters and as indicators of relationship in development of generic concepts. As a result some genera in groups such as Eucosmini are artificial groupings of convenience rather than taxa that reflect underlying evolutionary relationships. Probably a complete reshuffle of American *Phaneta*, *Eucosma*, *Epiblema*, *Suleima*, and *Sonia* will be warranted by a thorough investigation.

Several years ago I prepared a report treating an assortment of Eucosmini, including three previously undescribed species of *Epiblema.* However, after review of the manuscript, it seemed advisable to withhold the portion dealing with *Epiblema* until the work by Obraztsov on subgeneric relationships in Palearctic members of the genus was completed. Thus the rest of my study was published (Powell, 1963), and a review of Nearctic *Epiblema* in concordance with the European fauna was anticipated. Unfortunately types of the proposed new species were distributed to the appropriate museums, but the research was not resumed after the Palearctic classification appeared (Obraztsov, 1965a). The present descriptions are offered to rectify this situation and to make the names available for ecological work by C. D. MacNeill at the Oakland Museum and for more comprehensive taxonomic studies by Richard Brown who has completed a Master's degree thesis on *Epiblema* at the University of Arkansas.

Epiblema arizonana, new species
(Figs. 9, 10)

A large moth, resembling *E. carolinana* (Walsingham), having a mottled brownish forewing with a central whitish area followed by a darker terminal spot.

Male.—Length of forewing 9.1 to 10.2 mm (reared specimens). Head: labial palpus short, II segment length about 1.0 vertical eye diameter, slightly upcurved, thickly clothed with rather appressed scaling which forms a blunt, apical tuft obscuring III segment; latter about 0.33 the length of II, blunt; pale brownish exteriorly, whitish interiorly. Antenna slightly less than 0.5 forewing length; orange-brown, dorsal scaling brownish, darker toward base, scape white below. Scale tufts of crown dense, elongate, strongly directed mesad, brownish reflecting purplish; scaling of front short, appressed, whitish. Thorax: dorsum dark brown, the scales faintly tipped with whitish, more strongly so posteriorly; a tinge of red-brown in upraised tuft of scutellum; metanotum with dense, lateral hair brushes which do not entirely obscure scutellum; latter scaled brownish. Underside whitish, pro- and mesothoracic legs pale brownish exteriorly, excepting white apical bands of tarsi and tibiae. Forewing: length about 2.7 times width. A broad, appressed costal fold from base to beyond middle of costa; costal margin straight to end of fold, slightly convex beyond; termen slightly concave. Ground color grayish brown, mottled with darker, vertical strigulae. Costal fold of ground color with about seven darker bands; basal area heavily mottled with dark and light scales; a broad whitish area over middle one-third of dorsum, becoming diffuse above middle of wing, enclosing some pale grayish strigulae; a blackish spot immediately following pale area, just before tornus, with a black spot above it in apical area; outer costal and apical areas with some red-brown scaling. Fringe red-brown above middle, gray at tornus. Underside grayish brown, reflecting purplish; dorsal area white; latter with several rows of upraised, elongate scales. Hindwing: broader than forewing; costa with slight concavities before and following middle; termen very slightly concave, broadly curved to dorsum. Upperside dark brown, fringe broad, paler, the scales becoming white at apices. Underside dark brownish with paler streaks along veins and near margin; anal area whitish. Abdomen: (of holotype on slide) dorsal scaling dark brownish, underside paler, genital tuft shining pale brownish. Genitalia as in fig. 1 (drawn from holotype, "C. H. slide 1, 10 July, 1936;" two preparations examined); socii elongate, length equal to width of valva at neck (not evident in figure); valva moderately broad, cucullus length about two times its width, cornuti numerous, elongate, thin.

Female.—Essentially as described for male. Labial palpus apparently somewhat shorter. Forewing lacking costal fold and broader, length 2.5–2.6 times width; whitish areas more extensive and prominent, the markings, particularly the vertical strigulae, more distinct; tornal dark area as a nearly rectangular blackish spot crossed by two diagonal brown lines at veins. White areas of underside of hindwing more extensive. Genitalia as in fig. 5 (drawn from JAP prep. no. 3884, two preparations examined); anterior lobes of papillae anales produced ventrally; sterigma a simple, weakly sclerotized ring, ductus bursae with an ill-defined sclerotized patch above junction of ductus seminalis; signa large, smaller one as large as sterigma, subrectangular, larger one two times the smaller, distally broad and rounded; corpus bursae densely spinulate.

Holotype male: ARIZONA, OAK CREEK CÃNON, near FLAGSTAFF, COCONINO

COUNTY, emerged June 28, 1936, reared from *Rudbeckia laciniata* (G. P. Engelhardt); allotype female same data except June 26, 1936. Paratypes (18): 4 ♂♂, 14 ♀♀, same data except June 17 to June 30. One male bears a partially illegible handwritten label which appears to be: "root and stem borer Rudbeckia amplexicaulis." Seven females (June 24, 1936) are worn specimens and lack the host data and may be flown individuals. Holotype, allotype and 16 paratypes deposited in the U. S. National Museum of Natural History, two paratypes in the University of California, Berkeley collection.

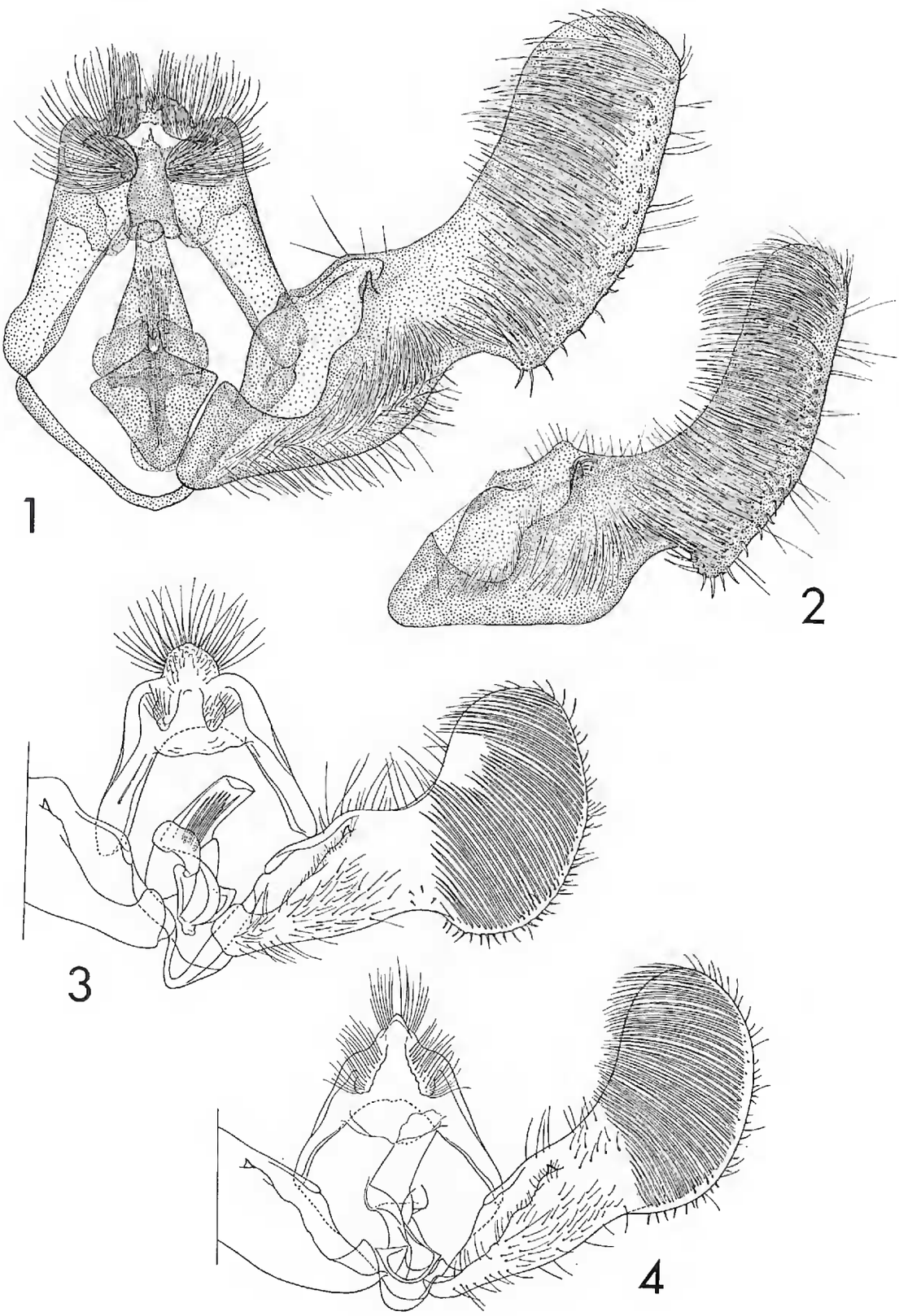
There is little variation among the specimens in good condition. The species is similar to *E. carolinana* (Walsingham), which is known to range west to Illinois. *E. arizonana* differs only slightly in appearance, having more restricted whitish areas and more contrasting dark markings. The male genitalia differ, the valva being considerably broader in *arizonana.* In *E. carolinana* the cucullus distally is slightly narrower than the neck of the valva (fig. 2), whereas it is broader in the present species. The foodplant is the same for both, which suggests that they may be races of a single species; but until more information is available, the differences in male genitalia and the allopatry are bases for species designation.

Superficially, the new species resembles *Eucosma williamsi* Powell (1963), and specimens of the two had been mixed in collections.

Epiblema macneilli, new species
(Figs. 11, 12)

A remarkably distinctive, elongate-winged moth, having a sordid white forewing marked by large blackish blotches.

Male.—Length of forewing 11.3–14.0 mm. Head: labial palpus large, II segment length about 1.7 times vertical eye diameter, greatly expanded by a broad scale brush ventrally, completely obscuring the short, appressed scaled, decumbent III segment; latter about .25 as long as II; scaling dark brown or blackish, reflecting purplish, narrowly tipped with whitish, paler basally and interiorly, scales of the ventral hair brush almost hairlike. Antenna about 0.4 forewing length, densely setate ventrally, the erect setae subequal to shaft diameter. Head scaling dense, elongate both on front and crown, the purplish, white tipped scales strongly directed mesad, exposing the conspicuous, red ocellus. Thorax: dorsal scaling concolorous with head, tegulae broadly tipped with white; metanotum posteriorly with short, broad, gray scales. Underside scaling dark gray, tibiae and tarsi distinctly banded with white. Forewing: elongate, narrow, not greatly broadened distally; length 2.9–3.1 times width; fold less than one-third costa length, rather narrow, costa beyond nearly straight, curved only slightly in outer third, termen slightly convex, steeply angled back. Ground color whitish, at times tinged with pale ochreous; markings dark brown or blackish, mostly distinct, as follows: basal one-fourth of wing including costal fold, enclosing a round costal spot of ground color, the patch angled outward at its middle; a rectangular spot on costa from end of fold to middle, extending to top of cell, followed by four triangulate



FIGS. 1–4, male genital structures of *Epiblema*, ventral aspect: 1, *E. arizonana* Powell, holotype; 2, valva of *E. carolinana* (Walsingham); 3, *E. macneilli* Powell, holotype; 4, *E. rudei* Powell, paratype.

spots along costa, the last at apex joined to four smaller spots along termen by the dark fringe; a large, rectangular spot on dorsum, before tornus, extending into lower, outer corner of cell, its sides concave; an indistinct blotch in preapical area. Underside dark brown, reflecting purplish, paler towards dorsum; whitish costal interspaces of upperside reproduced. Hindwing: considerably shorter than forewing; costa concave in outer half; apex broad, termen strongly angled back, rather sharply angled with dorsum. Variably whitish basally, tending to brownish apically; fringe brownish basally, whitish dorsally. Underside whitish, the veins and fringe brownish. Abdomen: scaling blackish gray, genital scaling paler. Genitalia as in fig. 3 (drawn from holotype, JAP prep. no. 355, three preparations examined); uncus prominent, cucullus very broad, subangulate on distal curvature, its length about 1.6 times width; cornuti numerous, elongate, thin.

Female.—Length of forewing 10.6 to 11.7 mm. Essentially as described for male but smaller with more distinct, contrasting forewing markings and darker hindwings. Forewing slightly broader than in male, length 2.7–2.8 times width. Maculation of forewing generally more extensive so that subtornal blotch often joins median costal spot and nearly reaches subapical blotch, latter connected to apical marks. Hindwing dark brown. Sclerotized portion of VII sternite relatively narrow. Genitalia as in fig. 6 (drawn from paratype, Mono Pass, JAP prep. 3866, two preparations examined); sclerotization of VIII tergite elongated and enlarged to form a nearly tubular extension, sterigma broad, rounded; signa small, broad, the smaller one hardly pointed; surface of corpus bursae granulose.

Holotype male: CALIFORNIA, near MONO PASS, 12,000 feet elevation, INYO COUNTY, August 11, 1958 (C. D. MacNeill), deposited in the California Academy of Sciences; allotype female, same locality, 12,500′, Sept. 3, 1965 (J. Powell), deposited in California Academy of Sciences on indefinite loan from the Essig Museum of Entomology, University of California, Berkeley. Paratypes (26): near Mono Pass, 12,600′, 6 ♂♂, 13 ♀♀, VIII-30, 31-65 (MacNeill, P. A. Opler, & H. G. Real), 1 ♂, same data except VIII-30-67 (Opler); same data as allotype, 1 ♂, 3 ♀♀ (Powell & P. A. Rude); Mt. Star, north of Mono Pass, 2 ♀♀, IX-3-65 (A. J. Slater); deposited in California Academy of Sciences, U. C. Berkeley and U. S. National Museum of Natural History.

One additional male in poor condition which appears to be conspecific, although it has a larger preapical blotch on the forewing, has been examined: "Summit Mt. Whitney, 14,500′, Inyo Co., Cal. VIII-15-53" (no collector given) (LACM).

With its narrow forewings and large blotched color pattern, *E. macneilli* is the most distinctive species of North American *Epiblema*. In genitalia form the species is most similar to the *walsinghami-infelix* complex, which contains more typical appearing members of the subgenus, smaller moths with broad, dark forewings having a white dorsal patch. Disregarding the pulvinus (or "clasper") the genitalia resemble certain *Eucosma* species (e.g., *subflavana* Walsingham); and *macneilli* would seem to be a more likely member of that genus, which is a much more heterogeneous assemblage, although even in American *Eucosma* it would not be closely approached in appearance. Superficially the

female rather closely resembles that of the Asiatic species *Eucosma victoriana* (Kennel). Evidently the moths are diurnal, and at the type locality seemed to be associated with *Hulsea algida* (Compositae), but I was unable to locate any galls or other evidence of larval work on above ground parts of this plant in September, 1965.

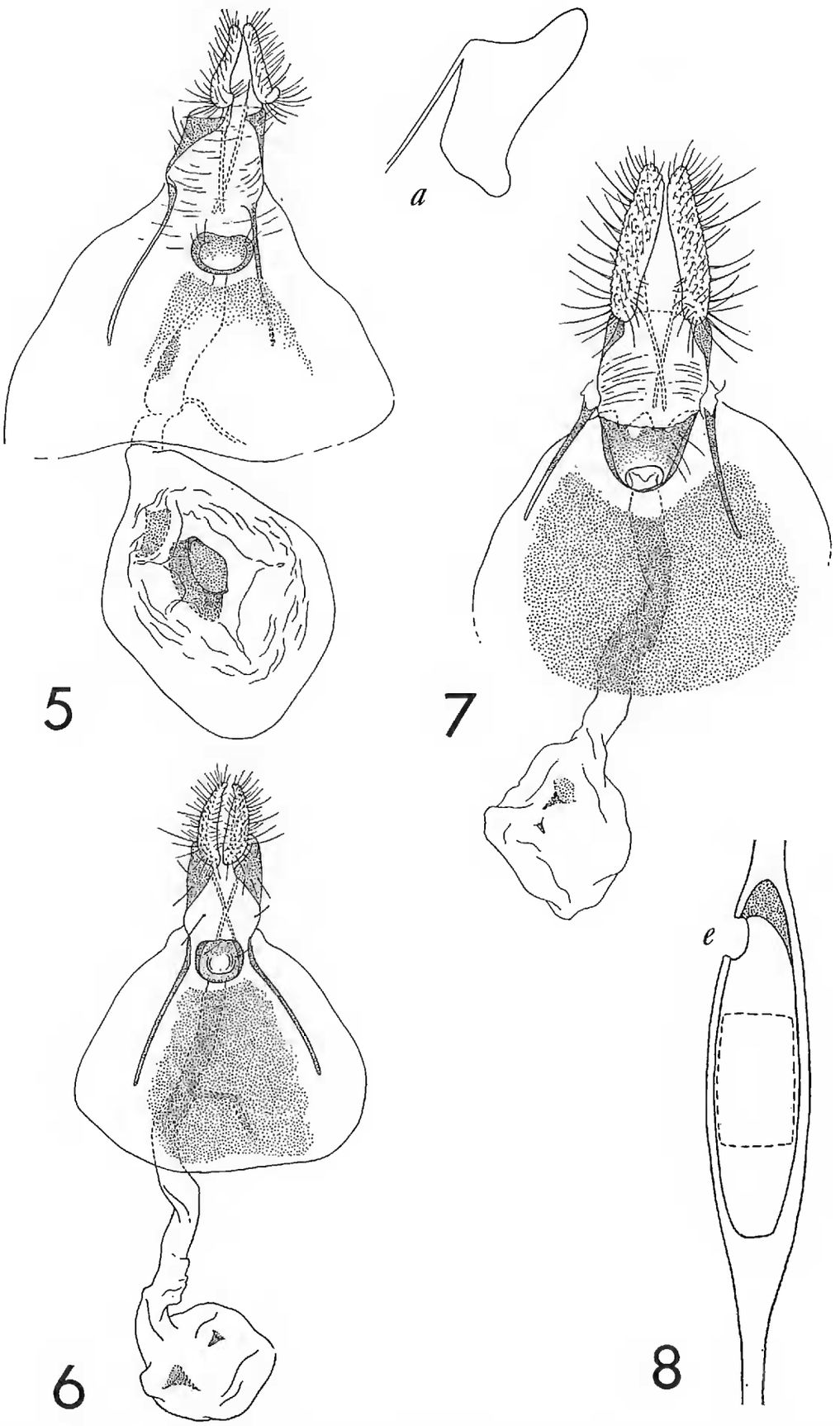
I take pleasure in naming the species for Don MacNeill, who has collected many interesting Lepidoptera during his numerous visits to the arctic-alpine type locality.

Epiblema rudei, new species
(Fig. 13)

A pale moth, resembling *E. obfuscana* and *E. desertana* in general appearance, the forewing having a narrow dark terminal band.

Male.—Length of forewing 8.4 to 10.6 mm (reared from field collected pupae). Head: labial palpus moderately elongate, appressed scaled (without a broad scale brush obscuring segment III), segment II length about 1.15–1.20 eye diameter; III .25–.30 as long as II, scaling dark brown, reflecting a purplish sheen. Head scaling concolorous, with some pale rust colored scaling intermixed. Thorax: dorsal scaling dark brown, becoming sordid whitish or gray posteriorly. Ventral scaling shining whitish gray, femora sordid whitish exteriorly, tibiae and tarsi dark gray, banded with whitish. Forewing: length 2.7–3.0 times width; narrow basally with a narrow costal fold extending nearly to mid costa, wing becoming broader distally, the apex produced; costa nearly straight, termen strongly angled back. Ground color sordid whitish or pale grayish, marked by two broad, transverse bands of pale bluish gray, the first covering basal one-third of wing, the second beyond middle, broad at costa where it encloses three pairs of white costal dashes, becoming narrower and rectangular across wing at end of cell, extending to dorsum just before tornus, obscured by ground color in costal one-third; both bands obscurely strigulate with indistinct, transverse pale lines. Subterminal area narrowly dark gray blending into the dark brown fringe which is tinged with red-brown. Underside gray, reflecting purplish, costa and subterminal areas narrowly cream-white; an indistinct whitish area at mid dorsum. Hindwing: broader than forewing, costal margin convex, apex rounded, terminal margin slightly convex. Ground color pale gray basally, irregularly streaked with darker gray-brown outwardly, becoming brownish on outer half of costal area and distal margins; fringe paler, gray. Underside white except veins on costal half gray. Abdomen: dorsal scaling dark gray, becoming sordid whitish on final 2 or 3 segments and laterally; ventral scaling mostly whitish. Genitalia as in fig. 4 (drawn from paratype, Colton, JAP prep. no. 233, 2 preparations examined); uncus 2 prominent triangular peaks, socii moderately elongate, valva broad, cucullus broadly rounded, its length about 1.75 width, sacculus only weakly emarginate before cucullus, cornuti apparently lacking.

Female.—Length of forewing 8.0 to 9.0 mm. Essentially as described for male, smaller with the forewing appearing broader due to absence of the costal fold. Fringe more richly rust-brown and hindwing slightly darker than in male. Genitalia as in fig. 7 (drawn from paratype, Colton, JAP prep. no. 2291, two preparations examined); papillae anales flat, unmodified; sclerotization of sterigma



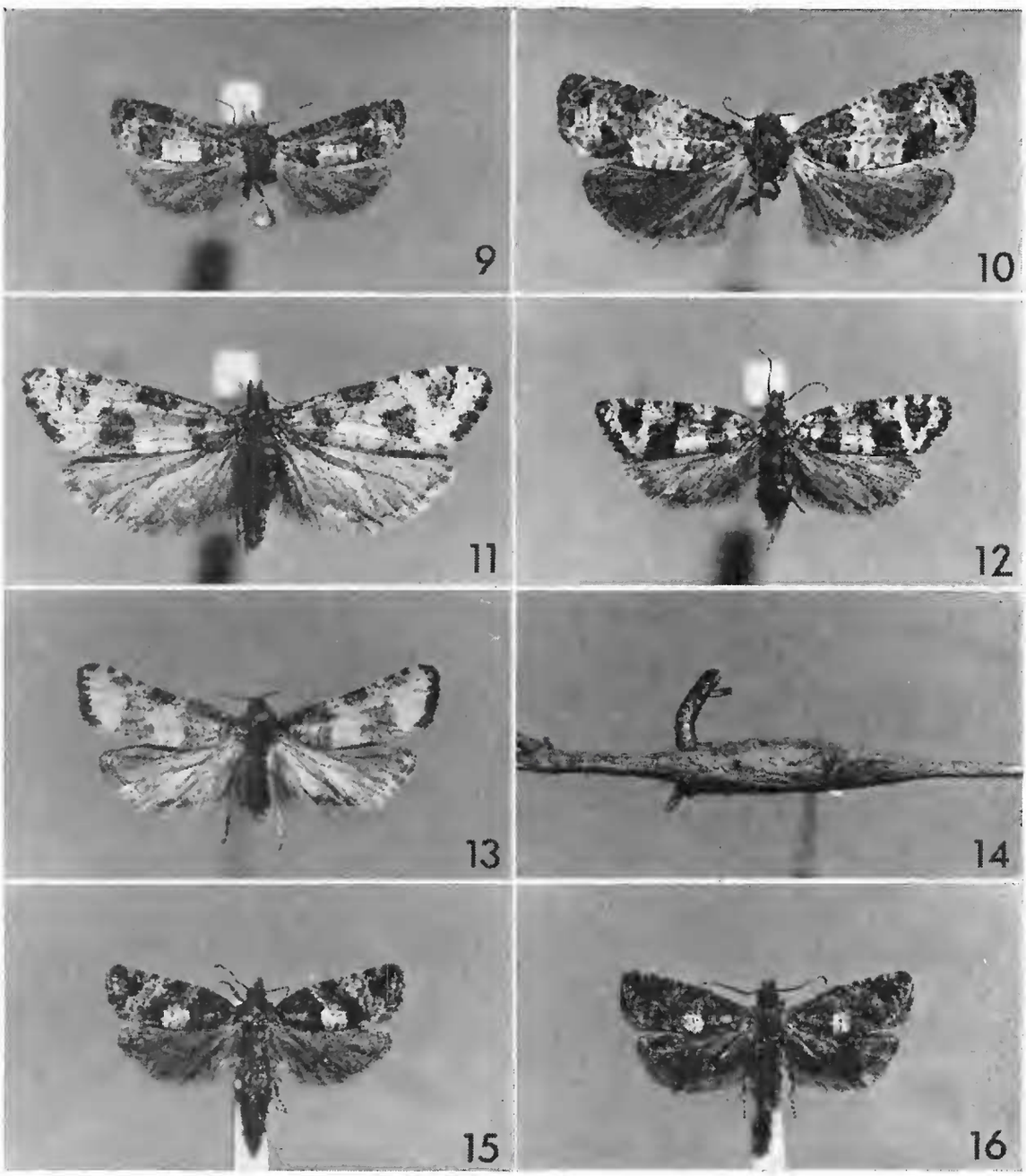
FIGS. 5–7, female genital structures of *Epiblema*, ventral aspect: 5, *E. arizonana* Powell, paratype (*a*, papillae anale, lateral outline); 6, *E. macneilli* Powell, paratype; 7, *E. rudei* Powell, paratype. Fig. 8, diagrammatic longitudinal section of gall caused by *E. rudei*: *e* = emergence hole; shaded area indicates zone of packed frass; approximate position of braconid cocoon indicated by dotted line.

irregularly emarginate posteriorly, signa small but acutely pointed, the smaller one sometimes very tiny; corpus bursae surface granulose.

Holotype male and allotype female: CALIFORNIA, BIG PANOCHE CREEK, at FRESNO-SAN BENITO COUNTY line, March 4, 1968, reared from stem galls on *Gutierrezia californica*, emerged March 17–19, 1968, JAP 68C7 (J. Powell); deposited in the California Academy of Sciences on indefinite loan from the Essig Museum of Entomology, U. C. Berkeley. Paratypes (14): same data, 1 ♂, 3 ♀♀; same locality: 4 ♂♂, IV-21-67, r.f. *Gutierrezia*, emgd. IV-24-67, JAP 67D99 (P. A. Rude), 2 ♂♂, III-6-69, r.f. *Gutierrezia*, emgd. III-20, 29-69, JAP 69C1 (Powell), 2 ♂♂, II-5-70, emgd. II-23, 26-70, JAP 70B1 (Powell); Colton, San Bernardino Co., Calif., 1 ♂, 2 ♀♀, III-13, 17-1910 "ex composit gall" (G. R. Pilate); deposited in the California Academy of Sciences, U. S. National Museum of Natural History, and U. C. Berkeley.

In external appearance *Epiblema rudei* most closely resembles the Solidago-feeders, *E. desertana* (Zeller) and *obfuscana* (Dyar) of the eastern U. S., which differ from the present species by having the basal patch of the forewing darker than the outer transverse band, and by having more rectangular shaped forewings (termen less steeply angled back than in *rudei*). A ratio of base-to-apex: base-to-tornus distances is 1.30–1.35: 1 in *rudei* and 1.1–1.2: 1 in the two eastern species. *Epiblema obfuscana* also differs by having the terminal dark band short, ending above the tornus, which is white and by having dark brown hindwings. In male genitalia the new species is distinguished from the above two in many particulars and appears to be most similar to *abbreviatana* (Walsingham), a smaller moth of quite different external appearance that ranges across the northern U. S.

This new species is named for Paul A. Rude, who first called my attention to the galls at Panoche Creek, one of many interesting discoveries that he made during fieldwork as an assistant on my N.S.F. sponsored project on microlepidoptera biologies. Paul had originally observed the characteristic galls during a study of dipterous galls on *Gutierrezia* at La Mesa, San Diego County, several years previously. Reexamination of that site in October, 1967, revealed that plant succession was eliminating the *Gutierrezia* and there was no evidence of *Epiblema*. Other places where we have seen galls presumed to be of *Epiblema rudei* are: 2 miles north of Lancaster, L.A. County and 2 miles southeast of Pinon Hills, San Bernardino County (immature galls in October on *Gutierrezia microcephala*); Jacalitos Canyon near Coalinga, Fresno County; and the hills 2 miles southwest of Kettleman City, Kings County. A search in the vicinity of Colton to the La Sierra-Lake Matthews area, Riverside County, in August, 1968, failed to reveal work of this moth, as did extensive late season reconnaissance in other arid regions of southern California, southern Nevada, and Ari-



FIGS. 9–16, adults and gall of *Epiblema*: 9, 10, *E. arizonana* Powell, ♂, ♀ paratypes; 11, 12, *E. macneilli* Powell, ♂, ♀ paratypes; 13, *E. rudei* Powell, ♂ paratype (JAP 67D99); 14, *E. rudei*, gall and eclosed pupal shell (Colton, Calif.); 15, *E. radicana* (Walsingham), ♀, San Bruno Mts., Calif.; 16, *E. hirsutana* (Walsingham), ♂, Berkeley Hills, Calif.

zona during 1966–1968, in connection with a survey of root-boring Eucosmini inhabiting various woody Compositae.

Gutierrezia is a disclimax situation plant, and in most of the areas where we have examined it, colonies grow in sites that are overgrazed or otherwise affected by man's activities. By contrast, in the Mojave and Central Valley where we found populations of this moth, the host-plant thrives on naturally loose sand substrates.

Biology.—Adults of *Epiblema rudei* evidently are nocturnal. One male (70B1) was retained alive for several days and was inactive during day, moving only at night.

Presumably full grown larvae overwinter, and pupation occurs in early spring. Although emergences occurred within 2–3 weeks following collection of galls at various times in spring, the normal flight period probably is April. One gall dissected in early February, 4 days following collection, contained a pupa, while 1 larva and 2 pupae were excised in mid-March, 12 days after collection, and both pupae and already evacuated galls were taken on April 21.

The galls are elongate, thickened areas of 1.5–3 mm thick stems; usually mature galls are about 20–23 mm in length, with a maximum diameter of 6.0–6.5 mm. The silk-lined pupal chamber varies considerably in size from one gall to another, depending primarily on the thickness of the gall walls, in diameter from 1.8 to 3.3 mm and in length from 13–17 mm (figs. 8, 14). Emergence occurs via a 2.5–4 mm aperture which the larva prepares just prior to pupation, leaving a thin layer of bark for the pupa to dislodge. This covering is more strongly attached on its lower rim so that the pupal shell hangs over it. After emergence the pupal shell usually readily falls away and the hatch recloses, leaving the external appearance of abandoned galls nearly indistinguishable from occupied ones.

At the type locality there was a high rate of parasitism: 65% of a 1969 random sample consisting of 26 old and active galls had either braconid cocoons or emergence holes of chalcidoids, and 4 of 6 collected in 1970 were parasitized. The braconids mature after the caterpillar has spun its silk pupal chamber lining, while the chalcidoids were of two types. A larger species (not reared) caused the death of the *Epiblema* after construction of the emergence 'window' but prior to cocoon spinning, while a pteromalid affected younger larvae, judging by gall size, and cut its own emergence hole at varying places in the gall. At the Kettleman Hills, where the galls were abundant in 1974, a similar high proportion of parasite emergence holes was evident, while at Jacalitos Canyon galls were rare in February, 1970, and the two active ones collected both produced parasites.

EPIBLEMA RADICANA (Walsingham)

(Fig. 15)

Paedisca radicana Walsingham, 1879, Illus. Lep. Het. Brit. Mus., 4:53 (TL: Rogue River, Ore.).

Epiblema radicana; Obraztsov, 1965, Amer. Mus. Novitates, 2213:3 (synonymy).

Eucosma vomonana Kearfott, 1907, Trans. Amer. Ent. Soc., 33:90 (TL: Cisco, Calif.).
Eucosma serangias Meyrick, 1912, Ent. Mo. Mag., 48:35 (invalid repl. name).

The complex synonymy and taxonomic confusion involving this species and *Griselda radicana* Heinrich which was occasioned after Heinrich misinterpreted Walsingham's species was disentangled by Obraztsov (1964, 1965b). Fortunately Obraztsov elected to preserve the name *radicana* Walsingham rather than declare it a *nomen oblitum*, and in the process eliminated one of Kearfott's nonsense names and one of Meyrick's unnecessary substitution names.

We have discovered two colonies of *Epiblema radicana* in the San Francisco Bay area, but efforts to locate the larvae have failed. The moths fly in moderately early spring and appear to be diurnal, which probably have been major factors in the century-long preservation of anonymity of this species. Numerous adults were active during midday in the first week of April, 1962, below Radio Peak in the San Bruno Mountains, San Mateo County. In subsequent years a few have been taken there between mid-March and mid-April: IV-13-66, III-17-68, III-28-69, and III-10-72. The site is a rocky ridge featuring a rich coastal scrub chaparral, with several woody composites that might include a likely hostplant of *Epiblema*. The moths seemed to be associated with *Eriophyllum* (probably *E. staechadifolium* and *E. confertiflorum*), although no precise relationship was observed. No gall-like structures were discovered and several hours digging in early March, 1972, produced only larvae of *Hysterosia* (Cochylidae) in the crown and roots. One female of *radicana* caged in April, 1966, with *Eriophyllum* foliage lived only 4 days and produced no eggs.

The second colony was located at Raines Park, Del Puerto Canyon, 20 miles west of Patterson, Stanislaus County, where adults (3 ♂♂, 1 ♀) were flushed from *Ribes quercetorum* bushes during late afternoon on April 28, 1969. This site is in sparse digger pine (*Pinus sabinana*) woods, a quite different habitat than that of the San Bruno Mountains, and no woody composite was observed in the immediate area.

EPIBLEMA HIRSUTANA (Walsingham)
(Fig. 16)

Paedisca hirsutana Walsingham, 1879, Illus. Lep. Het. Brit. Mus., 4:50 (TL: Sonoma Co., Calif.).
Epiblema hirsutana; Heinrich, 1923, Bull. U.S. Natl. Mus., 123:149.

This is another species that remained in seclusion for many years following Walsingham's original collection in 1871. No specimens were

known to Heinrich at the time of his 1923 revision. Later the National Museum received two from Walsingham's material via the Fernald collection (Heinrich, 1929), and these remained the only known specimens in American museum for another 30 years.

We rediscovered *E. hirsutana* when a colony turned up in the Berkeley Hills in northeast Oakland, Alameda County. A single male was taken April 3, 1959 (Chemsak and Powell), and males were common there, flying at midday April 17, 1962. In subsequent years only a few have been collected: V-16-63, IV-15-64, V-15-64, and V-16-67. This site, an east facing slope above the Caldecott Tunnel, used to be characterized by a mixture of native shrubs and herbs including *Lupinus arboreus*, *Phacelia californica*, *Symphoricarpos alba*, *Wyethia mollis*, *Artemisia californica*, and *A. douglasiana*, etc., but plant succession, especially invasion of alien grasses, encouraged by a fire in 1968, offroad motorbike traffic and fire suppression brush clearance, have greatly reduced the native vegetation. In 1962 *E. hirsutana* appeared to be flying in association with *Artemisia douglasiana*, but subsequent searches have failed to reveal any gall-like structures on this plant. Collections of overwintering larvae in the dry standing floral stalks produced only Pterophoridae and Mordellidae, and examination of roots in March, 1972, yielded only *Hysterosia* (Cochylidae). The *Artemisia* has been partly eliminated at this locality, and the colony of *E. hirsutana* also may be declining, although only one survey during the flight season has been conducted during the past 7 years.

ACKNOWLEDGEMENTS

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