

A NEW SPECIES OF *EPIBLEMA* PREVIOUSLY CONFUSED WITH *E. TRIPARTITANA* (ZELLER) AND  
*E. INFELIX* HEINRICH (TORTRICIDAE)

DONALD J. WRIGHT

3349 Morrison Ave., Cincinnati, Ohio 45220-1430, USA

**ABSTRACT.** *Epiblema glenni*, new species, is described from 36 adult specimens (29 ♂, 7 ♀). This species frequently has been misidentified as *E. tripartitana* (Zeller), its closest congener, from which it differs in details of forewing maculation. Records of *E. glenni* from seven states suggest a range extending from central Missouri to western North Carolina and north to central Michigan. A rather long history of confusion involving *E. glenni*, *E. tripartitana*, *E. infelix* Heinrich, and *E. scudderiana* (Clemens) is reviewed. Adults and genitalia (♂ and ♀) of all four taxa are illustrated.

**Additional key words:** Olethreutinae, Eucosmini, *Epiblema scudderiana*.

About one-third of the 40 recognized species of *Epiblema* (Hübner) in North America feature a predominantly dark forewing with a prominent whitish spot at the middle of the dorsal margin. One of the more conspicuously marked members of this group is *E. tripartitana* (Zeller), whose spot extends from the dorsal margin to the costa, forming a broad transverse band that completely separates the dark basal and terminal portions of the forewing.

While surveying remnant prairie habitat in Adams County, Ohio, I encountered a new species of *Epiblema* with forewing markings that are similar to yet clearly distinguishable from those of *E. tripartitana*. Investigation turned up additional representatives of this species, collected in the 1960's by Murray O. Glenn in Putnam County, Illinois, and mixed in two public collections with specimens of *E. tripartitana*. I could find no consistent differences in male genitalia between the new species and *tripartitana*, and preparations of neither matched Heinrich's (1923, Fig. 270) illustration of the latter species. The reason for this discrepancy proved to be a misinterpretation by Heinrich of several specimens from Florida. The holotype of *tripartitana* is a female from Dallas, Texas. Heinrich's (1923:146) treatment of this species refers to a series of specimens from Texas and Florida, and he illustrated the genitalia of a male from Cocoanut Grove, Florida. Examination of that specimen and of a number of similarly marked specimens from nearby Florida localities revealed that they are not conspecific with *tripartitana*. They agree in both male and female genitalia with *Epiblema scudderiana* (Clemens). Their forewing coloration is sufficiently near that of *tripartitana* to cause the aforementioned confusion, but the basic forewing pattern does match that of *scudderiana*. Moreover, I found a reared specimen of this species from Savannah, Georgia, labeled "Goldenrod stem borer," suggesting that it shares a common life history with *scudderiana*. For these reasons, I decided to treat the Florida specimens as representing a darkly marked population of *scudderiana*. Intraspecific variation in *scudderiana* is discussed below.

The proper application of the name *tripartitana* was confirmed by examining the holotype. In studying material from various collections I discovered that the new species also has been confused with *E. infelix* Heinrich, so an account of *infelix* is included for diagnostic purposes.

MATERIALS AND METHODS

I examined specimens from the following institutional and personal collections: American Museum of Natural History (AMNH), George J. Balogh (GJB), University of Connecticut (UConn), Loran D. Gibson (LDG), Illinois Natural History Survey (INHS), University of Louisville (UL), Michigan State University (MSU), Mississippi Entomological Museum (MEM), Museum of Comparative Zoology (MCZ), Ohio Lepidopterists (OL), United States National Museum of Natural History (USNM), James R. Wiker, and Donald J. Wright (DJW). Other cited collectors are abbreviated as follows: Julian P. Donahue (JPD), E. H. Metzler (EHM), Murray O. Glenn (MOG). Line drawings were made with the aid of a Ken-A-Vision microprojector (Model X1000-1). Terminology regarding forewing pattern elements follows Brown and Powell (1991). Forewing length was measured from base to apex, including fringe, and the number of specimens supporting a particular statistic is indicated by n.

SYSTEMATICS

*Epiblema tripartitana* (Zeller)  
(Figs. 2, 5, 12, 16)

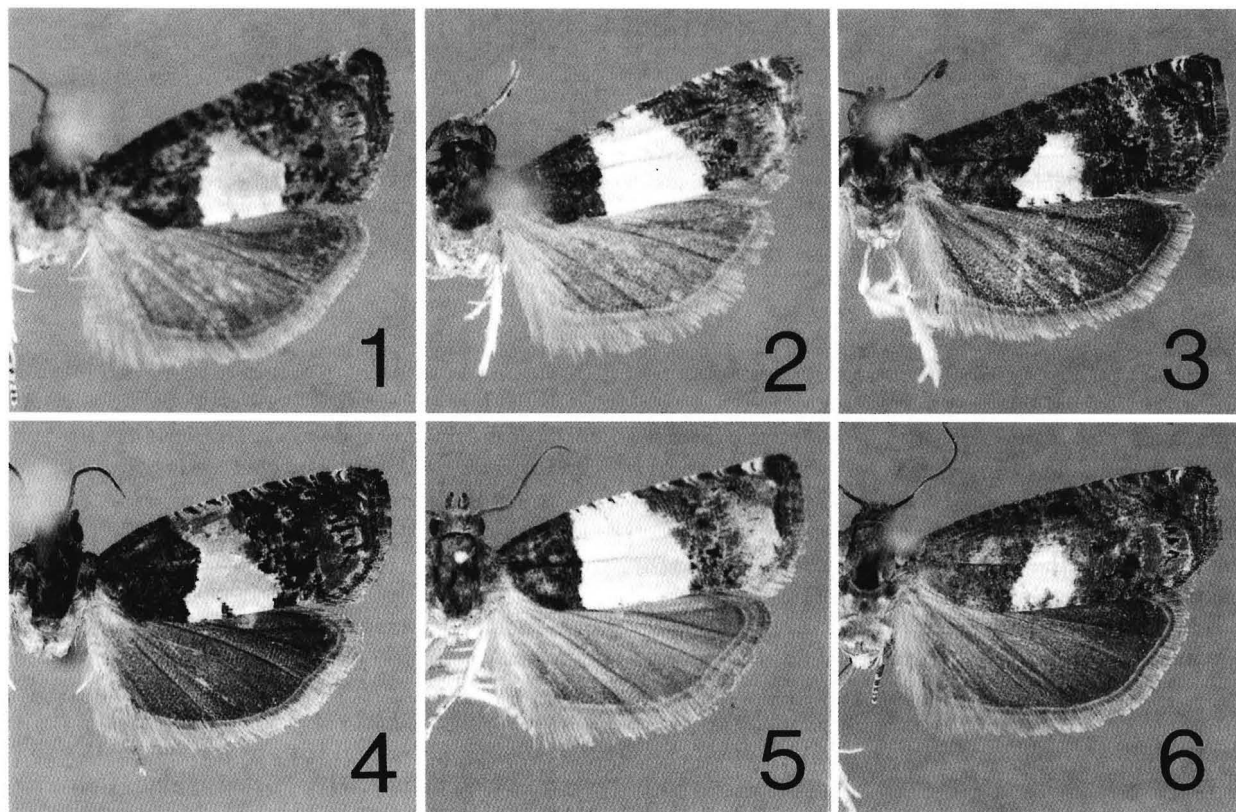
*Paedisca tripartitana* Zeller 1875:308, pl. 9, Fig. 39 (forewing).

*Eucosma tripartitana* Fernald [1903]:459; Barnes and McDunnough 1917:171.

*Epiblema tripartitana* (not Zeller 1875) Heinrich 1923:146; Kimball 1965:260.

*Epiblema tripartitana* McDunnough 1939:48; Powell 1983:35; Miller 1987:57 (wings, ♂ & ♀ genitalia).

**Holotype.** ♀: Dallas, Tex., Boll; MCZ Type No. 14337.



FIGS. 1-6. 1. *E. glenni*, holotype male, Adams Co., Ohio. 2. *E. tripartitana*, male, Ithaca, New York. 3. *E. infelix*, male, Laurel Co., Kentucky. 4. *E. glenni*, female, Adams Co., Ohio. 5. *E. tripartitana*, female, Morton Co., Kansas. 6. *E. infelix*, female, Laurel Co., Kentucky.

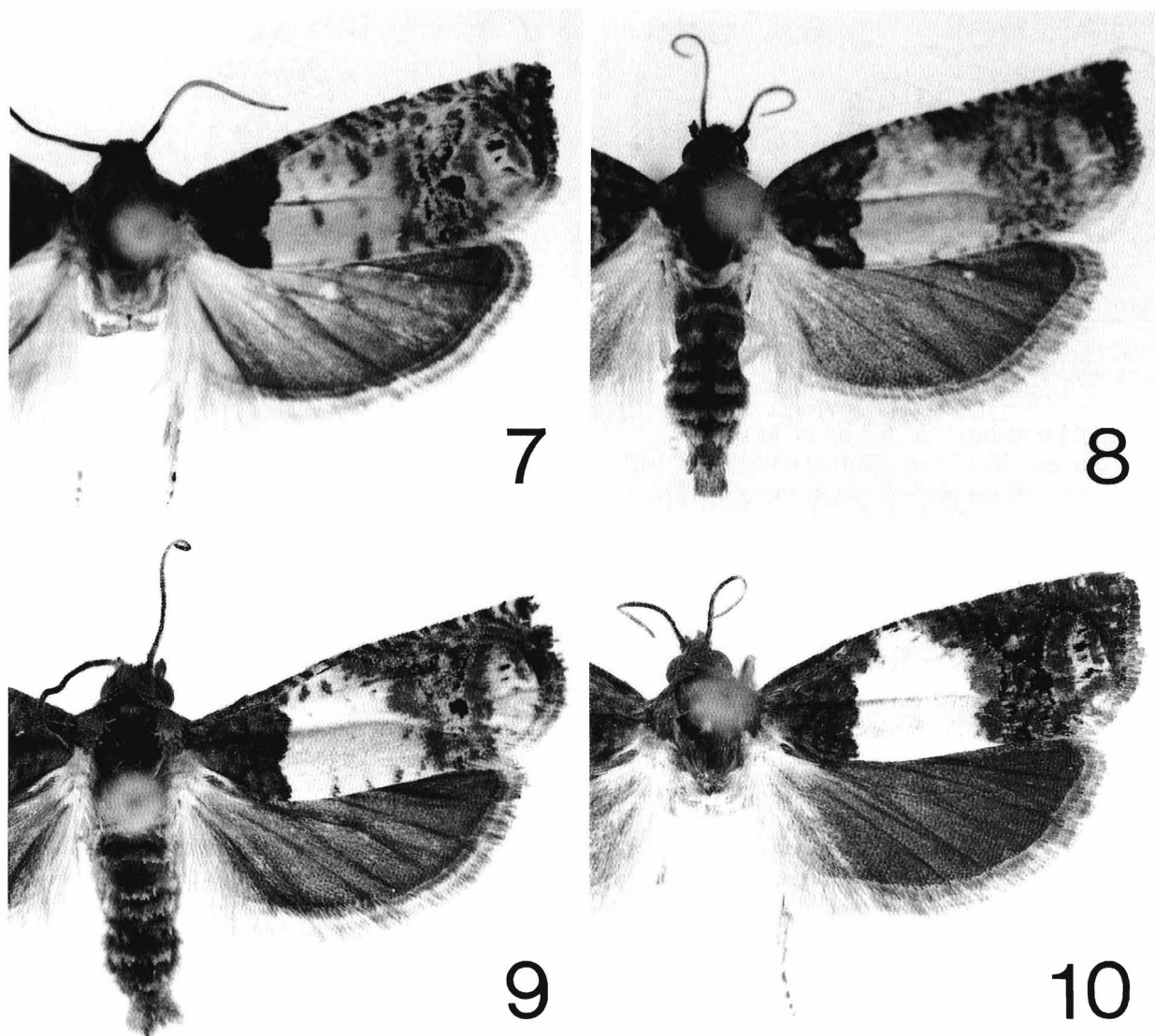
**Remarks.** In describing the forewing of *Paedisca tripartitana*, Zeller (1875) indicated that the interfascial spot extends from the dorsal margin to the costa and is unmarked except for about six very short diagonal lines along the costa. The lines to which he refers are dashes of ground color delimiting the costal strigulae. He also noted that the dorsal edge of the spot is considerably wider than the costal edge and that the spot's distal margin is convex.

Heinrich (1923) misidentified as *E. tripartitana* some darkly marked Florida specimens of *E. scudderiana*, and his illustration of *tripartitana* male genitalia (Fig. 270) is based on one of those specimens. Apparently he also was referring to the Florida specimens when he wrote the diagnostic couplet (no. 11) for *tripartitana* in his key (p. 137). There he characterized the interfascial spot as "extending nearly to costa," which is descriptive of the Florida specimens but is not accurate for *tripartitana*.

*Epiblema tripartitana* has been recorded from Florida, but the account in Kimball (1965) must be viewed with caution. My attempts to match his data with museum specimens always resulted in the darkly marked form of *scudderiana*.

I examined material from Colorado, Connecticut, Florida, Illinois, Iowa, Kansas, Louisiana, Michigan, Mississippi, Missouri, New Mexico, New York, Ohio, and Texas. Forewing length varied considerably: ♂ 4.0-7.5 mm (mean = 5.7, n = 17), ♀ 5.5-10.0 mm (mean = 6.7, n = 14). The upper extremes corresponded to individuals from east Texas reared by Bottimer (1926). The maculation of *E. tripartitana* exhibits a certain amount of geographic variation. The terminal portion of the forewing usually appears dull brown to blackish brown. However, in a small sample from Colorado, Iowa, Kansas, and New Mexico, the apical area was strongly suffused with light gray, the ocellus was poorly defined, and the area above the toral angle was conspicuously white.

**Biology.** *Epiblema tripartitana* flies from early April to early August, the April and May records being from New Mexico or states bordering the Gulf of Mexico. Bottimer (1926) reported *Rudbeckia maxima* Nuttall as a larval host in east Texas. He observed early larval development in the central part of the flower head, overwintering of the larva and subsequent pupation in the stem at the base of the plant, and spring emergence of the adult.



FIGS. 7–10. *E. scudderiana*. 7 Male, Erie Co., Ohio. 8. Female, Morton Co., Kansas. 9. Male, Bossier Parish, Louisiana. 10. Female, Manatee Co., Florida.

***Epiblema glenni* D. J. Wright, new species**

(Figs. 1, 4, 11, 15)

*Epiblema infelix* (not Heinrich 1923) Miller 1987:58 (part) (wings, ♂ genitalia).

**Description.** Head: Frons white, scales short and closely appressed; vertex dark brown, often shading to tan anteriorly; outer and ventral surfaces of labial palpus brown, inner and dorsal surfaces white to tan, apex of third segment tan; antenna dark brown above, edged with light tan posteriorly, ventral surface pubescent; ventral surface of scape with varying amounts of white to tan scaling. Thorax: Dorsal surface blackish brown, ventral surface light tan to dull white; legs dark

brown outwardly, light tan inwardly, with light tan tarsal annulations. Forewing (Figs. 1, 4): ♂ length 5.0–8.5 mm (mean = 6.1, n = 37), ♀ length 5.6–8.6 mm (mean = 6.6, n = 7); costa nearly straight in males, weakly convex basally in females; termen straight to weakly concave from  $M_3$  to  $R_5$ ; male costal fold extending from base to approximately  $0.6 \times$  length of forewing. Upper surface with salmon colored interfascial spot on dorsal margin, in males extending forward to just short of costal fold and separated therefrom by narrow strip of dark gray scales, in females extending to costa and merging there with whitish to salmon colored costal strigulae; interfascial spot roughly rectangular from dorsal margin to fold, constricting abruptly

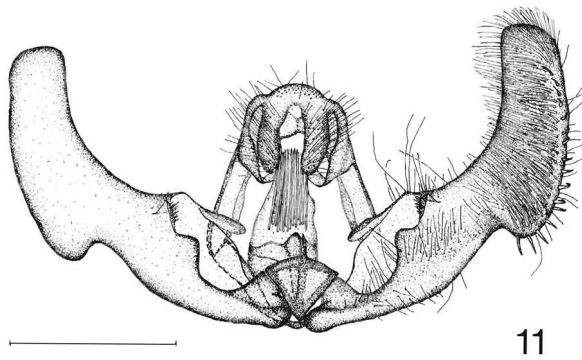


FIG. 11. Male genitalia, *E. glenni*, slide DJW 631 (DJW), scale bar 0.5 mm.

above fold to approximately half its dorsal width, its basal margin thinly and intermittently lined with white, its dorsal margin with one to three small black marks, the latter sometimes weakly expressed or absent. Central field of ocellus brown to whitish tan, crossed longitudinally by four black dashes, capped at apical corner with a black spot of variable expression, strongly bordered with gray along basal and tornal margins, much more weakly so along distal margin, gray border overlaid to varying degrees with light-brown to pale-salmon scales. Basal patch blackish brown, variously overlaid with gray; male costal fold blackish brown with dark gray costal strigulae; median area with black spot on basal margin of ocellus just above fold, a small gray spot above fold on distal margin of interfascial spot, and otherwise marked with varying black, brown and gray blotches. Costal area beyond interfascial spot brown to blackish brown, crossed by four paired white costal strigulae and their associated gray stria, the latter running outwardly toward ocellus and termen; terminal edge of membrane lined with white-tipped blackish-gray scales and separated from distal margin of ocellus by narrow strip of brown to orange-brown scales; fringe dark blackish gray apically, lighter and sometimes brownish at tornus. Hindwing: Uniformly grayish brown; fringe a

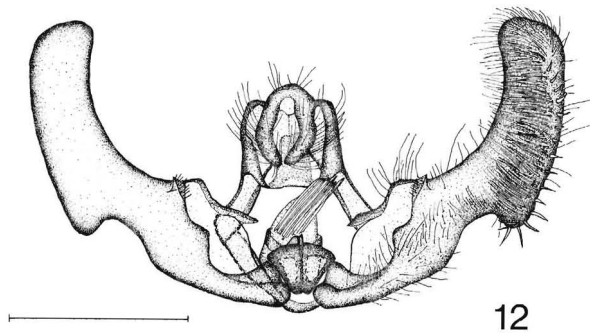


FIG. 12. Male genitalia, *E. tripartitana*, slide DJW 645 (MEM), scale bar 0.5 mm.

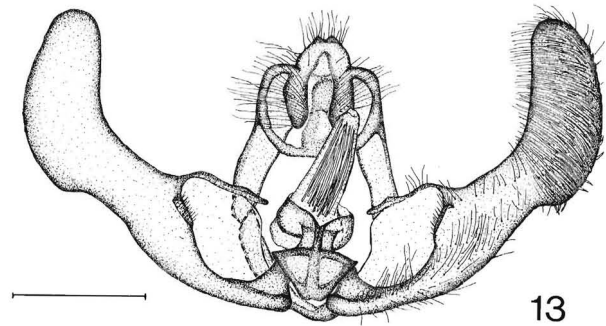


FIG. 13. Male genitalia, *E. infelix*, slide DJW 755 (USNM), scale bar 0.5 mm.

shade lighter. Male genitalia (Fig. 11): Uncus convex and dorsally setose, supported laterally by moderately developed shoulders; socii fingerlike, flattened, moderately long, and covered with long hairlike setae; gnathos a narrow sclerotized band, expanded medially; aedeagus with approximately 25 deciduous cornuti; juxta triangular; caulis short; costal margin of valva concave, outer margin weakly convex, inner and outer margins of apical one-third of cucullus nearly parallel, apex truncated, with rounded corners, invagination of ventral margin narrow, width of neck approximately one-half that of sacculus, ventral angle acutely rounded; margin of basal opening of sacculus featuring prominent basal projection with rounded vertex and nearly perpendicular sides; clasper mounted on margin of basal opening above projection; ventral margin of sacculus sparsely setose basally, more densely and heavily setose at neck; cucullus densely covered with stout setae on distal one-half of inner surface from ventral angle to three-fourths distance to apex, outer line of setae following distal margin of cucullus to one-half distance to apex and migrating thereafter onto inner surface; apical one-fourth of cucullus densely covered with hairlike setae. Female genitalia (Fig. 15): Papillae anales narrow, laterally facing, densely setose; tergum VIII sparsely setose; anterior and lateral edges of sterigma forming U-shaped collar, lamella postvaginalis well developed, gradually widening posteriorly,

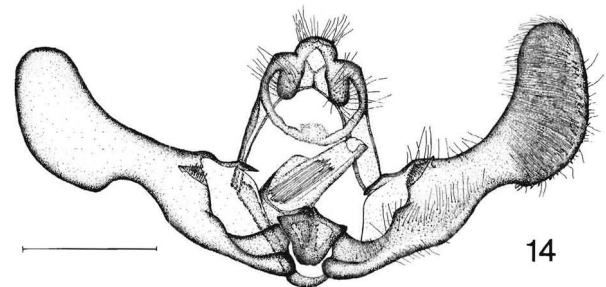


FIG. 14. Male genitalia, *E. scudderiana*, slide DJW 198 (USNM), scale bar 0.5 mm.

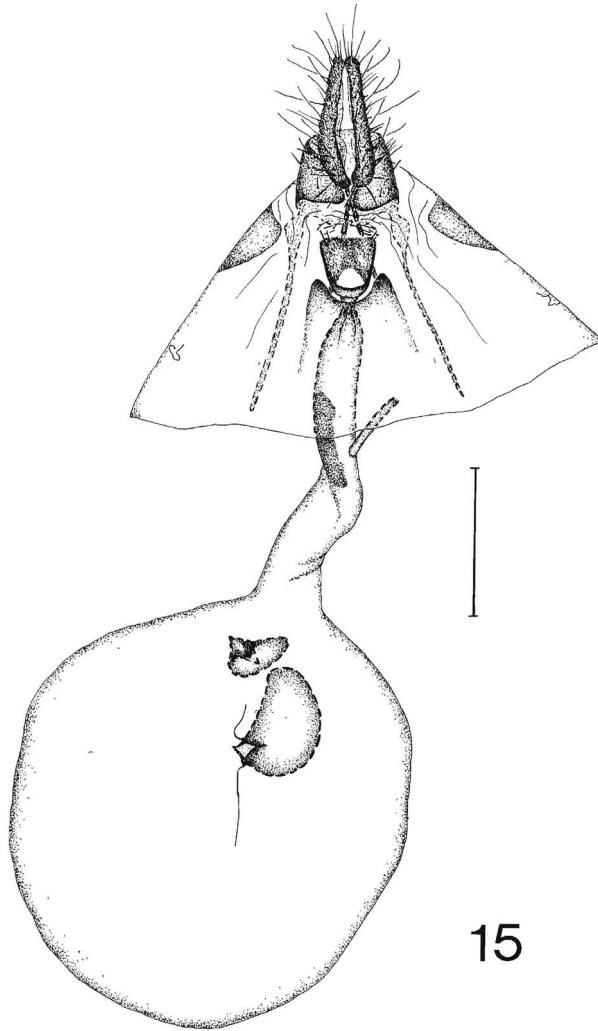


FIG. 15. Female genitalia, *E. glenni*, slide DJW 644 (DJW), scale bar 0.5 mm.

variably setose at the posterolateral corners, posterior margin straight, anterior margin A-shaped; posterior margin of sternum VII narrow, roundly invaginated to depth of  $0.3 \times$  length of sterigma, closely approximate to sterigma throughout; ductus bursae uniformly narrow, constricted below ostium, with long sclerotized patch opposite and posterior to juncture with ductus seminalis; corpus bursae with two signa shaped as in Fig. 16, one roughly twice the size of the other, the larger arising from ventral surface just above mid-bursa, the smaller from dorsal surface near juncture with ductus bursae.

**Holotype.** ♂: OH [Ohio]: Adams Co., 1 mi. S. E. of Lynx, August 12, 1998, leg. D. J. Wright; genitalia slide DJW 631; deposited in USNM. Type locality:  $38^{\circ}47'37''\text{N}$ ,  $83^{\circ}24'19''\text{W}$ .

**Paratypes.** ILLINOIS: Putnam Co., 17 June 1955, MOG (1 ♀), 8 July 1965, MOG (1 ♂), 14 July 1968,

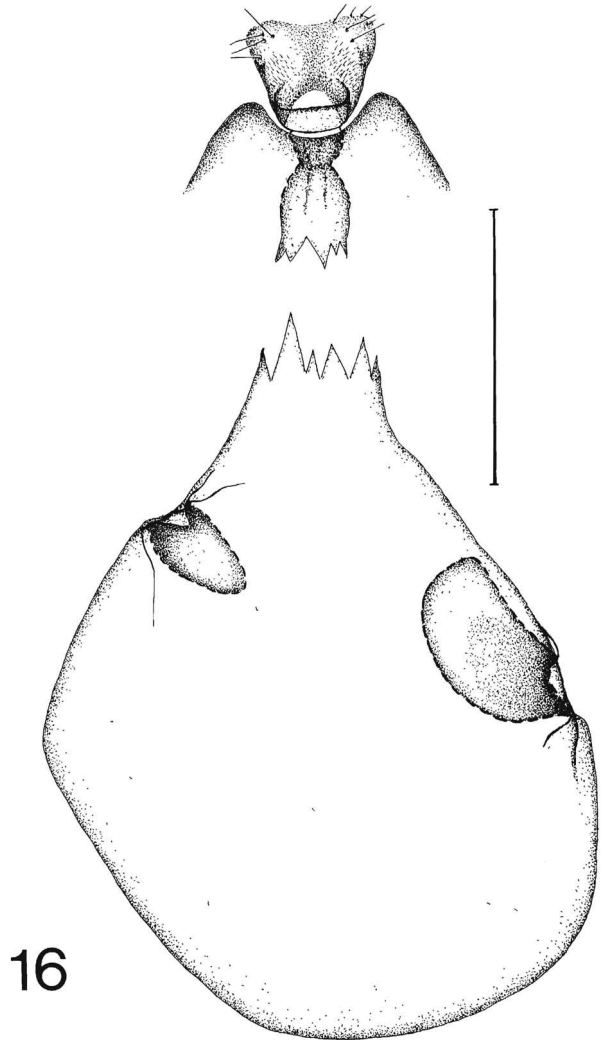


FIG. 16. Female genitalia, *E. tripartitana*, sterigma and lateral view of corpus bursae, slide DJW 751 (DJW), scale bar 0.5 mm.

MOG (1 ♂), 20 July 1968, MOG (1 ♂), 21 July 1965, MOG (1 ♀; genitalia slide DJW 344). KENTUCKY: Laurel Co., DBNF, Powerline cut W side Marsh Branch Rd, 25 July 1997, LDG (1 ♂). MICHIGAN: Barry Co., T3N R10W S22, 6 June 1968, JPD (1 ♂; genitalia slide PB 198), T3N R10W S3, 12 June 1987, GJB (1 ♂). MISSOURI: Reynolds Co., Grasshopper Hollow, Prairie Fen (TNC), 16 September 1996, GJB (1 ♀; genitalia slide DJW 346); St. Francois Co., St. Francois St. Pk. along Coonville Creek, 10 July 1982, GJB (1 ♀). OHIO: Adams Co., 1 mi. SE of Lynx, 25 July 1998, DJW (1 ♀; genitalia slide DJW 630), 1 August 1997, DJW (1 ♂; genitalia slide DJW 643), 3 August 1998, DJW (2 ♂), 3 August 2000, DJW (5 ♂), 12 August 1998, (7 ♂, 2 ♀; ♂ genitalia slides DJW 458, 632, ♀ genitalia slides DJW 457, 644), 21 August 1993, DJW (1 ♂; genitalia slide DJW 323), 10 September 1988, DJW (1 ♂; genitalia slide DJW 172), Lynx Prairie

#2, 10 September 1988, LDG (1 ♂; genitalia slide LDG 87); Erie Co., Resthaven Wildlife Area, 13 July 1991, LDG (1 ♂); Greene Co., Wright-Patterson Air Force Base, Huffman Prairie, Site G-3, 24 July 1992, EHM (1 ♂); Hamilton Co., Cincinnati, 3349 Morrison Ave., 24 July 1997, DJW (1 ♂); Scioto Co., Brushy Fork near Upper Twin Creek, 26 May 1990, DJW (1 ♂; genitalia slide DJW 347). Paratype depositories: AMNH, GJB, UConn, LDG, INHS, UL, MSU, MEM, MCZ, OL, USNM, DJW.

**Etymology.** This species is named in honor of the late Murray O. Glenn, in recognition of his contribution to the knowledge of the microlepidoptera of central Illinois.

**Distribution and biology.** The sample of 78 specimens from Illinois, Kentucky, Michigan, Missouri, North Carolina, Ohio, and Tennessee indicates a flight period from late May to mid September, but three-fourths of those records occurred between mid July and mid September. No larval host has been recorded.

**Diagnosis.** *Epiblema glenni* differs from *E. tripartitana* in the shape and coloration of the interfascial spot. In *E. tripartitana* the spot appears white to the naked eye, but a pale salmon tint usually is detectable under magnification. In females the spot merges with the costal stigulae, forming a continuous band from dorsal margin to costa; in males it is intercepted by the costal fold, but light-gray to gray costal strigulae on the adjacent portion of the fold often create the impression that it continues to the costal margin. The convex curvature of its distal margin varies from circular to that of a line bent just above the fold. In *E. glenni* the interfascial spot is distinctly salmon colored. Its width narrows markedly above the fold, where the distal edge angles abruptly inward. In females it continues forward to the costa as a narrower band; in males it is separated from the costal fold by a narrow strip of dark scales. I was unable to find characters of the male or female genitalia that would separate the two species. Although Figs. 11 and 12 suggest subtle differences in the shape of the cucullus, this feature is variable in both species and unreliable for diagnostic purposes.

*Epiblema infelix* Heinrich  
(Figs. 3, 6, 13, 17)

*Epiblema infelix* Heinrich 1923:151, Fig. 276 (genitalia of ♂ holotype); McDunnough 1939:48; Powell 1983:35; Miller 1987:58 (part) (♀ genitalia).

**Holotype.** ♂: Fiske Coll., 25 May 1904, Tryon, N.C.; USNM Type No. 24828; genitalia slide USNM 72880.

**Paratypes.** NORTH CAROLINA: Tryon, 4 July 1904, Fiske (1 ♀; genitalia slide USNM 70802), 5 July 1904, Fiske (1 ♂; genitalia slide USNM 70801).

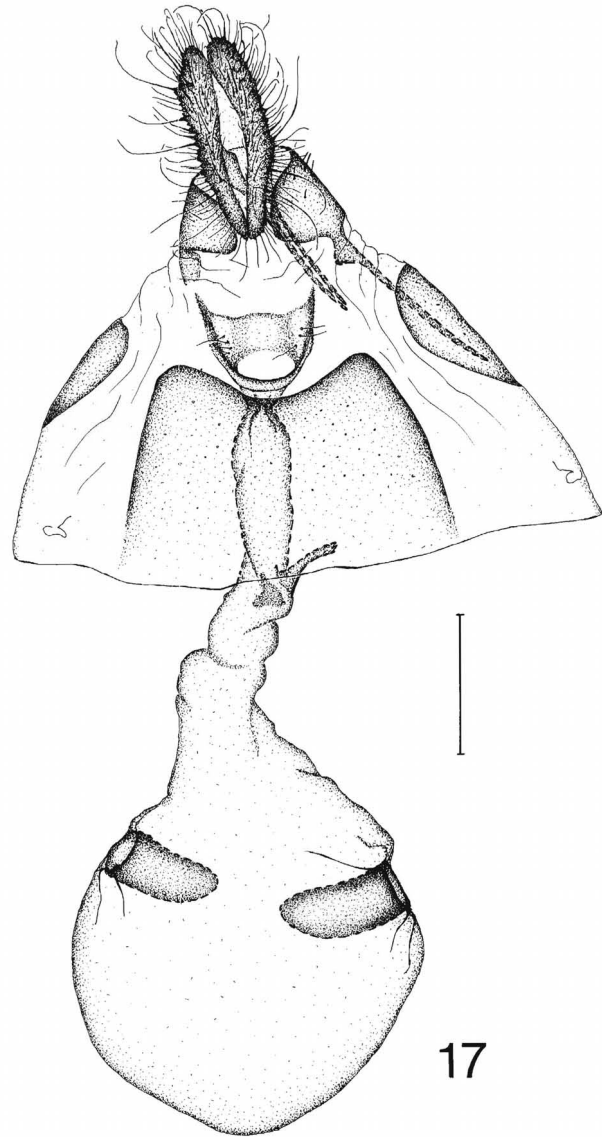


FIG. 17. Female genitalia, *E. infelix*, left apophysis anterior omitted for clarity, slide DJW 677 (MEM), scale bar 0.5 mm.

**Remarks.** *Epiblema infelix* has been a source of confusion for some time. It is poorly represented in institutional collections, and I often found mixed series in the material that I borrowed. I examined the Michigan specimen pictured in Miller (1987:58) as *E. infelix* and found it to be *E. glenni*. Miller's drawing of the male genitalia is representative of *glenni*, but his illustration of the female sterigma is based on the paratype of *infelix* from North Carolina (Miller pers. com.).

Heinrich's description portrays the forewing color as brownish ochreous and the white interfascial spot as irregularly square, with one or two short fuscous dashes on the dorsal margin. Based on an examination of 45 specimens, including the holotype and both paratypes, I would characterize the predominant hue of the forewing as gray, but worn specimens tend to have a brownish appearance. The basal area is rather dark, appearing blackish gray to the naked eye. The white interfascial spot is roughly triangular, extending from the dorsal margin forward to approximately two-thirds the distance to the costa. Its sharply defined basal edge angles obliquely outward from the dorsal margin and often contains a small, basally directed, triangular projection just forward of the dorsal margin. The distal edge is less well defined, the outer vertex on the dorsal margin being irregularly truncated. The interfascial spot is invaded from the dorsal margin by one to three dark marks, which vary considerably in degree of expression. Orange-brown coloration occurs in the costal area beyond the interfascial spot and along the distal edge of the ocellus, the former area being crossed by four paired costal strigulae and their associated gray stria. Forewing length varied as follows: ♂ 6.2–8.7 mm (mean = 7.6, n = 20), ♀ 9.5–10.2 mm (mean = 9.8, n = 4). The male costal fold extends from base to approximately 0.5 × length of forewing.

**Distribution and biology.** I studied specimens from Alabama, Arkansas, Kentucky, Michigan, Mississippi, North Carolina, South Carolina, and Virginia. Except for one North Carolina record dated 22 October, they indicate a flight period from early April to early July. Eighty percent of the records occurred between mid April and mid June. No larval host has been recorded.

*Epiblema scudderiana* (Clemens)  
(Figs. 7–10, 14, 18)

*Hedya scudderiana* Clemens 1860:358.

*Euryptychia saligneana* Clemens 1865:141.

*Paedisca affusana* Zeller 1875:307.

*Eucosma scudderiana* Fernald [1903]:459; Barnes and McDunnough 1917:171.

*Epiblema scudderiana* Heinrich 1923:147; McDunnough 1939:48; Powell 1983:35; Miller 1987:57 (wings, ♂ and ♀ genitalia).

**Lectotype.** *Hedya scudderiana*, designated by Darlington (1947:95). ♂: Type 7215, *Paedisca scudderiana* Clem.; Academy of Natural Sciences of Philadelphia. Type locality: Massachusetts. Miller (1973: Fig. 40) provides a photograph of this specimen and a discussion of the type fixation difficulties associated with Clemens' species.

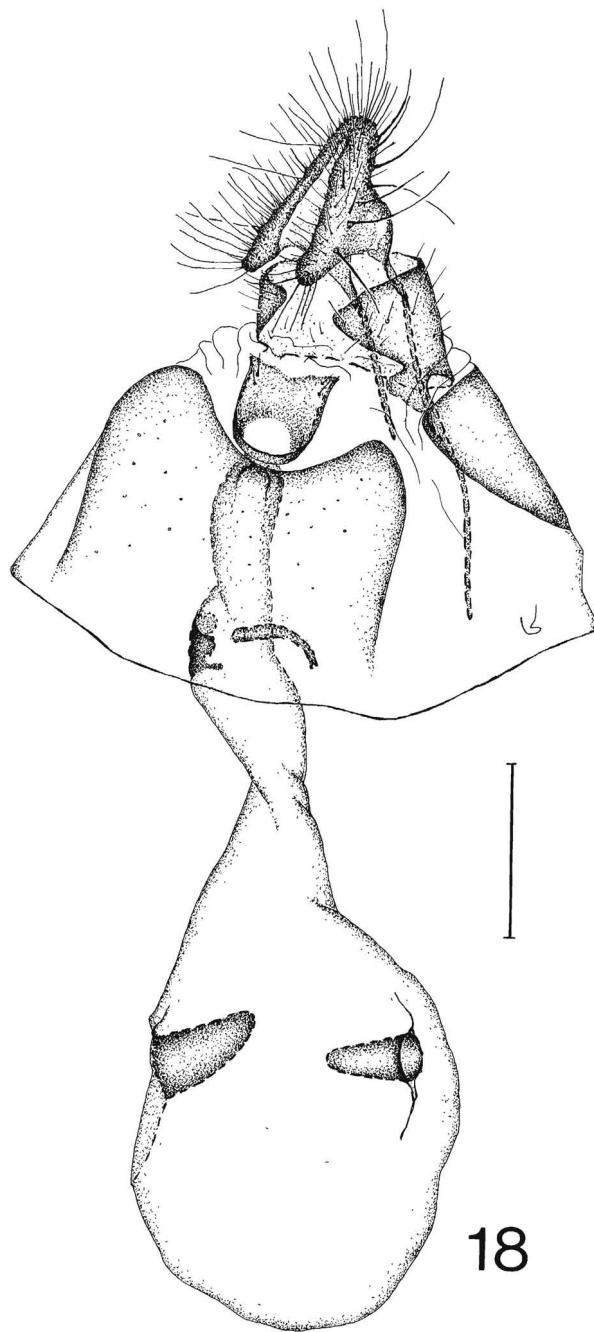


FIG. 18. Female genitalia, *E. scudderiana*, left apophysis anterior omitted for clarity, slide DJW 647 (INHS), scale bar 0.5 mm.

**Remarks.** The basic forewing pattern of *E. scudderiana* has the following features: basal patch blackish brown, variably overlaid with blue-gray scales; interfascial spot white, often marked with varying amounts of blue-gray scaling, extending from dorsal margin to just short of costa, its basal and distal margins roughly convex, producing a bulletlike shape; ocellus crossed longitudinally by up to four black dashes and variably

bordered on basal, distal and tornal margins with blue-gray scales; a narrow band of orange-brown coloration along costa beyond interfascial spot, crossed by four paired white costal strigulae, the latter with associated blue-gray stria running distally toward ocellus and termen; median area with prominent black spot just above fold on basal edge of ocellus and a variably expressed blue-gray band along distal margin of interfascial spot. There is considerable variation in the amount of contrast between interfascial spot and median area and in the coloration of the ocellus. In the Florida population that Heinrich mistook for *tripartitana*, the interfascial spot is nearly immaculate, the median area is dark brown, with little if any white scaling, and the central field of the ocellus is tan to brown. At the other extreme, specimens from the upper Midwest feature an interfascial spot that is moderately speckled with blue gray, a median area that is covered predominantly with white and bluish-gray scales, creating a mottled pale gray appearance to the naked eye, and an ocellus with a white central field. The study sample of 93 specimens included numerous intermediates from various locations, including Florida, New England, and the Gulf coast.

I examined male and female genitalia preparations of specimens representative of the range of the insect and found the following characters most useful for diagnostic purposes. Males ( $n = 14$ ): Uncus semicircular, dorsally setose, supported laterally by well developed shoulders; socii short, fingerlike, flattened, and moderately setose; costal margin of valva concave, outer margin convex, invagination of ventral margin broad and shallow, ventral angle gently rounded; margin of basal opening of sacculus strongly sinuate; inner surface of cucullus sparsely covered on basal one-third with hair-like setae, densely so on distal two-thirds with stouter setae. Females ( $n = 17$ ): Papillae anales narrow, laterally facing and strongly setose; anterior and lateral margins of sterigma forming U-shaped collar, its parallel sides flaring posteriorly; lamella postvaginalis well developed, with semicircular anterior margin and up to five setae on each lateral margin; posterior margin of sternum VII broad, concavely invaginated to depth of  $0.5 \times$  length of sterigma, approximate to ostium medially, diverging from sterigma laterally; ductus bursae tapering gradually, constricted just below ostium, and mildly sclerotized opposite juncture with ductus seminalis; corpus bursae with two cone-shaped signa of nearly equal size, positioned opposite one another at roughly mid-bursa. Figures 14 and 18 are typical of the dark population from Florida. Other genitalia illustrations can be found in Heinrich (1923, Figs. 270 (labeled *tripartitana*) and 271) and Miller (1987:57).

**Distribution and biology.** *Epiblema scudderiana* occurs across the eastern half of the United States and southern Canada. I examined specimens from Alabama, Florida, Georgia, Iowa, Kansas, Louisiana, Massachusetts, Mississippi, New York, North Carolina, Ohio, and Vermont. The larva is known to be a late-instar stem feeder on various species of *Solidago*, where it produces a conspicuous gall. Miller (1976) reports on the biology of this insect, providing additional larval hosts and references to the literature on this subject.

#### DISCUSSION

Of the four species treated here, specimens in reasonably good condition can be separated by features of the interfascial spot. In *E. scudderiana* it is white and stops just short of the costa. Its large bulletlike shape is distinctive, but in lighter colored specimens its distal edge is often poorly defined. *Epiblema infelix* has a white, roughly triangular interfascial spot, the anterior vertex of which extends about two-thirds the distance from the dorsal margin to the costa. The color and shape of the spot in *E. tripartitana* and *E. glenni* are discussed in the diagnosis section under *glenni*.

The dark form of *E. scudderiana* from Florida has a prominent blue-gray band that extends nearly from the costa to the dorsal margin along the distal edge of the interfascial spot. In specimens from the upper Midwest this band is not so well defined and is often broken by white coloration protruding from the interfascial spot. Intermediate expressions of this band were found in material from various localities. In *E. tripartitana* and *E. glenni* this feature is reduced to a short blue-gray dash above the fold and, in some instances, another disjoint blue-gray spot nearer the costa. *Epiblema infelix* exhibits varying amounts of gray shading beyond the interfascial spot, but the contrast with neighboring ground color is slight at best.

*Epiblema glenni* and *E. tripartitana*, though similar in both male and female genitalia, are distinct in this respect from *infelix* and *scudderiana*, as are the latter two from each other. Differences in valval shape are illustrated in Figs. 11–14. The margin of the basal opening of the sacculus in *glenni* and *tripartitana* features a basal projection below the clasper with rounded apex and sides that are roughly perpendicular. *Epiblema infelix* has no such projection, and the margin in *scudderiana* is strongly sinuate. The shape, relative size, and position of the female signa are useful diagnostic characters. In *glenni* and *tripartitana* the signa are unequal in size (Fig. 16), the larger arising near mid-bursa, the smaller near juncture with ductus bursae. In *infelix* and *scudderiana* they are roughly equal in size and



arise opposite one another at approximately mid-bursa (Figs. 17, 18).

#### ACKNOWLEDGMENTS

I thank R. L. Brown for advice and encouragement, D. L. Wagner for photographing the holotype of *E. tripartitana*, E. H. Metzler for help with the adult photographs, J. Snider for the use of his laboratory, and W. E. Miller and an anonymous reviewer for helpful comments on the manuscript. I especially appreciate the confidence and cooperation of Paul Knoop, whose permission to collect on his property in Adams, Co., Ohio, led to the results in this paper.

#### LITERATURE CITED

- BARNES, W. & J. McDUNNOUGH. 1917. Checklist of the Lepidoptera of boreal America. Herald Press, Decatur, Illinois. 392 pp.
- BOTTIMER, L. J. 1926. Notes on some Lepidoptera from eastern Texas. *J. Agr. Research* 33:797–819.
- BROWN, R. L. & J. A. POWELL. 1991. Description of a new species of *Epiblema* (Lepidoptera: Tortricidae: Olethreutinae) from coastal redwood forests in California with an analysis of forewing pattern. *Pan-Pac. Entomol.* 67:107–114.
- CLEMENS, B. 1860. Contributions to American lepidopterology. No. 6. *Proc. Acad. Nat. Sci. Philadelphia* 1860:345–362.
- . 1865. North American micro-lepidoptera. *Proc. Entomol. Soc. Philadelphia* 5:133–147.
- FERNALD, C. H. [1903]. In Dyar, H. G., A list of North American Lepidoptera. *U.S. Nat. Mus. Bull.* 52:1–723.
- DARLINGTON, E. P. 1947. Notes on certain types of Lepidoptera described by Brackenridge Clemens. *Trans. Am. Entomol. Soc.* 73:85–104.
- HEINRICH, C. 1923. Revision of the North American moths of the subfamily Eucosminae of the family Olethreutidae. *U.S. Nat. Mus. Bull.* 123:1–298.
- KIMBALL, C. P. 1965. Arthropods of Florida and neighboring land areas. Vol. 1. Florida Dept. of Agriculture. 363 pp.
- MCDUNNOUGH, J. 1939. Check list of the Lepidoptera of Canada and the United States of America. Part II. Microlepidoptera. *Mem. South. Calif. Acad. Sci.* 2:3–171.
- MILLER, W. E. 1973. Clemens types of Olethreutinae (Lepidoptera, Tortricidae). *Trans. Am. Entomol. Soc.* 99:205–234.
- . 1976. Biology and taxonomy of three gall forming species of *Epiblema* (Olethreutidae). *J. Lepid. Soc.* 30:50–58.
- . 1987. Guide to the olethreutine moths of midland North America (Tortricidae). *U.S.D.A. For. Serv. Agric. Handbook* 660:1–104.
- POWELL, J. A. 1983. Tortricidae, pp. 31–41. In Hodges, R. W. et al. (eds.), Check list of the Lepidoptera of America north of Mexico. E. W. Classey & Wedge Entomol. Res. Foundation, London, England.
- ZELLER, P. C. 1875. Beiträge zur Kenntniss der nordamerikanischen Nachtfalter, besonders der Microlepidopteren. *Verh. Zool.-bot. Ges. Wien.* 25:205–360, pl. VIII–X.

*Received for publication 30 January 2002; revised and accepted 2 June 2002.*