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BULLETIN  
OF THE  
AMERICAN MUSEUM OF NATURAL HISTORY  
VOLUME 129 : ARTICLE 3    NEW YORK : 1965





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BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY

Volume 129, article 3, pages 265–306, figures 1–28

*Issued March 22, 1965*

*Price: \$1.00 a copy*



## INTRODUCTION

THE PROPER APPLICATION of the correct scientific names for the species of *Glena* Hulst has been a difficult problem for many years. This was somewhat alleviated by McDunnough in 1920, but even his work left much to be desired, as some of the species in his paper were misidentified. Sperry's notes and descriptions of some of the species in 1952 straightened out several problems, but left others unsolved. The purpose of the present paper is to give a revision of the Nearctic species of this genus and, in so doing, to fix a permanent set of names for the taxa involved. It should be pointed out, however, that much work still needs to be done with this group. The early stages and food plants are virtually unknown, and more collecting is needed in order to obtain additional information on the distribution and time of flight of many of the species.

Hulst proposed *Glena* in 1896, and Warren named *Monroa* (a synonym) in 1904. Part of the difficulty in our working with this genus is that both men included incorrect information in their original descriptions, as was pointed out by McDunnough (1920). The last-named author included two species that he considered to be atypical for the genus, and attention was called to this fact. His redescription of the genus was not broadened to include these taxa, which was done by the present author (1958b), and these two species now constitute group I in the present revision.

Another difficulty has been a great lack of adequate material of virtually every species. Several of the taxa, particularly those from the southwestern part of the United States, are very much alike in appearance, a fact that has led to great confusion. Only within the past few years has the use of fluorescent and ultraviolet ("black") light in collecting brought in a larger number of specimens. As a result we can now begin to get some order out of what was chaos.

In the present paper the genus is divided into three groups. The basic division is based on secondary sexual characters in the male, namely, the presence or absence of both the tibial hair pencil and the medioventral row of bristles on the third abdominal segment. The

more primitive species have both these characters, and they constitute group I. The remaining species are separated by their wing shape and pattern. Those taxa with the more primitive wing shape and pattern, namely, relatively short and broad wings with the t. p. line curved and paralleling the outer margin, are placed in group II, whereas those species with more elongate wings and having the t. p. line paralleling the costa go into group III.

The genitalia of both sexes can be used for the purpose of dividing the genus, as well as two of the three groups. In the male the primitive condition is the presence of a very long and heavy spine, with a recurved base, in the vesica of the aedeagus. This spine is present in both species of group I, in one of the four species of group II, and in two of the five species of group III. The more advanced condition is the attachment of a large, thickly set group of small, deciduous spines to a small, platelike piece, plus a second, small, elongate spine; the latter is absent in the most highly evolved species.

The female genitalia show a similar series of developmental stages. Those species that have the very long and heavy spine in the vesica have a broad corpus bursae with a flat signum. The more advanced types possess a more slender corpus bursae, and they have signa that are V-shaped in cross section.

### MATERIALS STUDIED

During the preparation of this paper 2464 specimens and 264 genitalic dissections from the collections of several museums and private collectors were studied.

### ACKNOWLEDGMENTS

The author wishes to acknowledge with thanks the cooperation and aid of the following men who have examined types at his request or who have allowed him to study specimens in their charge: Dr. J. F. G. Clarke of the Smithsonian Institution; Dr. P. J. Darlington, Jr., of the Museum of Comparative Zoölogy at Harvard College; Mr. D. S. Fletcher of the British Museum (Natural History); Dr. R. M. Fox of the Carnegie Museum; Dr. C. D. MacNeill of the Cali-

foria Academy of Sciences; Mr. L. M. Martin of the Los Angeles County Museum; Dr. E. G. Munroe of the Research Branch, Entomology Research Institute, Ottawa; Dr. E. L. Todd of the Insect Identification and Parasite Introduction Research Branch, United States Department of Agriculture; and Mr. C. W. Kirkwood of Summerland, California.

The author wishes to thank Mrs. Marjorie S. Favreau of the Department of Entomology of the American Museum of Natural History for the drawings of the genitalia and for the preparation of the maps. The genitalic preparations that are illustrated in this

paper have been taken from the collection of the American Museum of Natural History.

Certain abbreviations have been used, as follows:

M.C.Z., the Museum of Comparative Zoölogy at Harvard College  
U.S.N.M., United States National Museum, Smithsonian Institution, Washington, D. C.

Some of the specimens used in the preparation of this paper were collected by the author with the support of National Science Foundation Grants G-9037 and G-25134. This assistance is gratefully acknowledged.



## SYSTEMATIC DESCRIPTIONS

### GENUS *GLENA* HULST

*Glena* HULST, 1896, p. 358. DYAR, "1902" [1903], p. 327. SMITH, 1903, p. 77. BARNES AND McDUNNOUGH, 1917a, p. 118. McDUNNOUGH, 1920, p. 22, pl. 11, fig. 6 (venation of type species); 1938, p. 163. FORBES, 1948, p. 54. SPERRY, 1952, p. 71. RINDGE, 1958b, p. 14.

*Monroa* WARREN, 1904, p. 555. McDUNNOUGH, 1920, p. 22 (synonym of *Glena*).

Head, front flat, smooth-scaled; eyes large, wider than front; antennae of male bipectinate, with pectinations arising from apex of segments and extending almost to apex of shaft, each pectination with numerous setae and single terminal seta; antennae of female simple, scaled, with terminal pair of setae; tongue present; labial palpi small to moderate in size, not reaching middle of eye. Thorax without tufts; fore tibia of male with elongate process, as long as tibia, arising near base and extending distally beyond end of segment, in female much shorter, one-half to one-third of length of tibia; hind tibia with two pairs of spurs, with or without hair pencil in male. Abdomen without tufts; male with third segment with or without medioventral row of bristles, remainder of abdomen without additional modifications.

Forewings broad, elongate in some species, with 11 veins and elongate areole;  $R_{1+2}$  anastomosed, with small cross vein to  $R_{3+4}$ ,  $R_5$  arising basal to cross vein;  $M_1$  from upper angle,  $M_2$  from near middle of dc,  $M_3$  from lower angle;  $Cu_1$  from near angle,  $Cu_2$  from one-half of distance to angle; with small fovea at base of wing below cubital vein in male. Hind wings broad, elongate in some species; outer margin either smooth or weakly concave between veins; frenulum strong in both sexes; with seven veins; Sc with slender base, either paralleling cell for one-fourth to one-half of length or converging at a point within this distance;  $R_1$  separating from  $M_1$  before upper angle,  $M_3$  from lower angle;  $Cu_1$  from from near angle,  $Cu_2$  from near middle of cell;  $m+ldc$  slightly curved or weakly angulate.

MALE GENITALIA: Uncus with basal portion sharply tapering, apical section slender, terminating in two small points; socius absent; gnathos strongly developed, with

small to moderate median enlargement having punctate surface; valves large, elongate, symmetrical; costa without tubercle, sclerotized, concave, extending posteriorly beyond apex of uncus and remainder of valve, with numerous short setae; sacculus swollen, sclerotized, with slender sclerotized process extending along inner face of valve, parallel with costa, extending most of length of valve, and bearing short, heavy spines; transtilla absent or weakly indicated; cristae represented by large group of elongate setae on each side near base of sacculus in some species; furca absent; anellus large, sclerotized, more or less bilobed and rugose posteriorly; tegumen and saccus very broad, ovate; aedeagus subequal in length to combined lengths of uncus, tegumen, and saccus, without ornamentation; vesica either with single, elongate, recurved spine or with large patch of short, deciduous spines.

FEMALE GENITALIA: Papillae anales simple, elongate, with apophyses posteriores less than twice as long as apophyses anteriores; sterigma with lateral sclerotized areas and with smaller, median, sclerotized piece; ductus bursae short, membranous; ductus seminalis arising ventrally from posterior surface of corpus bursae; the latter membranous, of moderate length, slightly swollen anteriorly in some species; signum present, represented by either transverse or elliptical spinose process of moderate size.

The maculation of the species of *Glena* is of two basic types. In one, including those species with relatively broad wings, both the t. p. line of the forewings and the extradiscal line of the hind wings vary from being dentate to being represented by spots on the veins, and the lines are more or less curved, subparalleling the outer margins of the wings. In the other group, those species having more elongate wings, the pattern is represented by a heavy, straight, t. p. line extending from about the middle of the inner margin of the forewings toward the apex. In all the species of the genus the secondaries are concolorous with, and have the same type of maculation as is found on, the forewings.

EARLY STAGES: Apparently the caterpil-

lars of only two species (*grisearia* Grote and *cribrataria* Guenée) have been described, although more have been reared.

TYPE SPECIES: Of *Glena*, *cognataria* Hübner; of *Monroa*, *quinquelinearia* Packard. In both cases these were monotypic genera.

RANGE: The species covered in this paper are found in North America, occurring in southern Canada, the eastern, southern, and southwestern parts of the United States, and northern Mexico. In the Neotropical Region the genus is represented by a number of species.

*Glena* forms a distinct group within the Cleorini (McDunnough, 1920) of the subfamily Ennominae. This genus is closely allied to *Stenoporpia* McDunnough; in fact Forbes (1948) considered the latter to be a subgenus of *Glena*. I cannot agree, as the differences in the genitalia of both sexes are too great. Probably *Stenoporpia* developed from some *Glena*-like ancestral stock, but the two genera today have certainly evolved sufficiently to be considered as separate entities. The male genitalia of *Glena* can be distinguished from those of *Stenoporpia* by the wider median extension of the gnathos, the broader attachment of the valves to the tegumen, the smaller and more slender sclerotized arm on the inner face of the valves, with a larger area of multiple spining, the broader anellus, and prominent arming of the vesica with either a very large single spine or a dense group of short deciduous spines. The female genitalia of *Glena* can be recognized by the median and lateral sclerotized areas of the sterigma, the membranous ductus bursae, and the shape of the signum.

#### KEY TO SPECIES

##### BASED ON MACULATION, SECONDARY SEXUAL CHARACTERS, AND DISTRIBUTION

1. Forewings relatively short and broad; t. p. line curved, subparalleling outer margin, and meeting inner margin distal to its middle . . . . . 2
  - Forewings relatively long and narrow, with elongate apex; t. p. line straight, subparalleling costa, and meeting inner margin basal to its middle . . . . . 7
- 2(1). Upper surface of wings white, grayish white, or mainly black . . . . . 3
  - Upper surface of wings grayish brown, with a faint violaceous tint in some specimens . . . . . *cognataria*
- 3(2). Upper surface of wings white or grayish white . . . . . 4
  - Upper surface of wings mainly black . . . . . *nigricaria*
- 4(3). T. p. line consisting of prominent, unconnected, black venular dots; eastern North America . . . . . *cognataria*
  - T. p. line made up of dark, pointed dashes on veins, the dashes connected or separate; western North America . . . . . 5
- 5(4). Males with hair pencil on hind tibia; venular dots of t. p. line often connected . . . . . 6
  - Males without hair pencil on hind tibia; venular dots of t. p. line more or less unconnected . . . . . *arcana*
- 6(5). Upper surface of wings white, with contrasting black maculation; Arizona and northern Mexico . . . . . *grisearia*
  - Upper surface of wings light gray or grayish brown, with rather poorly defined maculation; Colorado, New Mexico, and Texas . . . . . *furfuraria*
- 7(1). Upper surface of abdomen without bands . . . . . 8
  - Upper surface of abdomen with prominent bands . . . . . 11
- 8(7). Upper surface of wings unicolorous grayish brown; t. p. line tending to be more strongly represented on veins than in cells . . . . . *interpunctata interpunctata*
  - Upper surface of wings unicolorous pale gray or with outer portion darker than median area; t. p. line of equal thickness . . . . . 9
- 9(8). Upper surface of wings unicolorous pale gray; length of forewing ranging from 11 to 17 mm. . . . .
  - . . . . . *mcdunnougharia kirkwoodaria*
  - Upper surface of wings with outer portion darker than median area . . . . . 10
- 10(9). Longest pectinations of male antennae about 2.0 mm. in length; t. p. line more or less straight and heavy; southern Rocky Mountain states . . . . .
  - . . . . . *interpunctata thomasaria*
  - Longest pectinations of male antennae about 1.1 mm. in length; t. p. line thin, biconcave; Coahuila . . . . . *zweifeli*
- 11(7). T. p. line with apex recurved; eastern North America . . . . . *plumosaria*
  - T. p. line with apex straight or slightly bent; western North America . . . . . 12
- 12(11). Upper surface of wings whitish gray; t. p. line prominent, broadly shaded distally with brown or grayish brown band . . . . . 13



- Upper surface of wings pale gray; t. p. line varying from being absent to complete; when present, only weakly shaded distally. . . *mcdundougharia kirkwoodaria*
- 13(12). Longest pectinations of male antennae about 1.0 mm.; upper surface of wings tending to be shaded with dark brownish gray; Texas and New Mexico . . . *quinquelinearia*
- Longest pectinations of male antennae 1.5 to 1.7 mm. in length; upper surface of wings weakly shaded with pale gray and brown; eastern California and southern Rocky Mountain states . . . *mcdundougharia mcdundougharia*

#### BASED ON MALE GENITALIA AND SECONDARY SEXUAL CHARACTERS

1. Venter of third segment with median row of bristles . . . . . 2  
Venter of third segment without median row of bristles . . . . . 3
- 2(1). Process of sacculus with slender, spinose median area, and with swollen and curved apical section ending in about middle of valvula . . . . . *grisearia*  
Process of sacculus with very thin median area without spines, and with capitate terminal swelling extending to margin of valvula . . . . . *furfuraria*
- 3(1). Vesica with very long spine, sharply recurved at base . . . . . 4  
Vesica not as above . . . . . 6
- 4(3). Sacculus and its process with outer one-half spinose . . . . . *interpunctata*  
Sacculus and its process with not more than one-fourth spinose . . . . . 5
- 5(4). Basal portion of process of sacculus bent; terminal spinose area of process about 0.3 mm. in length . . . . . *arcana*  
Basal portion of process of sacculus straight; terminal spinose area of process about 0.5 mm. in length . . . . . *zweifeli*
- 6(4). Vesica armed with both a spine and large group of deciduous setae . . . . . 7  
Vesica armed with group of deciduous setae only . . . . . 8
- 7(6). Posterior spine of vesica usually straight and equal in length to deciduous group of spines, being from 0.2 to 0.4 mm. in length; distal section of sacculus arm angled posteriorly, spinose area from 0.3 to 0.4 mm. in length . . . . . *nigricaria*  
Posterior spine of vesica usually elongate and curved, in length one and one-half to two times as long as deciduous group of spines, being from 0.4 to 0.7 mm. in length; distal portion of sacculus arm

- straight, spinose area from 0.4 to 0.5 mm. in length. . . . . *cribrataria*
- 8(6). Sacculus arm with terminal knoblike swelling, and with setae on this projection only . . . . . 9  
Sacculus arm without terminal swelling; setae extending along outer one-third to one-half of length of process. . . 10
- 9(8). Uncus with length of apical portion ranging from three-tenths to two-fifths of maximum width of base of uncus; spinose portion of process of sacculus from 0.2 to 0.3 mm. in length . . . . . *quinquelinearia*  
Uncus with length of slender apical portion about one-fourth of maximum width of base of uncus; spinose portion of process of sacculus from 0.2 to 0.4 mm. in length . . . . . *mcdundougharia*
- 10(8). Sacculus arm with posteriorly directed bend in middle . . . . . *cognataria*  
Sacculus arm straight . . . . . *plumosaria*

#### BASED ON FEMALE GENITALIA<sup>1</sup>

1. Sterigma with inner margins of sclerotized lateral areas very irregular . . . . . *arcana*  
Sterigma with inner margins of sclerotized lateral areas smoothly rounded . . . 2
- 2(1). Ductus seminalis arising from very large basal swelling, the latter at least as wide as width of ductus bursae . . . . . 3  
Ductus seminalis arising from much smaller swelling . . . . . 4
- 3(2). Sterigma heavily sclerotized, with elongate median area; signum with central area flat . . . . . *grisearia*  
Sterigma with lateral areas lightly sclerotized and with median area membranous; signum with central area V-shaped in cross section . . . . . *interpunctata*
- 4(2). Sterigma with median area elongate; signum with central part flat . . . . . *furfuraria*  
Sterigma with median area ovoid or elliptical; signum with central portion concave or V-shaped in outline . . . 5
- 5(4). Ductus bursae with narrowed anterior portion approximately as long as its width . . . . . 6  
Ductus bursae with narrowed anterior portion approximately three times as long as its width . . . . . 8
- 6(5). Signum with outer margins evenly and strongly spinose, and with central area tending to be concave . . . . . *nigricaria*

<sup>1</sup> The female genitalia of *zweifeli* are unknown.

- Signum with outer margins irregular, and with central area V-shaped in cross section, having a well-defined dorsal ridge . . . . . 7
- 7(6). Signum V-shaped in cross section for entire length; median area of sterigma well sclerotized . . . . . *cognataria*
- Signum with only middle section V-shaped, anterior and posterior margins fusing ventrally, with dorsal ridge extending laterally on both sides beyond fused area . . . . . *cribrataria*
- 8(5). Posterior one-third or one-half of corpus bursae with numerous longitudinal striations . . . . . *quinclinearia*
- Posterior one-third or one-half of corpus bursae smooth, without longitudinal striations . . . . . 9
- 9(8). Sterigma with anterior margins of lateral areas situated in weakly scalloped fold; signum elliptical, with outer margins evenly dentate . . . . . *plumosaria*
- Sterigma with anterior margins of lateral areas placed in smooth fold; signum tending to have posterior margin dentate, anterior margin concave, and with lateral teeth only . . . . . *mcdunnougharia*

#### GROUP I

The members of this group can be recognized by the presence of the hair pencil on the hind tibia of the male, and the medio-ventral row of bristles on the third segment of the abdomen of the male.

The species in this group have wings that are relatively short and broad. The t. p. line of the forewings and the extradiscal line of the hind wings are curved and more or less parallel the outer margins of the wings.

The male genitalia are characterized by the fact that the process of the sacculus is prominently swollen at the base and bears a thick band of spines on this enlargement. The vesica is armed with a very long, slightly curved spine that is sharply recurved at its base. When exerted, the vesica and the elongate spine lie at approximately a right angle to the aedeagus.

The female genitalia can be recognized by the heavily sclerotized and elongate lateral areas of the sterigma and its elongate median strip. The corpus bursae is relatively wide and enlarged anteriorly. The signum is a transverse spinose process, with the central

area flat. The ductus seminalis arises from a broad protuberance.

This group includes two species in this paper; both are to be found mainly in the southern Rocky Mountain states. One occurs primarily west of the continental divide, and its range extends into northern Mexico. The other is found east of the divide and out onto the plains of central Texas and Oklahoma. A number of other species belong to this group, but they are Neotropical in distribution.

#### *Glena grisearia* (Grote)

Figures 1, 3, 4

*Cymatophora* (*Boarmia*) *grisearia* GROTE, 1883, p. 124.

*Cymatophora grisearia*: McDUNNOUGH, 1920, p. 9.

*Boarmia grisearia*: HULST, 1888b, p. 50. SMITH, 1891, p. 72.

*Ectropis grisearia*: HULST, 1896, p. 358. DYAR, "1902" [1903], p. 327. SMITH, 1903, p. 77.

*Cleora grisearia*: BARNES AND McDUNNOUGH, 1917a, p. 117.

*Stenoporpia grisearia*: McDUNNOUGH, 1938, p. 164. COMSTOCK, 1956, p. 116.

*Glena grisearia*: KIRKWOOD, "1957" [1958], p. 167, pl. 37A (genitalia of female type), pl. 37B (type).

*Cleora pexata* SWETT, 1907, p. 53. BARNES AND McDUNNOUGH, 1917a, p. 117.

*Glena pexata*: McDUNNOUGH, 1920, p. 24, pl. 3, fig. 11 (male genitalia), pl. 7, fig. 16 (male); 1938, p. 164. SPERRY, 1952, p. 78, pl. 15 (female). KIRKWOOD, "1957" [1958], p. 167 (synonym of *grisearia*).

This is a large species having whitish wings with black markings. It occurs in Arizona, New Mexico, and Chihuahua.

MALE: Head, vertex white, with scattered black scales; front black or brownish black, with upper and lower margins white; palpi nearly horizontal, barely extending beyond front, dull blackish gray; antennae with pectinations on inner side about two-thirds as long as those on outer side. Thorax white above, with scattered black scales, in some specimens the latter more or less concentrated at end of collar, across patagia, and as either two spots or as thin band connecting them posteriorly on thorax; below white; legs white, lightly overlain with black and ochraceous scales, anterior portion of fore-



legs black, tarsi of all legs grayish brown. Abdomen above white, with variable amounts of black and blackish brown scaling, and with paired black dorsal spots posteriorly on each segment, becoming progressively smaller posteriorly; below white.

**UPPER SURFACE OF WINGS:** Forewings with ground color white, lightly overlain with black and brownish black scales and strigations; cross lines black, arising from prominent, black, costal spots, with t. p. line most strongly represented; t. a. spot at approximately one-fourth of length of costa, line tending to be obsolescent, in some specimens appearing as inwardly directed tooth on cubital vein and as spot on anal vein; median line arising from spot near middle of costa, going outward to small black discal spot, then becoming obsolescent in most specimens, in some cases represented by small dots on cubital and anal veins; t. p. line arising from spot about three-fourths of length of costa, weakly S-shaped, subparalleling outer margin, represented by outwardly directed teeth or dashes on veins, these connected to form line in some specimens; s. t. line incomplete, dull black, represented by two spots near costa, two more opposite cell, and above tornus; terminal line slender, black, and with large, black, intravenular spots; fringe concolorous with wing. Hind wings concolorous with forewings; intradiscal line present in posterior part of wing; discal spot round or elongate; extradiscal line like t. p. line in color and pattern; s. t. and terminal lines similar to those of forewing; fringe like that of primaries.

**UNDER SURFACE OF WINGS:** Forewings white or pale ochraceous white, more or less overlain with dull gray scales in cell and adjacent areas; costa pale ochraceous, with variable amount of brownish black scaling; discal spot elongate, grayish black; without maculation except for broad, rather nebulous, subterminal band, strongest in upper part of wing; veins on all wings ochraceous. Hind wings white, with a few scattered dark scales; maculation similar to that of forewings.

**LENGTH OF FOREWING:** 15 to 20 mm.

**FEMALE:** Similar to male, but with upper and lower surfaces of wings tending to be

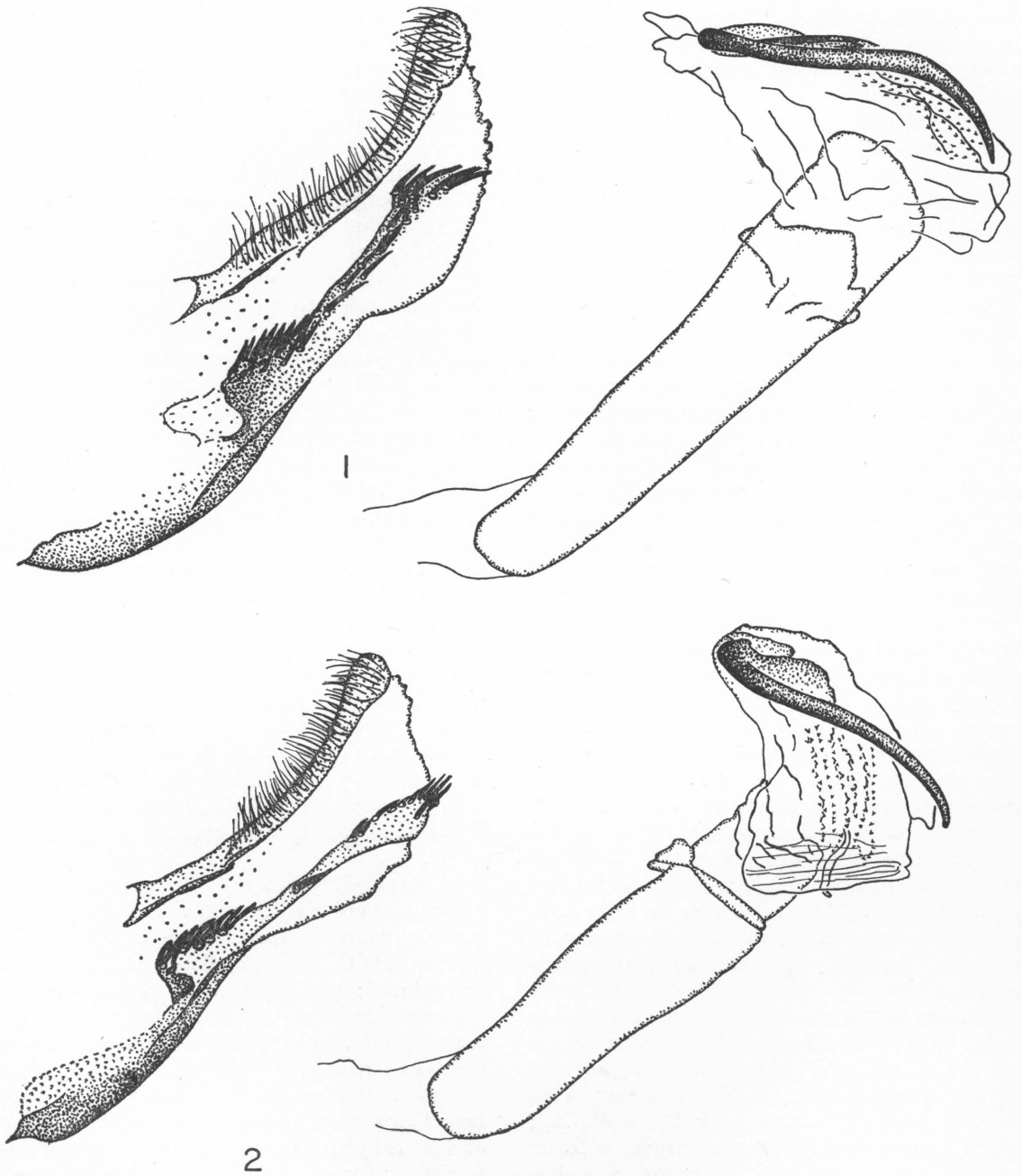
slightly more heavily overlain with dark scaling.

**LENGTH OF FOREWING:** 18 to 22 mm.

**MALE GENITALIA:** Uncus triangular, sides straight, with apical portion slender, having parallel sides, in length about one-third of maximum width of base of uncus; gnathos with tapering median enlargement, its apex bluntly rounded; valves with costa swollen apically; valvula slender, with small constriction distal to end of sacculus; sacculus swollen, sclerotized, with process arising from distal portion; process with sharply swollen base bearing numerous spines, becoming slender medially and with spines in most specimens, process slightly enlarged apically and with curved set of spines, these not reaching margin of valvula; length of process, from base to tip of apical spines, approximately 1.0 mm.; cristae represented by large number of very slender setae arising from area between base of sacculus and anellus; anellus with base of moderate width, sharply narrowed posteriorly, then gradually expanding into large, convoluted area; vesica with very long spine, sharply recurved upon itself basally, and with apex bent; length of spine varying from 1.0 to 1.4 mm., of recurved base from 0.5 to 0.6 mm.; vesica with weakly sclerotized band near base of spine, bearing very short deciduous spines, and with band of short spicules extending parallel to spine.

**FEMALE GENITALIA:** Sterigma with large, heavily sclerotized lateral areas, their inner margins rounded, more or less tapering laterally, and with anteromedian and distal areas convoluted; median strip of sterigma long and slender, from 0.7 to 0.8 mm. in length and 0.2 mm. in width; ductus bursae membranous, rectangular, slightly wider than long; ductus seminalis arising from very broad protuberance, its width equal to that of ductus bursae, evenly tapering and curving to right side; corpus bursae relatively broad, with anterior one-third or one-fourth gently swollen, posteriorly with numerous longitudinal striations and weakly sclerotized in area of base of ductus seminalis; sterigma a transverse elliptical process, with edges and flat median area finely spinose.

**EARLY STAGES:** Comstock (1956, p. 116) has briefly described the last two larval instars.



FIGS. 1, 2. Male genitalia, showing right valve and aedeagus with vesica exserted. 1. *Glana grisearia* (Grote), Sierra Vista, Cochise County, Arizona, April 7, 1963 (R. F. Sternitzky). 2. *G. furfuraria furfuraria* (Hulst), Cedar Creek Camp, Lincoln County, New Mexico, July 2, 1961 (F., P., and J. Rindge).



FOOD PLANT: Oak (Comstock, *loc. cit.*).

TYPES: Grote described *grisearia* from a single female; this specimen has been illustrated by Kirkwood ("1957" [1958], pl. 37B). The type is in the collection of the United States National Museum.

Cassino based his description of *pexata* on two males. Only one of these is in the Museum of Comparative Zoölogy at Harvard College; it is hereby selected as the lectotype, and it is M.C.Z. No. 14597.

TYPE LOCALITIES: Of *grisearia*, Arizona; of *pexata*, Huachuca Mountains, Cochise County, Arizona.

RANGE: Southern Arizona, southern New Mexico, and Chihuahua (see fig. 3). On the wing from April through September.

REMARKS: One hundred thirty-two specimens (including both types) and 14 genitalic dissections were studied. This large species with the black and white wings is usually not difficult to recognize. The only species with which it can be confused is *arcana* Rindge; the latter taxon lacks both the tibial hair pencil and medioventral bristle tuft on the third abdominal segment which are present in *grisearia*.

The male genitalia of *grisearia* can usually be recognized by the fact that the process of the sacculus has a moderately large base and a spinose median area, and that the swollen and curved apical section ends about in the middle of the valvula.

The female genitalia can be separated from those of the other species covered in this paper by the very broad base of the ductus seminalis, by the convolution of the inner and outer portions of the large lateral areas of the sterigma, and by the elongate median strip of the sterigma.

#### *Glena fufuraria* (Hulst)

*Boarmia fufuraria* HULST, 1888a, p. 214.

This species is similar to *grisearia*, but it is grayer in color and the maculation is not so distinct as in that species. This polytypic taxon occurs in Colorado, New Mexico, and Texas in two subspecific populations.

*Glena fufuraria* has been misidentified by several authors. It is not known to what species the Beutenmüller reference (1892, p. 194) applies; this was to a California "type" of *fufuraria*. The citations of both McDun-

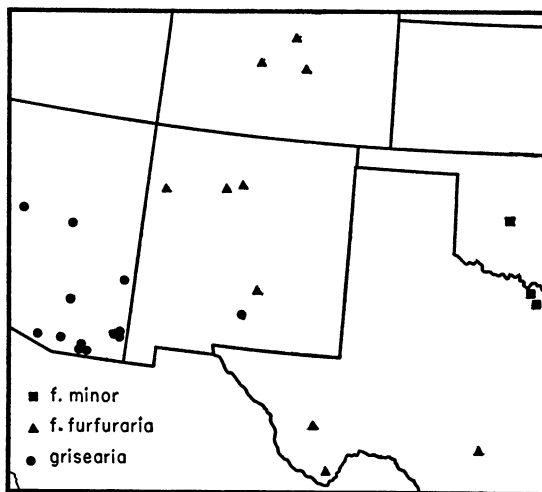


FIG. 3. Distribution of *Glena grisearia* (Grote) and *G. fufuraria* (Hulst).

nough (1920, p. 24) and Cassino (1927, p. 75) are referable to *Glena arcana* Rindge.

#### *Glena fufuraria fufuraria* (Hulst)

Figures 2, 3, 5

*Boarmia fufuraria* HULST, 1888a, p. 214. SMITH, 1891, p. 72. RINDGE, 1955, p. 143.

*Cleora fufurata*: HULST, 1896, p. 357.

*Cleora fufuraria*: DYAR, "1902" [1903], p. 325. SMITH, 1903, p. 77. BARNES AND McDUNNOUGH, 1917a, p. 117.

*Glena fufuraria*: McDUNNOUGH, 1920, p. 24 (*partim*, not figs.); 1938, p. 164. RINDGE, 1958b, p. 15.

*Glena alpenata* CASSINO, 1927, p. 74 (*lapsus calami* for *alpinata*).

*Glena alpinata*: McDUNNOUGH, 1938, p. 164. New synonymy.

The nominate subspecies is the larger of the two populations, and it has obscure maculation. It is found in lower mountain ranges of Colorado, New Mexico, and western Texas.

MALE: Head, vertex white or whitish gray, with a few scattered dark scales; front black, with lower margin narrowly white; palpi with second and third joints rising to middle of eye, dull grayish black; antennae with pectinations on inner and outer sides of almost equal length. Thorax grayish white above, with scattered brownish black scales, in some specimens the latter more or less concentrated in middle of patagia; below white; legs ochraceous white, anterior portion of forelegs and tarsi of all legs grayish brown. Abdomen

above grayish white, with many scattered blackish brown scales, the latter concentrated into either paired black dorsal spots or as posterior band on each segment; below paler.

**UPPER SURFACE OF WINGS:** Forewings with ground color light gray, overlain with grayish brown scales; cross lines varying from being weakly represented to obsolescent, grayish black or brownish black when present; t. a. and median lines obsolescent, consisting of dark costal spots about one-fourth and one-half of distance from base, and spots on cubital and anal veins, in some specimens with slightly dark scaling between anal vein and inner margin; discal spot varying from being absent to weakly represented; t. p. line arising from dark costal spot approximately three-fourths of distance from base, then subparallel outer margin, represented by dark venular spots or dashes, these not connected in most specimens; s. t. line weakly represented by dark, somewhat nebulous spots in upper part of wing, these shaded distally by narrow, curved, white line, the latter extending to tornus in some specimens; terminal line of dark cellular spots; fringe concolorous with wing. Hind wings concolorous with forewings; intradiscal line weakly represented in posterior part of wing; discal spot small or obsolescent; extradiscal line like t. p. line in color and pattern; s. t. line obsolescent; terminal line and fringe like those of primaries.

**UNDER SURFACE OF WINGS:** Forewings grayish white, more or less heavily overlain with grayish brown scales and strigations; costa pale ochraceous, with variable amount of dark scaling; discal spot elongate, gray; without maculation except for broad, nebulous, subterminal band in upper part of wing; terminal line narrow, complete; veins on all wings of some specimens ochraceous. Hind wings white or whitish gray, with a few scattered dark scales; maculation similar to that of forewings.

**LENGTH OF FOREWING:** 16 to 20 mm.

**FEMALE:** Similar to male; some specimens more heavily overlain above and below with dark scales.

**LENGTH OF FOREWING:** 17 to 22 mm.

**MALE GENITALIA:** Similar to those of

*grisearia*, differing mainly as follows: uncus with tip of apical portion slightly swollen in some specimens; gnathos with apex of median enlargement bluntly pointed; valves with apex of costa only slightly enlarged; valvula with definite median constriction, and with outer portion lobate; process of sacculus with large basal process bearing several rows of spines, becoming very thin medially and without spines in most specimens, apically swollen and having spines along upper and lower margins, the tips of these spines extending beyond edge of valvula; length of process, from base to tip of apical spines, approximately 1.1 to 1.3 mm.; anellus with only moderate constriction posteriad of base; vesica with spine slightly shorter, and with smaller recurved base; length of spine varying from 0.9 to 1.1 mm., of recurved base from 0.3 to 0.4 mm.

**FEMALE GENITALIA:** Sterigma with large, smoothly sclerotized, lateral areas, their inner margins either more or less straight or gently curved, and with distal margins more weakly sclerotized and bluntly rounded; median strip of sterigma relatively short, approximately 0.38 mm. in length and 0.18 mm. in width; ductus bursae lightly sclerotized, more or less rectangular, width twice as great as length; ductus seminalis arising from moderate swelling, in width about one-half of that of ductus bursae, posteriorly with small constriction and then quickly tapering in width; corpus bursae relatively broad, with anterior one-half or one-third swollen, posteriorly with numerous longitudinal striations, tending to be lightly sclerotized and with surface very finely granular; sterigma a transverse elliptical process, with edges and flat median area finely spinose.

**EARLY STAGES:** Unknown.

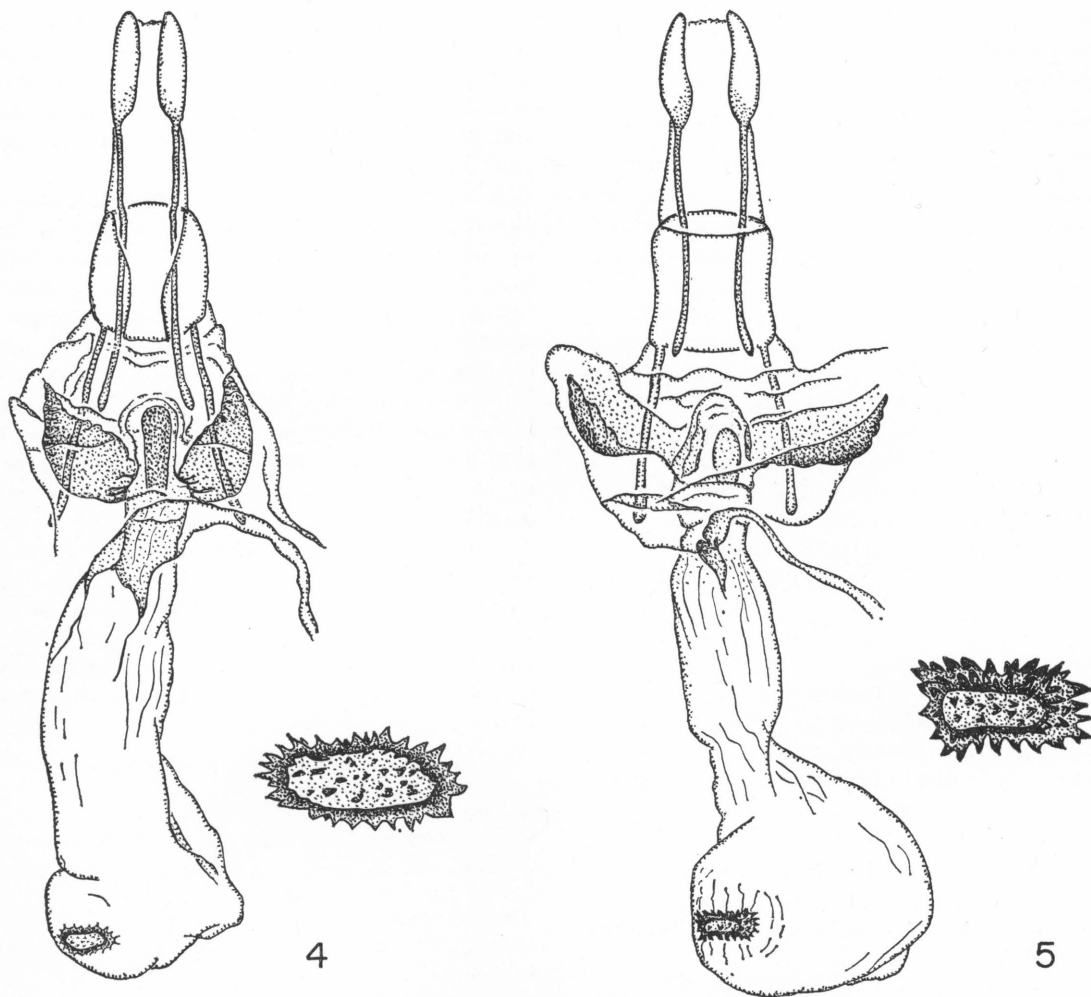
**FOOD PLANT:** Unknown.

**TYPES:** The lectotype of *furfuraria* is in the collection of the American Museum of Natural History; this male specimen was designated by Rindge (1958b, p. 15).

The holotype, male, and allotype, female, of *alpinata* are in the Museum of Comparative Zoölogy at Harvard College.

**TYPE LOCALITIES:** Of *furfuraria*, Colorado; of *alpinata*, Alpine, Brewster County, Texas.

**RANGE:** The southern Rocky Mountains,



FIGS. 4, 5. Female genitalia, with enlarged view of signum. 4. *Glana grisearia* (Grote), Southwestern Research Station of the American Museum of Natural History, Cochise County, Arizona, May 5, 1956 (M. Statham). 5. *G. furfuraria furfuraria* (Hulst), Alpine, Texas, May.

primarily at moderate elevations to the east of the continental divide, in the states of Colorado, New Mexico, and Texas. In the last-named state the species occurs in the Trans-Pecos area and on the Edwards Plateau. (See fig. 3.) The moths have been taken from April through September.

REMARKS: Forty-seven specimens (including the type specimens of both names) and 35 genitalic dissections have been studied. This subspecies is characterized by the large size and the poorly defined maculation.

The male genitalia of *furfuraria* are very

similar to those of *grisearia*, but a number of differences are present, as outlined in the description given above. This species usually can be recognized by the shape and by the spining of the process of the sacculus. This structure has a large base, a more slender median area that is without spines, and a more rounded, capitate terminal swelling that extends to the margin of the valvula than are to be found in *grisearia*.

The female genitalia of this species can be distinguished from those of *grisearia* by the fact that the ductus seminalis has a much

smaller base, by the smoothly sclerotized lateral areas of the sterigma, and by the much smaller median strip of the same area.

*Glena furfuraria minor* Sperry, new status

*Glena minor* SPERRY, 1952, p. 75, pl. 15 (adults).

This subspecies tends to be more contrastingly patterned and smaller in size than the nominate subspecies. It occurs in the plains country of Texas and Oklahoma.

MALE: Similar to nominate *furfuraria*, but with upper surface of wings more heavily overlain with brown scales, and with cross lines tending to be more distinctly represented, as the t. a. and t. p. lines are complete in most specimens.

LENGTH OF FOREWING: 13 to 16 mm.

FEMALE: Similar to male.

LENGTH OF FOREWING: 15 to 20 mm.

MALE GENITALIA: Similar to those of nominate subspecies.

FEMALE GENITALIA: Similar to those of nominate subspecies.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: The holotype, male, and allotype, female, are in the collection of the American Museum of Natural History.

TYPE LOCALITY: Montague County, Texas.

RANGE: The plains country of northern Texas and central Oklahoma (see fig. 3). The moths are on the wing from May through September.

REMARKS: Seven specimens (including the types) and five genitalic dissections have been studied. The only material studied has been from the type series.

#### GROUP II

The species of this group lack both the hair pencil on the hind tibia and the medioventral row of bristles on the third abdominal segment of the males.

The maculation and shape of the wings are similar to those of the preceding group.

The male genitalia do not have the basal swelling of the process of the sacculus. This process has from about one-fourth to more than one-half of its length set with heavy spines. The vesica is variously armed. One species has a very long, slightly curved spine that is sharply recurved at its base; the other taxa have a heavy, deciduous clump of fine

spines and may or may not have a spine of moderate size. When exerted, the vesica extends longitudinally; the very long spine of *arcana* Rindge lies parallel to the aedeagus, not transversely as do the spines that are found in group I.

The female genitalia show various stages in the reduction of the amount of sclerotization of the lateral areas of the sterigma, as these vary from being heavily sclerotized to membranous. The median area of the sterigma is usually elliptical or oval, although in one species it is an elongate strip. The corpus bursae is either relatively wide or slender, and it is more or less enlarged anteriorly. The signum is either a transverse spinose process, or is more smoothly sclerotized and has a longitudinal fold.

Group II includes four species. Two of these occur in western North America, one being quite restricted in its distribution, while the other is very widespread, ranging from southern British Columbia into Mexico. The other two taxa occur in eastern North America.

#### *Glena arcana* Rindge

Figures 6, 8, 9

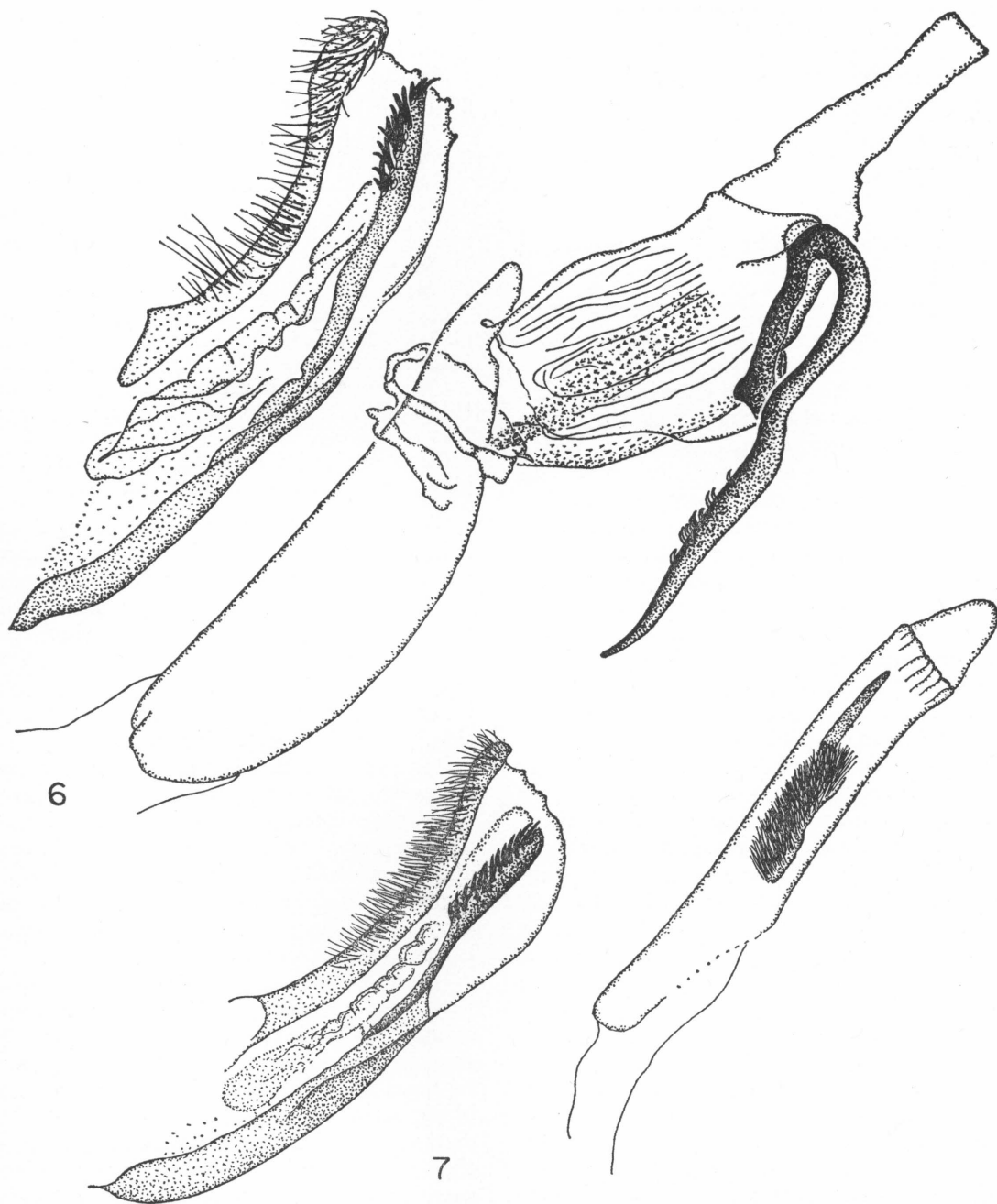
*Glena furfuraria* auct. nec Hulst: McDUNNOUGH, 1920, p. 24, pl. 3, fig. 10 (male genitalia), pl. 7, fig. 13 (adult). CASSINO, 1927, p. 74.

*Glena arcana* RINDGE, 1958b, p. 15, figs. 6 (adult), 14, 15 (male genitalia), 26 (female genitalia).

This species is very similar to both *grisearia* and *furfuraria*, but it can be recognized by the characters given for group II. In color the upper side of the wings is about intermediate between the wings of *grisearia* and those of *furfuraria*, while the pattern is more like that of the latter species. The structure of the male antenna is similar to that of *grisearia*, as the pectinations on the inner side are noticeably shorter than those on the outer side. The length of the forewings ranges from 18 to 21 mm. for males, and from 19 to 22 mm. for females.

The male genitalia are characterized by an elongate, tapering uncus with the ventrally curving apex laterally compressed, by the fact that the process of the sacculus has spines on the swollen, terminal one-fourth only, by the broad anellus, and by the basal





FIGS. 6, 7. Male genitalia, showing right valve and aedeagus, with vesica exerted in 6. 6. *Glana arcana* Rindge, paratype, Madera Canyon, Santa Cruz County, Arizona, June 23, 1955 (W. A. Rees). 7. *G. nigricaria* (Barnes and McDunnough), Colorado (Bruce).

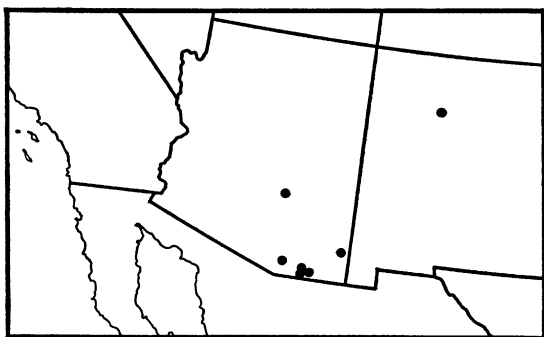


FIG. 8. Distribution of *Glenn arcana* Rindge.

recurvature of the elongate spine in the vesica. This last-mentioned character is similar to the species of group I, but the exerted vesica extends longitudinally and the spine lies parallel to the aedeagus. The vesica also has bands with short spicules ventrally and on the right side, as well as a band with deciduous spines at the base. The large spine itself has a number of very small, short, curved spines about midway in the middle of the free arm. The length of the spine is greater than that in the preceding species, as it ranges from 1.6 to 1.7 mm.; the recurved base measures from 0.6 to 0.7 mm.

The female genitalia are basically similar to those of group I but can be recognized by the very irregular inner margins of the heavily sclerotized lateral areas of the sterigma. The median strip of the sterigma is weakly sclerotized, and it varies from 0.75 to 1.00 mm. in length and from 0.3 to 0.4 mm. in width. The ductus seminalis arises from a broad base, situated in a weakly sclerotized, striate area with a granular surface, gradually tapering in width and curving to the right and then posteriorly. The corpus bursae is relatively broad and swollen anteriorly. The signum is more or less elliptical, with spinose margins and central area; the posterior margin is only weakly spinose, and the signum is V-shaped in cross section.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: The holotype, male, and allotype, female, are in the collection of the American Museum of Natural History.

TYPE LOCALITY: Huachuca Mountains, Cochise County, Arizona.

RANGE: Southeastern Arizona and New

Mexico (see fig. 8). The moths have been taken from June through September.

REMARKS: Forty-eight specimens and 15 genitalic dissections have been studied.

***Glenn nigricaria* (Barnes and McDunnough)**

Figures 7, 10, 11

*Selidosema nigricaria* BARNES AND McDUNNOUGH, 1913, p. 129, pl. 7, fig. 11 (female type).

*Cleora nigricaria*: BARNES AND McDUNNOUGH, 1917a, p. 117.

*Glenn nigricaria*: McDUNNOUGH, 1920, p. 24, pl. 3, fig. 8 (male genitalia); 1927, p. 266; 1938, p. 164. BLACKMORE, 1927, p. 42. JONES, 1951, p. 131.

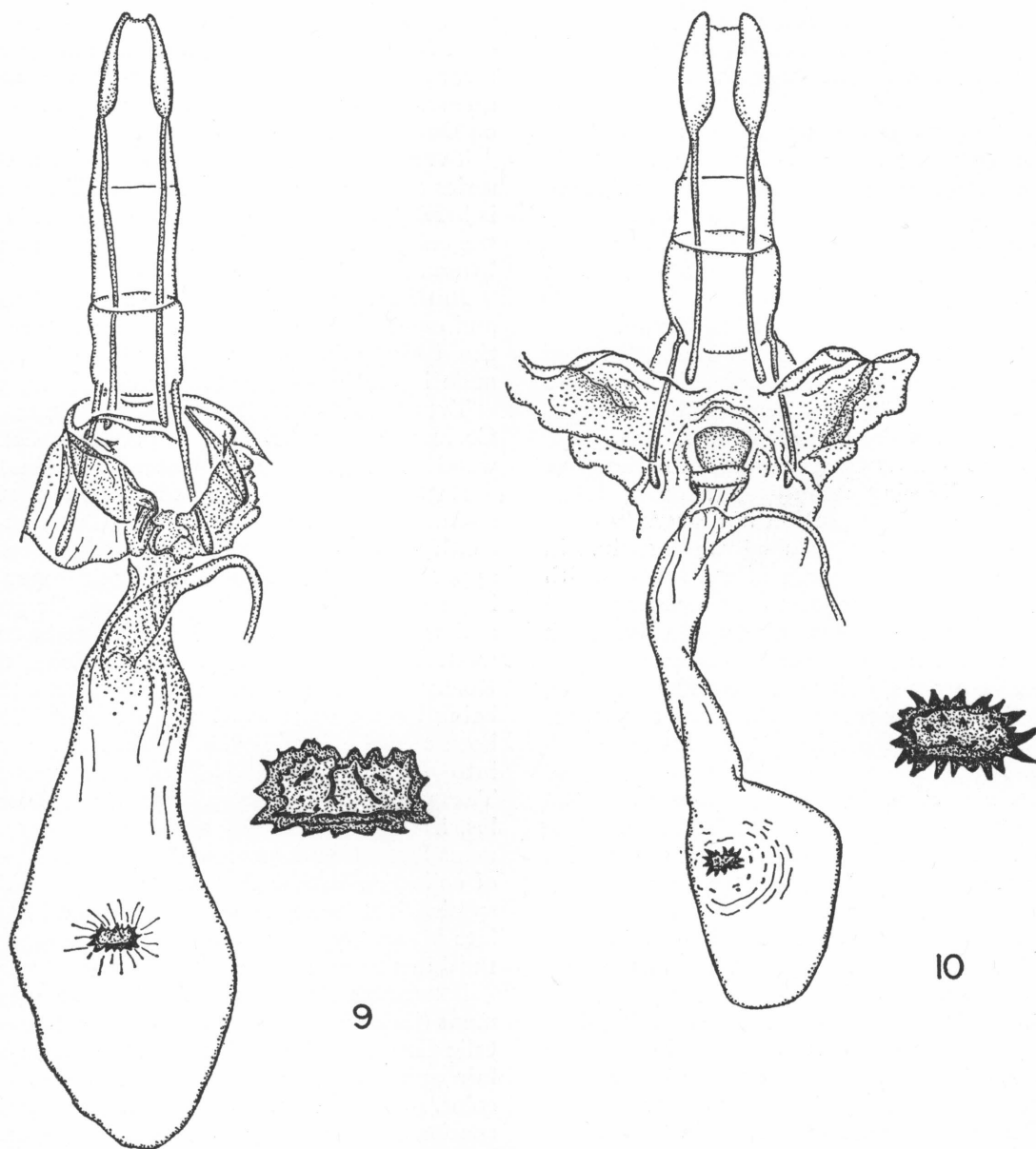
*Cleora rusticaria* BARNES AND McDUNNOUGH, 1917b, p. 244, pl. 29, fig. 9 (lectotype male). New synonymy.

*Glenn rusticaria*: McDUNNOUGH, 1920, p. 24, pl. 3, fig. 9 (male genitalia); 1938, p. 164.

This species is unique in the genus in that it has the upper surface of the wings largely black. It occurs in western North America.

MALE: Head, vertex grayish black, with tips of scales tending to be light gray; front dull black; palpi rising to middle of eyes, grayish black; antennae with pectinations on inner side slightly shorter than those of outer side. Thorax grayish black above, scales of collar and patagia with ends narrowly gray; below whitish gray; legs pale grayish brown or grayish white, anterior portion of forelegs and tarsi of all legs grayish brown. Abdomen above grayish black, posterior portions of segments blackish brown, with narrow pale gray band along caudal margin; below whitish gray or pale ochraceous gray.

UPPER SURFACE OF WINGS: Forewings with ground color gray, heavily and evenly overlain with black or blackish brown scales; cross lines black, variable in strength, present in most specimens; t. a. line arising from black costal spot approximately one-fifth of distance from base, going outwardly into cell, then sharply angled and proceeding to inner margin; median line arising from black costal spot basad of middle of costa, going outwardly to discal spot, then angled, becoming broader and proceeding to inner margin; t. p. line prominent, arising from black costal spot at three-fourths of distance from base, strongly represented by outwardly directed teeth or dashes on veins, subparallel to outer margin but curving outwardly at inner mar-



FIGS. 9, 10. Female genitalia, with enlarged view of signum. 9. *Glena arcana* Rindge, paratype, Madera Canyon, Santa Rita Mountains, Arizona, August 1, 1947 (Comstock and Martin). 10. *G. nigricaria* (Barnes and McDunnough), Rist Canyon, Larimer County, Colorado, July 10, 1957 (F. and P. Rindge).

gin; s. t. line incomplete, represented by several whitish gray scallops in cells, in some specimens these lie distad of incomplete dark band; terminal line very narrow, black, interrupted by veins, and with large intravenular spots; fringe concolorous with wing. Hind

wings concolorous with forewings; intradiscal line broad, appearing as continuation of median line of primaries; discal spot black, ovate or elongate; extradiscal line like t. p. line in color and pattern; subterminal area darker than median area, with pale gray band

near middle, and in some specimens with a partial, narrow, scalloped band distad thereto; terminal line and fringe like those of forewings.

**UNDER SURFACE OF WINGS:** Forewings pale gray; costa ochraceous brown; discal spot gray, elongate; without maculation; veins on all wings faintly ochraceous in many specimens. Hind wings grayish white; without maculation except for small discal spot and incomplete terminal line.

**LENGTH OF FOREWING:** 15 to 23 mm.

**FEMALE:** Similar to male, but with upper surface of wings tending to be slightly more heavily and evenly covered with black scales.

**LENGTH OF FOREWING:** 15 to 22 mm.

**MALE GENITALIA:** Similar to those of *arcana*, differing mainly as follows: uncus triangular, apical portion not laterally compressed, strongly bilobed terminally, in length about one-fourth of maximum width of base of uncus; process of sacculus angled for greater distance in middle of valve, with result that terminal portion is nearer costa than in *arcana*, and lying at different angle, tending to be parallel with basal two-thirds of costa; apical portion of process not swollen, lying in central region of valvula, and with numerous fine spines, spinose area 0.3 to 0.4 mm. in length; without large, dense patch of cristae at base of valves; vesica with deciduous patch of short setae and with single, slightly curved cornutus, latter ranging from about 0.2 to 0.4 mm. in length.

**FEMALE GENITALIA:** Sterigma with lateral areas smoothly and lightly sclerotized, broadly curved medially and tapering distally, with anterodistal portions situated in a fold; median area of sterigma heavily sclerotized, more or less ovate, with posterior portion widened, about 0.4 mm. in both length and width; ductus bursae short, funnel-like; ductus seminalis arising from near posterior end of ventral swelling of corpus bursae; corpus bursae with posterior one-half slender, very lightly sclerotized in part and with longitudinal striations, anterior portion swollen, globose; signum a transverse elliptical process, with edges and flat median area finely spinose.

**EARLY STAGES:** Undescribed.

**FOOD PLANT:** *Pinus ponderosa* Lawson (Jones, 1951, p. 131). A series of 17 reared

specimens has been received from the Canadian National Collection, and the food plant records are as follows: 13 on *Pinus ponderosa*, three on *P. contorta* Loudon, and one on Douglas fir.

**TYPES:** *Nigricaria* was described from a series of one male and five females. The male is hereby designated as the lectotype; it is in the collection of the United States National Museum.

*Rusticaria* was described from one male and one female; both these specimens are in the United States National Museum. The male is hereby designated as the lectotype.

**TYPE LOCALITIES:** Of *nigricaria*, Palmerlee, Cochise County, Arizona; of *rusticaria*, Glenwood Springs, Garfield County, Colorado.

**RANGE:** This species occurs from the southern interior regions of British Columbia south into Mexico (see fig. 11). The species apparently encircles the Great Basin, extending south in eastern Washington, Oregon, and western Nevada, and California on the west. To the east it comes south down the Rocky Mountain states, with specimens also being known from southwestern North Dakota and the Black Hills of South Dakota, into Arizona, New Mexico, and western Texas. A single male from Cuernavaca, Morelos, has been examined; the dearth of specimens from Mexico presumably reflects a lack of collecting rather than the absence of the species. The moths have been captured from late March through September, with most of the dates being in June and July.

**REMARKS:** One thousand fifty-one specimens (including both lectotypes) and 58 genitalic dissections have been studied. There is a fair amount of individual variation in the color, pattern, and size of this moth, but the species can be recognized as it is the only black moth in the genus. There does not appear to be much geographic variation in this species. The only specimens that differ noticeably from the average appearance of this taxon are found in northeastern California. Some, but not all, of the examples from Lassen, Plumas, and Shasta counties have relatively little black suffusion on the upper surface of the wings.

This is the first species to be treated that has the deciduous spine patch and small cornutus in the vesica. McDunnough (1920), p.



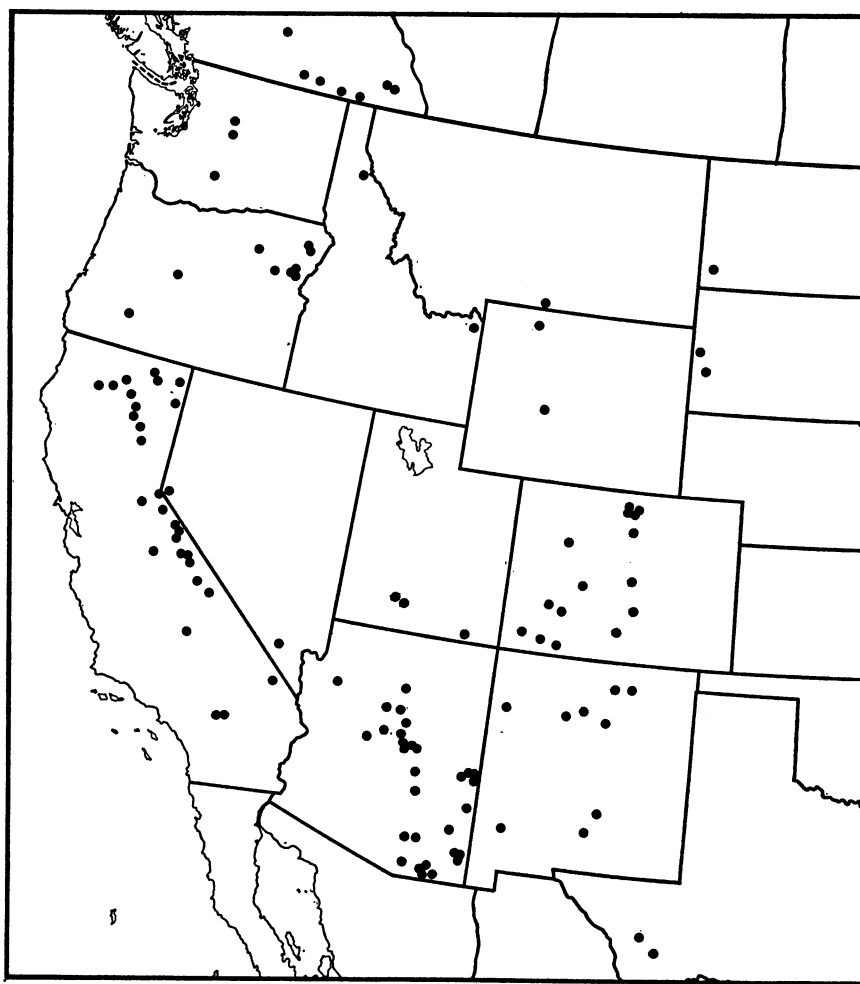


FIG. 11. Distribution of *Glena nigricaria* (Barnes and McDunnough).

24, pl. 3, figs. 8, 9) called attention to the close relationship between the male genitalia of *nigricaria* and those of *rusticaria*. The only obvious difference between the two is in the vesica, where the former has lost the deciduous spines, while they are present in the latter. This variation is not one of specific value, as the spines may be lost during mating; they are often found within the bursa copulatrix.

The female genitalia are similar to those of the species of group I in the nature of the signum. The present species can be recognized by the ovoid median process and the large, smoothly sclerotized lateral areas of the sterigma. The shape of the corpus bursae of *nigricaria* is somewhat intermediate be-

tween the wide ones of all the preceding species and the narrow ones that are to be found in the following taxa.

McDunnough (1920, p. 24) called attention to *Boarmia nepia* Druce, which he thought might be closely allied to *nigricaria*. An examination of photographs of the genitalia of the female type of *nepia* proves that *nepia* is definitely not conspecific with *nigricaria*. The type specimen of *nepia* is in the collection of the British Museum (Natural History).

#### *Glena cribrataria* (Guenée)

Figures 12, 14, 15

*Tephrosia cribrataria* GUENÉE, 1857, p. 260.  
BOISDUVAL AND GUENÉE, 1858, phalénites, pl. 3,  
fig. 9. MORRIS, 1860, p. 57. WALKER, 1860, p.

402. PACKARD, 1876, p. 424, pl. 11, fig. 13; 1890, p. 841. GROTE, 1882, p. 49. ANON., 1882, p. 24. BEUTENMÜLLER, 1890, p. 222. SMITH, 1890, p. 338; 1891, p. 72.

*Cleora cribrataria*: GUMPPENBERG, 1892, p. 319. DYAR, "1902" [1903], p. 326. SMITH, 1903, p. 77; 1909, p. 503. BARNES AND McDUNNOUGH, 1917a, p. 117.

*Glena cribrataria*: McDUNNOUGH, 1920, p. 23, pl. 3, fig. 6 (male genitalia); 1938, p. 164. FORBES, 1928, p. 602. KIMBALL, 1939, p. 36. JONES AND KIMBALL, 1943, p. 116. RINDGE, 1956, p. 7.

*Glena (Glena) cribrataria*: FORBES, 1948, p. 54.

*Cleora cribraria (sic!)*: HULST, 1896, p. 357.

*Cleora cribrataria (sic!)*: MOORE, 1955, p. 71.

*Boarmia fuliginaria* HULST, 1888a, p. 215. SMITH, 1891, p. 72. McDUNNOUGH, 1920, p. 10. RINDGE, 1955, p. 143.

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

*Cleora fuliginaria*: BARNES AND McDUNNOUGH, 1916, p. 184.

*Cleora indicataria* ab. *fuliginaria*: BARNES AND McDUNNOUGH, 1917a, p. 117.

*Glena fuliginaria*: McDUNNOUGH, 1938, p. 164. RINDGE, 1956, p. 7 (synonym of *cribrataria*).

*Glena (Glena) fuliginaria*: FORBES, 1948, p. 54.

This species is considerably smaller than any of the preceding ones. The wings above are light gray or pale grayish brown, and the cross lines are represented by a series of dots on the veins. This moth occurs in eastern North America.

MALE: Head, vertex white or whitish gray; front narrow, black or blackish brown, with narrow pale gray band across bottom; palpi extending beyond front, rising to middle of eyes, brownish black or dark brownish gray; pectinations of antennae very long, of equal length on both sides of shaft. Thorax whitish gray above, with narrow black band anteriorly, and with two black spots posteriorly; below dull white; legs whitish gray or ochraceous white, anterior portion of forelegs brownish gray. Abdomen whitish gray above, with large, paired, black or blackish brown dorsal spots on each segment, getting progressively smaller posteriorly; below grayish white.

UPPER SURFACE OF WINGS: Forewings with ground color light gray, more or less overlain with gray and brownish gray scales; cross lines represented by a series of unconnected black or blackish brown venular dots; t. a. and median lines formed by spots on costa,

cubital and anal veins; discal dot absent; t. p. line with spots on all veins, subparalleling outer margin; s. t. line represented by rather nebulous spots in cells  $M_1$  and  $M_2$  and above tornus, with additional spots present in some specimens; terminal line of prominent, black cellular spots; fringe concolorous with wing. Hind wings concolorous with forewings; intradiscal line present in posterior part of wing; discal spot present; extradiscal, subterminal, and terminal lines like those of primaries; fringe concolorous with wing.

UNDER SURFACE OF WINGS: Forewings gray or pale grayish brown; costa concolorous with remainder of wing, with dark gray scaling; discal spot dark gray, elongate; without maculation except for faint subterminal band and weakly represented terminal line. Hind wings whitish gray, with scattered pale gray or pale brownish gray scales; without maculation except for discal dot and obsolescent terminal line.

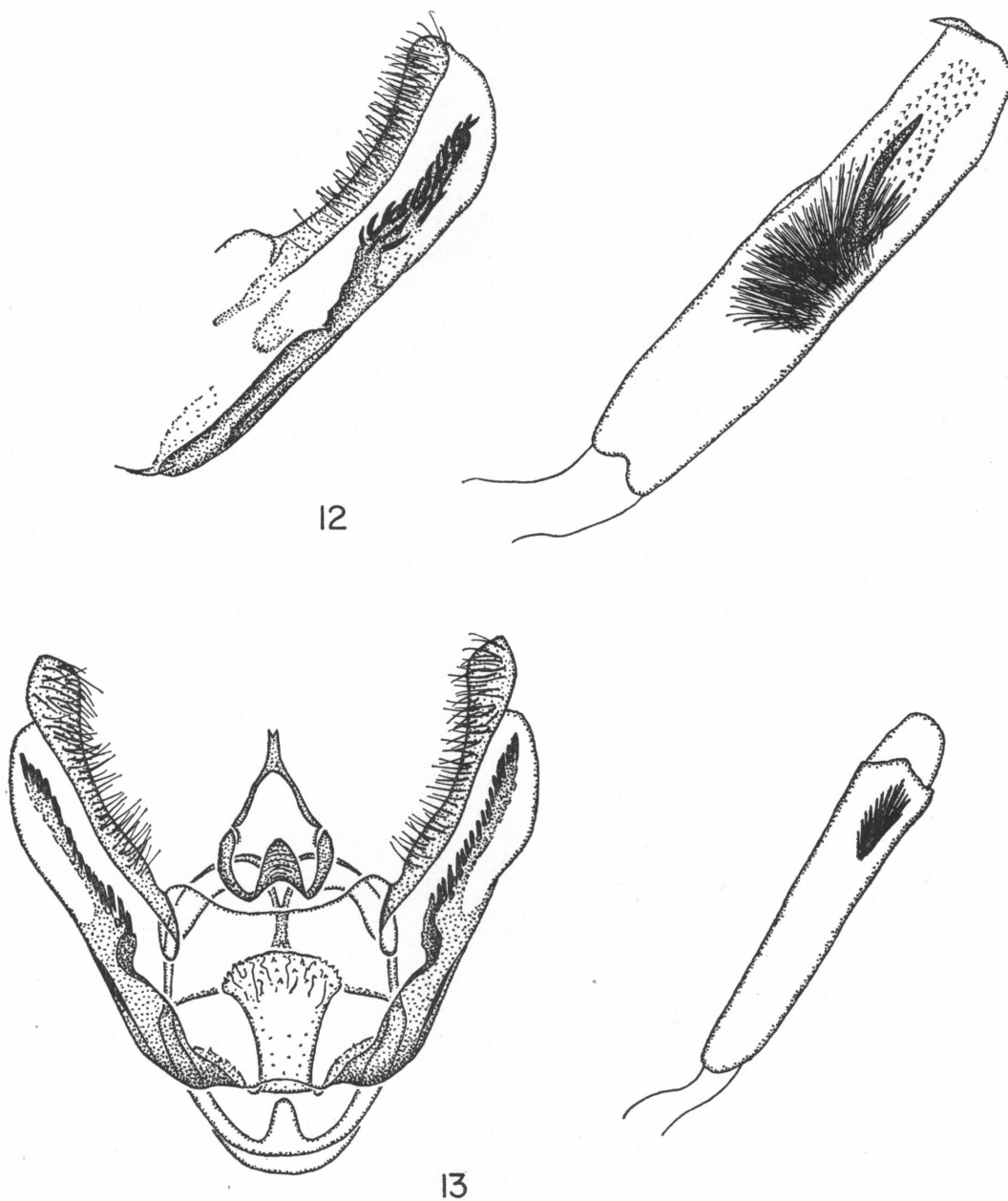
LENGTH OF FOREWING: 12 to 16 mm.

FEMALE: Similar to male, but with maculation of upper surface tending to be less strongly represented.

LENGTH OF FOREWING: 12 to 17 mm.

MALE GENITALIA: Similar to those of *nigricaria*, differing mainly as follows: uncus with apical portion very short, in length about one-fifth of maximum width of base of uncus; process of sacculus with short, wide, median, angled piece, with elongate spinose terminal portion terminating before reaching margin of valve, the spinose portion ranging in length from 0.4 to 0.5 mm.; vesica with deciduous patch of short setae and with single, straight, or weakly curved cornutus, the latter about 0.4 to 0.7 mm. in length.

FEMALE GENITALIA: Sterigma membranous or very lightly sclerotized, lateral areas smooth and with their anterior margins situated in a prominent scalloped fold, with median area scarcely differentiated; ductus bursae lightly sclerotized, more or less rectangular posteriorly, then narrowed anteriorly to join corpus bursae; ductus seminalis arising from small, posterior tubercle; corpus bursae slender, anterior one-half and posterior one-sixth slightly swollen, with latter weakly sclerotized ventrally; signum with transverse dorsal ridge, median area tending to be flattened ventrally.



FIGS. 12, 13. Male genitalia, figure 12 showing right valve and aedeagus. 12. *Glena cribrataria* (Guenée), Orange Mountains, New Jersey, May 24 (F. Lemmer). 13. *G. cognataria* (Hübner), Hicoria, Highlands County, Florida, December 14, 1945 (L. J. Brass).

**EARLY STAGES:** The caterpillar was briefly described by Guenée (1857, p. 260). Apparently this description formed the basis for the later notes by Packard (1876, p. 424), Gumpenberg (1892, p. 319), and Forbes (1948, p.

54). Packard (1890, p. 841) gave a brief description of the pupa.

**FOOD PLANTS:** Poplar was given by Guenée (1857, p. 260); many subsequent authors cite this reference. Also given were willow (Beu-

tenmüller, 1890, p. 222) and spruce (Packard, 1890, p. 841; McDunnough, 1920, p. 24; Forbes, 1928, p. 602, 1948, p. 54).

**TYPES:** Guenée described *cribrataria* from three males; these are in the collection of the United States National Museum. One of them is hereby designated as the lectotype; the genitalia have been dissected and are on slide E.L.T. 1897.

Hulst's description of *fuliginaria* was based on a single male; this specimen is in the collection of the American Museum of Natural History.

**TYPE LOCALITIES:** Of *cribrataria*, "Géorgie américaine"; of *fuliginaria*, Illinois. The type of the latter bears a locality label that reads "N. Ill."

**RANGE:** Eastern North America (see fig. 14). The species is found from Minnesota, Illinois, and Ontario south to Florida and Mississippi. The moths have been taken from late April through August in the north; in the south they begin flying in March.

**REMARKS:** One hundred ten specimens (in-

cluding both types) and 12 genitalic dissections have been studied. This species can be recognized by its small size, gray coloration (fading to grayish brown in old specimens), and by a series of separate, dark venular spots that represent the cross lines.

The status of *fuliginaria* was a puzzle for many years. This was finally settled in 1956 (Rindge, p. 7). This moth is apparently a melanic individual, as Hulst suggested in his original description. No other melanistic specimens have been seen.

The male genitalia of *cribrataria* can be distinguished from those of *nigricaria* by the shorter terminal projection of the uncus, by the longer, spinose area of the process of the sacculus, and by the longer spine of the vesica.

The female genitalia of *cribrataria* differ from those of all the previously discussed species in the nature of the signum. Another unique feature is the scalloped anterior margin in the fold of the lateral areas of the sterigma.

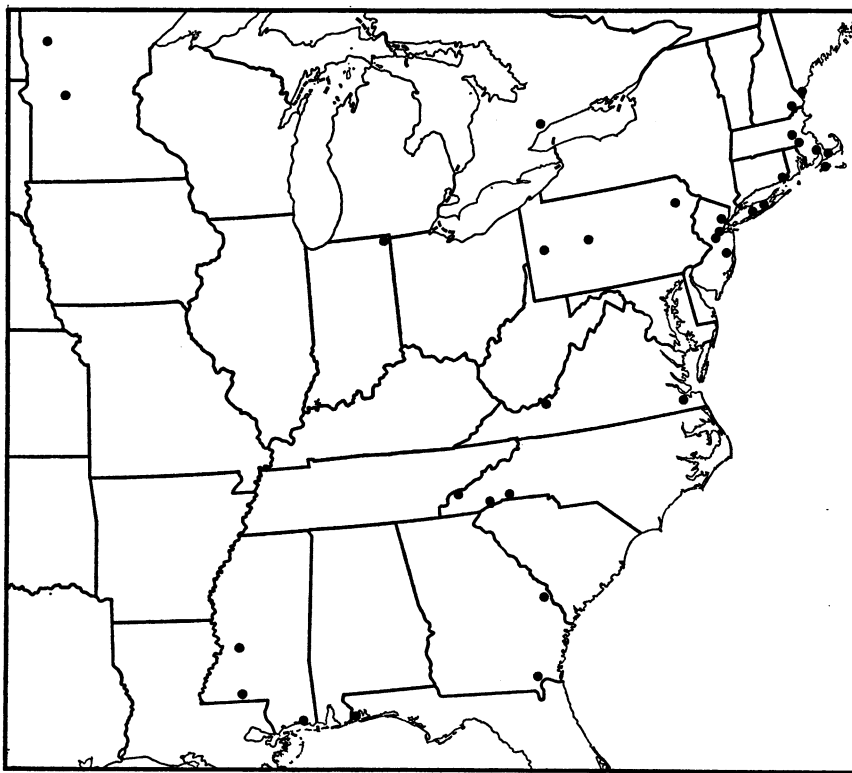


FIG. 14. Distribution of *Glana cribrataria* (Guenée).



*Glena cognataria* (Hübner)

Figures 13, 16, 17

*Anagoga cognataria* HÜBNER, "1825" [1824-1831], p. 34, figs. 549, 550. HEMMING, 1937, p. 475.

*Tephrosia cognataria*: PACKARD, 1876, p. 421, pl. 11, fig. 11 (adult). GROTE, 1882, p. 49. ANON., 1882, p. 24. BEUTENMÜLLER, 1890, p. 222. SMITH, 1890, p. 338; 1891, p. 72.

*Cleora cognataria*: GUMPPENBERG, 1892, p. 58.

*Glena cognataria*: HULST, 1896, p. 358. DYAR, "1902" [1903], p. 327. SMITH, 1903, p. 77; 1909, p. 504. BARNES AND McDUNNOUGH, 1917a, p. 118. GROSSBECK, 1917, p. 99. McDUNNOUGH, 1920, p. 23, pl. 3, fig. 4 (male genitalia); 1938, p. 163. FORBES, 1928, p. 602. PROCTER, 1938, p. 239; 1946, p. 277. KIMBALL, 1939, p. 36. JONES AND KIMBALL, 1943, p. 116. DARLINGTON, 1952, p. 40. FERGUSON, 1954, p. 315. RINDGE, 1956, p. 8; 1958a, p. 18.

*Glena (Glena) cognataria cognataria* (Geyer): FORBES, 1948, p. 54.

*Aspilates acidaliaria* WALKER, 1862, p. 1684.

*Glena acidaliaria*: DYAR, "1902" [1903], p. 327 (synonym of *cognataria*). McDUNNOUGH, 1938, p. 163. RINDGE, 1958a, p. 19.

*Aspilates infixaria* WALKER, 1862, p. 1685.

*Glena infixaria*: DYAR, "1902" [1903], p. 327 (synonym of *cognataria*). SMITH, 1903, p. 77. BARNES AND McDUNNOUGH, 1917a, p. 118. McDUNNOUGH, 1920, p. 23; 1938, p. 163. RINDGE, 1958a, p. 19.

*Diastictis crassata* HULST, 1896, p. 333. RINDGE, 1955, p. 140.

*Cymatophora crassata*: DYAR, "1902" [1903], p. 314. SMITH, 1903, p. 74.

*Itame crassata*: BARNES AND McDUNNOUGH, 1917a, p. 114. McDUNNOUGH, 1938, p. 161.

*Glena crassata*: RINDGE, 1956, p. 8 (synonym of *cognataria*); 1958a, p. 19.

*Selidosema muricolor* HULST, 1896, p. 355. DYAR, "1902" [1903], p. 324. SMITH, 1903, p. 77. RINDGE, 1955, p. 149.

*Cleora muricolor*: BARNES AND McDUNNOUGH, 1916, p. 184 (synonym of *cognataria*).

*Glena muricolor*: BARNES AND McDUNNOUGH, 1917a, p. 118. McDUNNOUGH, 1920, p. 23; 1938, p. 163. RINDGE, 1958a, p. 19.

*Anisodes umatillaria* STRECKER, 1899, p. 9.

*Cosymbia umatillaria*: DYAR, "1902" [1903], p. 292. SMITH, 1903, p. 70. BARNES AND McDUNNOUGH, 1916, p. 172 (synonym of *cognataria*).

*Glena umatillaria*: BARNES AND McDUNNOUGH, 1917a, p. 118. GROSSBECK, 1917, p. 99. McDUNNOUGH, 1920, p. 23; 1938, p. 163. RINDGE, 1958a, p. 19.

*Selidosema insaria* DYAR, 1909, p. 27.

*Glena insaria*: BARNES AND McDUNNOUGH,

1917a, p. 118 (synonym of *cognataria*). McDUNNOUGH, 1920, p. 23; 1938, p. 163. RINDGE, 1958a, p. 19.

*Glena (Glena) cognataria insaria*: FORBES, 1948, p. 55.

This is the smallest species of this group. The upper surface of the wings is a grayish brown, with a pinkish or violet tinge in fresh specimens, and the maculation is weakly represented. The species occurs in eastern North America.

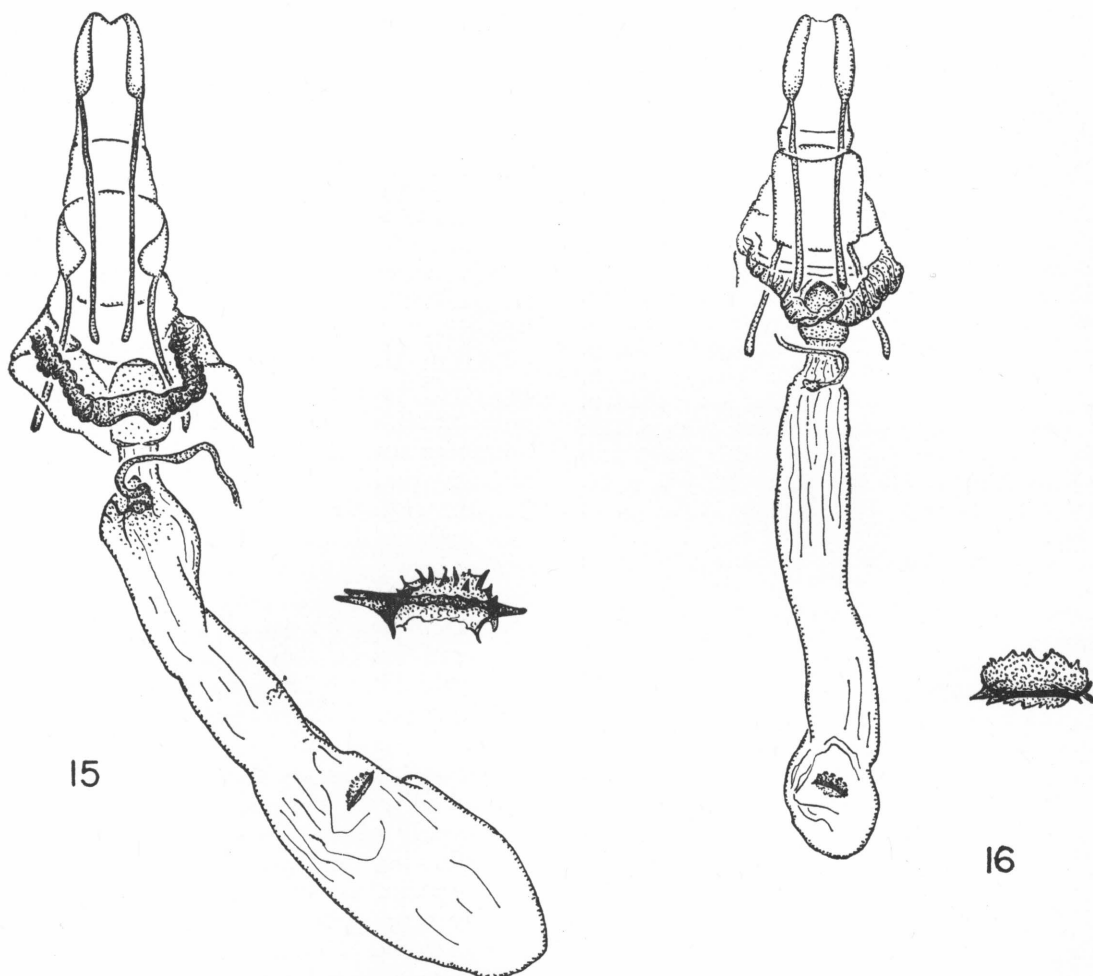
MALE: Head, vertex white, with a few scattered brown scales; front dark brown; palpi small, rising to middle of eyes, brown; antennae strongly pectinate, pectinations of almost equal length on both sides of shaft. Thorax white or whitish gray above, with a few scattered brown scales; below grayish white; legs grayish white or grayish brown, forelegs with anterior portion brownish black. Abdomen pale grayish white above, with scattered brown scales, in some specimens with paired black or brownish black spots on posterior portion of middle segments; below paler.

UPPER SURFACE OF WINGS: Forewings with ground color light gray, more or less heavily and evenly overlain with brown scales, the latter having faint pinkish or purple tint in fresh specimens; cross lines obsolescent or weakly represented; t. a. and median lines obsolescent or absent; discal spot absent; t. p. line represented by unconnected series of small, dark brown or brownish black, venular dots, subparalleling outer margin or tending to curve basally in lower part of wing, these shaded distally by faint, nebulous dark band in many specimens; s. t. line absent; terminal line of small, dark, intravenular spots; fringe concolorous with wing. Hind wings concolorous with forewings; intradiscal line weakly indicated in some specimens in posterior portion of wing; discal spot small or obsolescent; extradiscal line and outer portion of wing similar to those of forewings.

UNDER SURFACE OF WINGS: Forewings brownish gray, hind wings pale gray, with scattered brown scales; veins faintly ochraceous; maculation absent except for small, pale, discal dots.

LENGTH OF FOREWING: 12 to 15 mm.

FEMALE: Similar to male, but tending to be



FIGS. 15, 16. Female genitalia, with enlarged view of signum. 15. *Glena cribrataria* (Guenée), Orange Mountains, New Jersey, June 8 (F. Lemmer). 16. *G. cognataria* (Hübner), Lakehurst, New Jersey, May 11–20 (F. Lemmer).

slightly darker and to have slightly less clearly defined maculation above.

LENGTH OF FOREWING: 13 to 15 mm.

MALE GENITALIA: Similar to those of *nigricaria*, differing mainly as follows: uncus with length of apical portion about one-third of maximum width of base of uncus; process of sacculus with very short, median, angled piece, and with very long spinose terminal portion terminating before reaching margin of valve, the apical spinose portion ranging in length from 0.4 to 0.6 mm.; vesica with deciduous patch of short setae only.

FEMALE GENITALIA: Similar to those of *cribrataria*, differing mainly as follows: ster-

igma with lateral areas and anterior folds smaller, and with heavily sclerotized median area, approximately square in outline but with posterior margin rounded, in size about 0.3 mm. in both length and width; ductus bursae smaller, less heavily sclerotized; corpus bursae slightly swollen anteriorly, entire structure with numerous longitudinal striations; signum V-shaped in cross section, with transverse dorsal ridge.

EARLY STAGES: Undescribed.

FOOD PLANT: Blueberry, according to Procter (1938, p. 239; 1946, p. 277) and Darlington (1952, p. 40).

TYPES: It is not known whether Hübner's

type of *cognataria* is in existence.

Walker described both *acidaliaria* and *infixaria* from single male specimens; they are both in the collection of the British Museum (Natural History).

The unique female type of *crassata* is in the American Museum of Natural History (Rindge, 1955, p. 140).

Hulst described *muricolor* from more than one specimen, but he did not specify how many. The specimen in the collection of the American Museum of Natural History

(Rindge, 1955, p. 149) with the genitalia mounted on slide F.H.R. No. 6357 is hereby designated the lectotype.

Strecker described *umatillaria* from a single male; it is in the collection of the Chicago Natural History Museum.

Dyar described *insaria* from two males and one female. U.S.N.M. No. 12209, a male with its genitalia on slide H.W.C. No. 225, is hereby designated the lectotype.

TYPE LOCALITIES: Of *cognataria*, Pennsylvania; of both *acidaliaria* and *infixaria*,



FIG. 17. Distribution of *Glana cognataria* (Hübner) and *G. plumosaria* (Packard).

unknown; of *crassata*, Hastings, Flagler County, Florida (although it is given erroneously in the original description as Colorado; see Rindge, 1955, p. 140); of *muricolor*, Hazleton, Luzerne County, Pennsylvania; of *umatillaria*, Florida; of *insaria*, Fort Meade, Polk County, Florida.

RANGE: Eastern North America, from Nova Scotia and New Brunswick to Florida (see fig. 17). Ferguson (1954, p. 315) says that this species is essentially one of bogs and blueberry barrens in Nova Scotia. The adults are on the wing from May through August in the north; in Florida they fly throughout the year. Gumpfenberg's record (1892, p. 318) for Panama is in error.

REMARKS: Two hundred fifty-two specimens (including the types of *crassata*, *muricolor*, *umatillaria*, and *insaria*) and 17 genitalic dissections have been studied. The small size, the pinkish or purplish brown coloration, and the rather poorly defined maculation are diagnostic characters for this species. Forbes (1948, p. 55) applied Dyar's name in a subspecific sense to specimens from Florida. In the opinion of the present author, these southern examples are not sufficiently distinct to warrant the use of a subspecific name for this population. If this is thought to be necessary, *crassata* Hulst is the oldest name available.

Forbes (1948, p. 54) credited the name *cognataria* to Geyer, although Hemming (1937, p. 475) claimed that it definitely should be assigned to Hübner.

The male genitalia of *cognataria* are similar to those of *cribrataria* but can be distinguished by the longer terminal portion of the uncus, the longer spinose area of the process of the sacculus, and the absence of the separate cornutus in the vesica.

The female genitalia of this species are also similar to those of *cribrataria*. These structures of *cognataria* are smaller, and can be recognized by the more heavily sclerotized median area of the sterigma and by the different shape of the signum.

### GROUP III

The species of this group lack both the hair pencil on the hind tibia and the medioventral row of bristles on the third abdominal segment of the males.

In this group the forewings of all the included species are elongate, as the costa is longer in relation to the inner margin than in the previous two groups. The hind wings are also more elongate and are somewhat triangular in outline. The upper surface of the wings is usually light gray or grayish brown. The maculation of the forewings consists of a more or less straight and usually prominent t. p. line, extending from near the apex of the wing to basal to the middle of the inner margin. The secondaries usually have at least one straight, dark, cross line.

The male genitalia do not have the basal swelling of the process of the sacculus. This process is an elongate, slender one, and the extent of spining along its length varies from almost the entire distance to a relatively small terminal swelling. There are two types of armature in the vesica. Three species have an elongate, recurved spine, while the other two taxa have only a heavy, deciduous clump of fine spines. The vesica of the former type, when exerted, extends at a right angle to the aedeagus, and the heavy spine more or less parallels the organ, with the tip of the cornutus being anteriorly directed.

The female genitalia of this group show a series of developments similar to those found in group II. The lateral areas of the sterigma become less heavily sclerotized, and the corpus bursae changes from being short and thick to being more elongate and slender. The signum varies from being flat and dentate to being V-shaped in cross section and smoothly sclerotized.

Group III includes five species, two of which are polytypic. One species and one subspecies are described as new in this revision. Three of the species are found in the southwestern United States, extending from California to Texas and north into Colorado and Utah; one is from northern Mexico; and the fifth species is from the southeastern United States, extending as far north as New Jersey.

*Glena interpunctata* (Barnes and McDunnough)

*Monroa (Cleora) interpunctata* BARNES AND MCDUNNOUGH, 1917b, p. 240, pl. 25, fig. 9.

This is one of the larger species in the group, and it is polytypic. The cross lines are more or less clearly represented, depending

on which subspecies is concerned. There are two such populations. One occurs from southern Arizona to western Texas; it has the t. p. line represented primarily by dots on the veins. The second subspecies occurs to the north of the first in the southern Rocky Mountain states; it has the t. p. line more solidly represented. The median line, when distinguishable, tends to converge with the t. p. line near the inner margin in this species.

***Glena interpunctata interpunctata***  
(Barnes and McDunnough)

Figures 18, 20, 24

*Monroa (Cleora) interpunctata* BARNES AND MCDUNNOUGH, 1917b, p. 240, pl. 25, fig. 9 (holotype), (*partim*, not pl. 30, fig. 3).

*Glena interpunctata*: MCDUNNOUGH, 1920, p. 24; 1938, p. 164.

*Monroa quinquelinearia* auct. nec Packard: BARNES AND MCDUNNOUGH, 1917b, pl. 30, fig. 4 (male genitalia of paratype; the captions of figs. 3 and 4 are reversed).

This subspecies is slightly smaller than the following one. The upper surface of the wings is grayish brown; the t. p. line is usually not very prominent, and it tends to be represented mainly on the veins. This taxon occurs from southern Arizona to western Texas.

MALE: Head, vertex whitish gray, with a few scattered brown scales; front dark grayish brown or brownish black; palpi short, barely reaching front, concolorous with front; antennae with pectinations on inner side of shaft shorter than those on outer side, with longest pectinations about 1.7 to 2.0 mm. in length. Thorax grayish white above, with scattered brown scales in some specimens, the latter tending to be concentrated anteriorly on thorax; below paler; legs pale ochraceous white, with anterior part of forelegs and all tibia darker. Abdomen grayish white above, with scattered dark brown and blackish brown scaling; below paler.

UPPER SURFACE OF WINGS: Forewings with ground color light gray, more or less heavily overlain with brown and brownish black scales; cross lines obsolescent or rather weakly represented; t. a. line incomplete, represented by dot on cubital vein and short line from anal vein to inner margin, these connected in some specimens; median line present in lower part of wing, more strongly

represented on veins, paralleling or convergent with t. p. line; discal dot small; t. p. line black, extending from about cell  $R_5$  to middle of inner margin, more strongly represented on veins, giving appearance of partially broken line in many specimens; outer portion of wing slightly darker than median area, with s. t. line of ground color, appearing in lower part of wing; terminal line of intravenular dark spots; fringe concolorous with wing. Hind wings concolorous with forewings; intradiscal line broad, present in lower part of wing; extradiscal line not attaining apex of wing, prominent, not enlarged on veins; outer portion of wing similar to that of forewings but with s. t. line tending to be more prominent.

UNDER SURFACE OF WINGS: Forewings pale gray, with grayish brown costa; hind wings pale grayish white; all wings without maculation except for small discal spots on forewings; veins faintly ochraceous in some specimens.

LENGTH OF FOREWING: 15 to 18 mm.

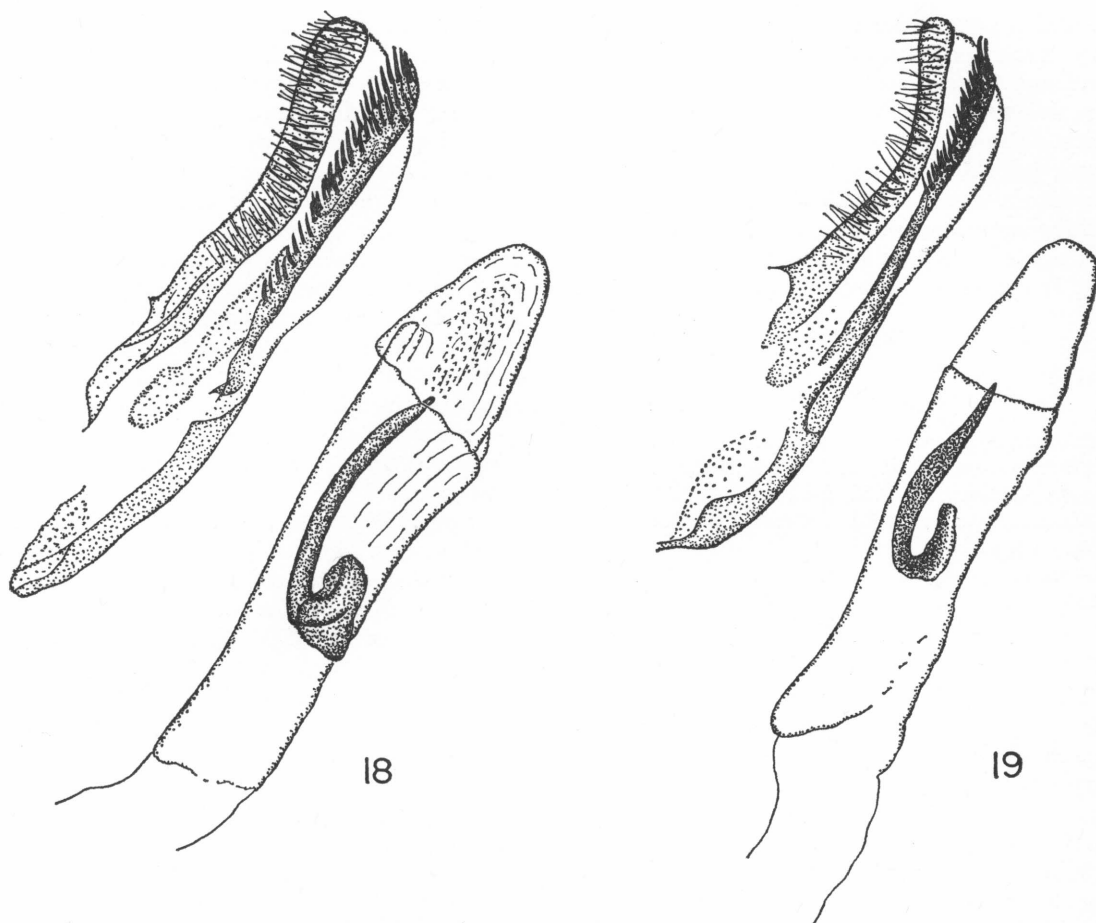
FEMALE: Similar to male but with upper surface of wings more heavily and evenly overlain with gray and grayish brown scales, and with maculation tending to be more or less obsolescent.

LENGTH OF FOREWING: 14 to 17 mm.

MALE GENITALIA: Similar to those of *cognataria*, differing mainly as follows: much larger in size; uncus with length of apical portion about three-tenths of maximum width of base of uncus; process of sacculus with elongate spinose portion variable in length, ranging from 0.6 to 1.0 mm., very weakly swollen apically, with apex and terminal spines extending to, or just beyond, margin of valve; basal portion of valve with small group of cristae; aedeagus with vesica having a heavy, elongate spine, recurved at base; length of spine ranging from 0.65 to 0.85 mm., recurved base 0.2 to 0.3 mm. in length.

FEMALE GENITALIA: Sterigma with lateral areas lightly sclerotized, very long, extending to dorsum, of approximately equal width throughout, and with median area membranous; ductus bursae lightly sclerotized, roughly rectangular in outline; ductus seminalis arising from very broad chamber, in width at least as wide as ductus bursae, then tapering and turning to right; corpus bursae





FIGS. 18, 19. Male genitalia, showing right valve and aedeagus. 18. *Glana interpunctata interpunctata* (Barnes and McDunnough), Southwestern Research Station of the American Museum of Natural History, Cochise County, Arizona, July 12, 1957 (M. Statham). 19. *G. zweifeli*, new species, holotype, 1 mile south of Cedritos, Coahuila, June 22, 1957 (R. Zweifel).

short and broad, anterior end slightly swollen, posterior end weakly sclerotized ventrally and with a number of longitudinal striations; signum with spinose margins and median area, the latter flat.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: This species was described from four male specimens. One of the types was figured with the original description; this specimen is in the collection of the United States National Museum, and it is hereby designated as the lectotype. Its genitalia are mounted on slide E.L.T. No. 1898.

TYPE LOCALITY: Paradise, Cochise County, Arizona.

RANGE: Arizona, New Mexico and western Texas (see fig. 20). The adults have been captured from mid April to early September.

REMARKS: Two hundred seventy-seven specimens (including the type) and 27 genitalic dissections have been studied. This species is similar to *thomasaria* but it is smaller, the wings are darker and less contrasting in color, and the t. p. line is less prominent and tends to be broken into more or less separate dots.

There is a certain amount of variation in the strength and course of the cross lines in this population. The upper surface of the wings of this subspecies is apparently rather easily rubbed, with a consequent loss of

scales, which may cause some difficulties in the tracing of the cross lines. The variation is most noticeable in the t. p. line, as this is the most prominent part of the maculation. This line varies from being black, heavy, and only slightly enlarged on the veins to being faintly represented by a few dark venular dots. The course of the t. p. line is usually straight, but in some specimens there is a weak curve in the lower portion of the line.

The male genitalia of this species can be separated from those of the species of groups I and II that have the heavy, recurved spine in the aedeagus by the very much longer spinose process of the sacculus.

The female genitalia of this species can be identified by the short and thick corpus bursae, the very wide base of the ductus seminalis, and the very long lateral areas of the sterigma.

***Glena interpunctata thomasaria***

Sperry, new combination

*Glena thomasaria* SPERRY, 1952, p. 75, pl. 15 (adults).

*Monroa quinquelinearia* auct. nec Packard: SPERRY, 1952, p. 77 (*partim*).

This subspecies is larger than nominate *interpunctata*, and it is one of the largest representatives in the group. This taxon occurs in the Rocky Mountain states.

MALE: Head, vertex white; front black or brownish black; otherwise as in nominate subspecies. Thorax and abdomen similar to those of nominate subspecies.

UPPER SURFACE OF WINGS: Forewings with ground color pale grayish white, more or less overlain with grayish brown and brown scales; cross lines variable in strength, with t. p. line the most prominent; t. a. line weakly represented, subparalleling t. p. line, geminate in lower part of wing; median cross line obsolescent in upper part of wing in many specimens, converging with t. p. line toward inner margin; discal spot absent; t. p. line black, weakly curved, and with grayish brown or brown shade line distally in most examples; outer portion of wing slightly darker than median area, with s. t. line of ground color extending down center; terminal line weakly represented, dark, narrow; fringe concolorous with wing. Hind wings concolorous with forewings; intradiscal line

broad, present in posterior part of wing; extradiscal line similar to t. p. line, extending more or less straight across wing toward apex but fading out anteriorly, and with grayish brown or brown shade line distally; outer portion of wing similar to that of forewing.

UNDER SURFACE OF WINGS: Forewings pale gray, with costa grayish brown; hind wings whitish gray; all wings without maculation; veins tending to be faintly ochraceous.

LENGTH OF FOREWING: 16 to 20 mm.

FEMALE: Similar to male but tending to be less contrastingly colored and slightly darker.

LENGTH OF FOREWING: 17 to 18 mm.

MALE GENITALIA: Similar to those of nominate subspecies, but tending to differ as follows: uncus slightly wider and shorter, with length of apical portion about one-fourth of maximum width of base of uncus; process of sacculus with elongate spinose portion ranging in length from about 0.9 to 1.0 mm.; length of spine in aedeagus 0.7 to 0.8 mm., recurved base about 0.3 mm. in length.

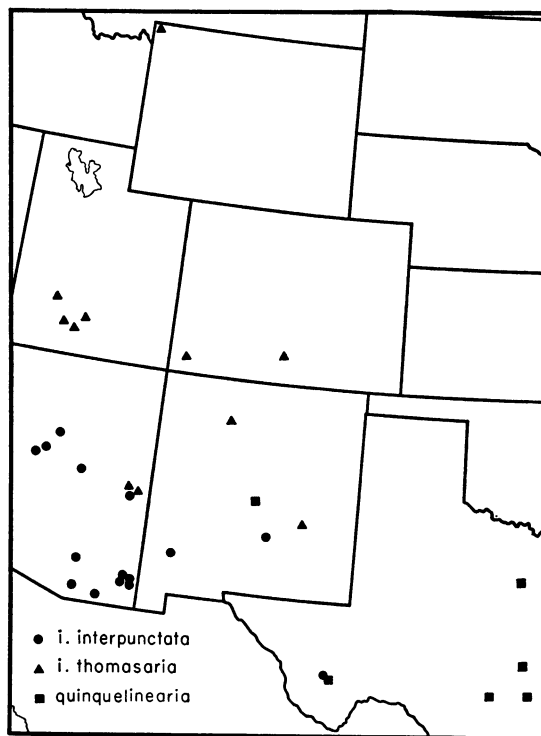


FIG. 20. Distribution of *Glena interpunctata* (Barnes and McDunnough) and *G. quinquelinearia* (Packard).

**FEMALE GENITALIA:** Similar to those of the nominate subspecies.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**TYPES:** The holotype, male, and allotype, female, are in the collection of the American Museum of Natural History. The holotype is the right-hand specimen of the two figured by Sperry with the original description.

**TYPE LOCALITY:** South Fork, Little Colorado River, White Mountains, Apache County, Arizona.

**RANGE:** This subspecies is known from the White Mountains of eastern Arizona, southern Utah, southern Colorado, and New Mexico (see fig. 20). Two specimens have been examined from Yellowstone National Park, Wyoming. The adults have been taken in late June and July.

**REMARKS:** Ninety-five specimens (including the type) and 11 genitalic dissections have been studied. This population is large and pale, with a slightly curving, strongly represented t. p. line. The latter tends to be confluent with the median line near the inner margin, and it is usually shaded distally by a broad, grayish brown, shade line.

The genitalia of both sexes are very much like those of the nominate subspecies. Certain minor differences are indicated in the description of male structures, but whether or not these dissimilarities will prove to be valid when a large number of preparations have been made remains to be seen.

***Glena zweifeli*, new species**

**Figure 19**

This species has relatively short and broad wings; the color of the upper surface of the wings is a grayish brown, similar to that of *interpunctata*, but the t. p. line is complete and curved, more like that of *thomasaria*. This taxon can also be recognized by the male genitalia. It is known from the state of Coahuila, Mexico.

**MALE:** Head, vertex white; front blackish brown; palpi small, barely reaching front, dark grayish brown; antennae strongly pectinate, pectinations on inside of shaft slightly shorter than those on outside, with longest pectinations about 1.1 mm. in length. Thorax badly rubbed above, apparently whitish gray, with brown scales anteriorly; below paler;

legs grayish brown, darker anteriorly on forelegs.

**UPPER SURFACE OF WINGS:** Forewings with ground color grayish white, more or less overlain with grayish brown scales; cross lines weakly represented; t. a. line represented by dot on cubital vein and row of scales crossing anal vein to inner margin, paralleling costa in course; median line similar to t. a. line but paralleling t. p. line; discal spot weakly represented; t. p. line extending from about vein  $M_1$  to inner margin basal to middle, paralleling outer margin, with two weak concave bends, the posterior of the two longer and more deeply curved, and with t. p. line weakly shaded distally by faint brownish gray band; outer portion of wing darker than median area, with broad s. t. band of ground color extending from near apex to tornus; terminal line dark brown, very narrow, enlarged into prominent intravenular spots; fringe concolorous with wing. Hind wings concolorous with forewings except for paler anterior margin; intradiscal line dark, rather broad, present in lower part of wing; discal spot absent; extradiscal line similar to, and heavier than, t. p. line, represented in lower two-thirds of wing; outer portion of wing similar to that of forewing but darker.

**UNDER SURFACE OF WINGS:** Forewings pale grayish brown, with costa brownish gray; hind wings whitish gray; all wings without maculation except for faint traces of discal dots and of broad, very faint, subterminal band.

**LENGTH OF FOREWING:** 17 mm. (holotype).

**FEMALE:** Unknown.

**MALE GENITALIA:** Similar to those of *interpunctata*, differing mainly as follows: process of sacculus with spining on terminal one-third only, spinose portion slightly less than 0.5 mm. in length, extending to, or just beyond, margin of valve, and with median section of process straight and narrow; aedeagus with vesica having a heavy, elongate spine, broadly recurved at base; length of spine 0.65 mm., of recurved base 0.25 mm.

**FEMALE GENITALIA:** Unknown.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**TYPE:** Holotype, male, 1 mile south of Cedritos, Coahuila, Mexico, June 22, 1957 (R. Zweifel). This specimen is in the collection of

the American Museum of Natural History.

**RANGE:** This species is known only from the type locality in eastern Coahuila, in the lower portion of the Sierra Madre Oriental. The locality is about 16 miles east of Arteaga, in a piñon pine and yucca association.

**REMARKS:** One specimen and one genitalic dissection have been studied. This species is similar to the two preceding subspecies and, in appearance, is somewhat intermediate between them. The wing color is more like that of *interpunctata*, but the cross lines are more similar to those of *thomasaria*.

The male genitalia of *zweifeli* are like those of *interpunctata*, but can be distinguished from them by the much shorter spinose area of the process of the sacculus.

It gives me pleasure to name this new species after Dr. Richard G. Zweifel, my friend and colleague, who collected the specimen.

***Glena plumosaria* (Packard), new combination**

Figures 17, 21, 25

*Cymatophora plumosaria* PACKARD, 1874, p. 51; 1876, p. 431, pl. 11, fig. 17 (male). GROTE, 1882, p. 49.

*Boarmia plumosaria*: ANON., 1882, p. 24.

*Ectropis plumosaria*: GUMPPENBERG, 1892, p. 335.

*Cleora plumosaria*: DYAR, "1902" [1903], p. 326. SMITH, 1903, p. 77. BARNES AND McDUNNOUGH, 1917a, p. 118.

*Monroa plumosaria*: WARREN, 1904, p. 555.

*Anacamptodes plumosaria*: McDUNNOUGH, 1920 p. 31 (*partim*, not pl. 5, fig. 6); 1938, p. 164.

This species can be recognized by its dark color, the curve or hook at the apical end of the straight t. p. line, and the wide brown shade line outside the t. p. line. This taxon occurs in the southeastern United States, getting as far north as New Jersey.

**MALE:** Head, vertex white or grayish white, with brown scales between bases of antennae; front black, some specimens with a few whitish scales along ventral margin; palpi extending beyond front, either concolorous with, or slightly paler than, front; antennae strongly pectinate, pectinations on inside of shaft slightly shorter than those on outside, with longest pectinations about 1.7 mm. in length. Thorax grayish white above, with scattered grayish brown scales, collar

brown or brownish gray, and with darker brown scales anteriorly on thorax; paler below; legs grayish white, with anterior portion of forelegs brownish black. Abdomen grayish white above, with brownish gray and black scales, the latter tending to form either paired spots or bands posteriorly on central segments; below ochraceous gray.

**UPPER SURFACE OF WINGS:** Forewings with ground color light gray, more or less heavily overlain with grayish brown and brown scales; cross lines weakly represented except for t. p. line; t. a. line extending from cubital vein to inner margin near base of wing, parallel with costa; median line paralleling t. p. line from middle of wing to inner margin; discal dot obsolescent or absent; t. p. line arising as rather nebulous costal spot three-fourths of distance from base, then appearing as dark spot on vein  $M_1$ , sharply curving to vein  $M_2$ , then becoming prominent and going straight to inner margin basal to middle, straight portion of line shaded distally with wide brown or grayish brown band; outer portion of wing darker than median area, cells  $M_1$  and  $M_2$  with dark brownish gray spots; s. t. line of ground color, outwardly curved in cells, and extending most of length of wing; terminal line black, very narrow, partly obsolescent, and with prominent intravenular spots; fringe concolorous with wing. Hind wings concolorous with forewings; intradiscal line broad, present in lower part of wing; discal spot small to moderate in size; extradiscal line similar to t. p. line, weakly represented anteriorly, sharply curving, becoming prominent and extending to anal margin, and with broad, brown, outer shading; outer portion of wing similar to that of forewing.

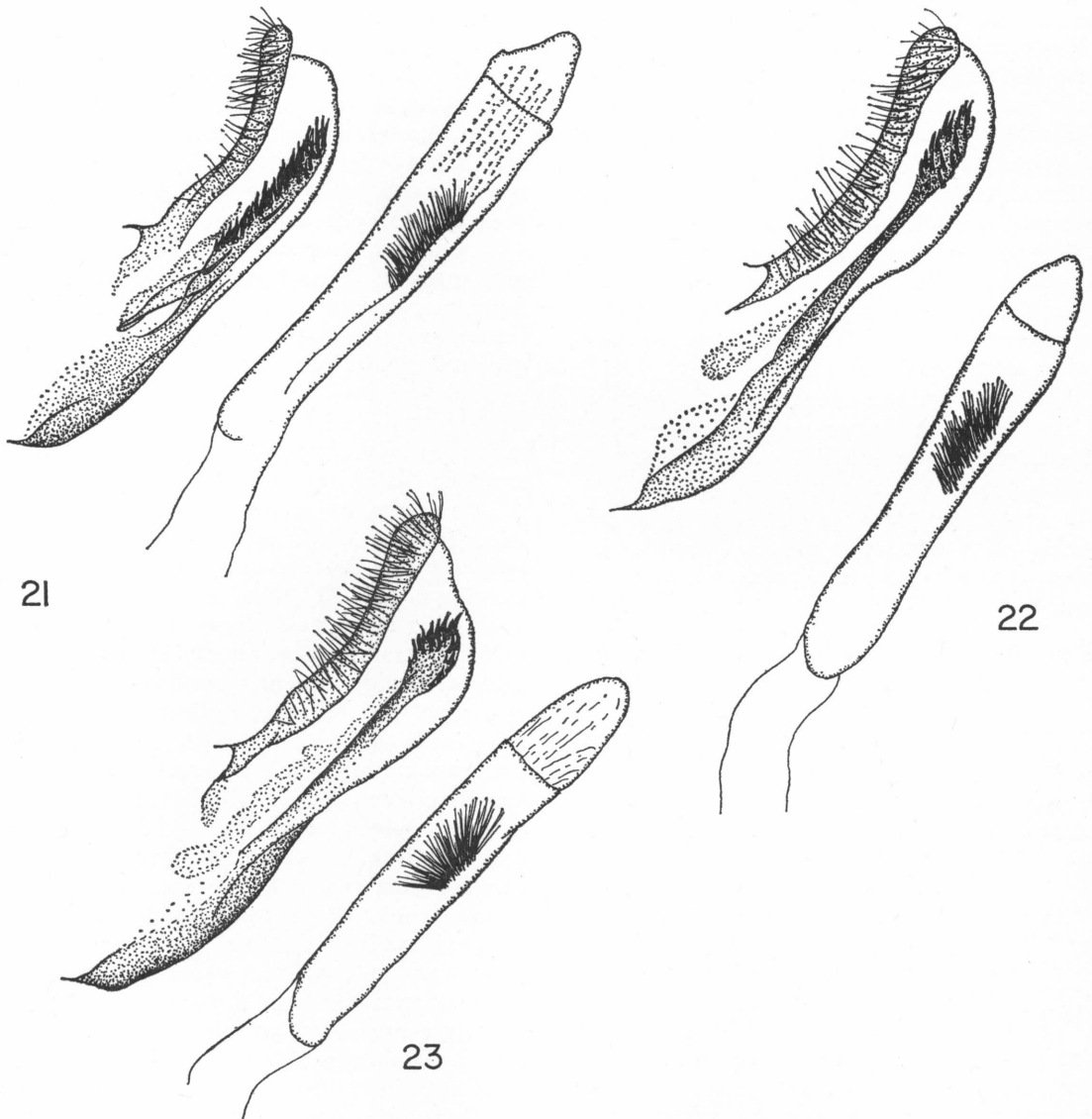
**UNDER SURFACE OF WINGS:** Forewings grayish white, with numerous brownish gray scales, and with costa faintly ochraceous; hind wings whitish gray, with scattered brown scales; without maculation except for small discal spots and narrow terminal line; veins faintly ochraceous.

**LENGTH OF FOREWING:** 13 to 14 mm.

**FEMALE:** Similar to male but with less brown scaling, the wings thus appearing less contrasting in color.

**LENGTH OF FOREWING:** 16 mm.

**MALE GENITALIA:** Similar to those of *in-*



FIGS. 21-23. Male genitalia, showing right valve and aedeagus. 21. *Glana plumosaria* (Packard), Pearl, Rankin County, Mississippi, August 20, 1961 (B. Mather). 22. *G. quinquelinearia* (Packard), Palo Pinto County, Texas, July 12, 1940 (L. H. Bridwell). 23. *G. mcdunnougharia mcdunnougharia* Sperry, paratype, Granite Well, California, May 24, 1939 (G. H. and J. L. Sperry).

*terpunctata*, differing mainly as follows: process of sacculus with spinose area not reaching margin of valve, spinose portion about 0.4 to 0.5 mm. in length; basal portion of valvula with weakly sclerotized area; aedeagus with vesica having an elongate group of fine, deciduous setae.

FEMALE GENITALIA: Sterigma with elon-

gate lateral areas weakly sclerotized, their anterior margins situated in folds, and with median area membranous; ductus bursae elongate, about three times as long as wide, with posterior portion lightly sclerotized; ductus seminalis arising from small sclerotized area at junction of ductus bursae and corpus bursae; corpus bursae slender, with

anterior one-half only slightly wider than remainder, posterior end asymmetrical, with corpus extending to left of junction with ductus bursae; signum with spinose margins, and V-shaped in cross section.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

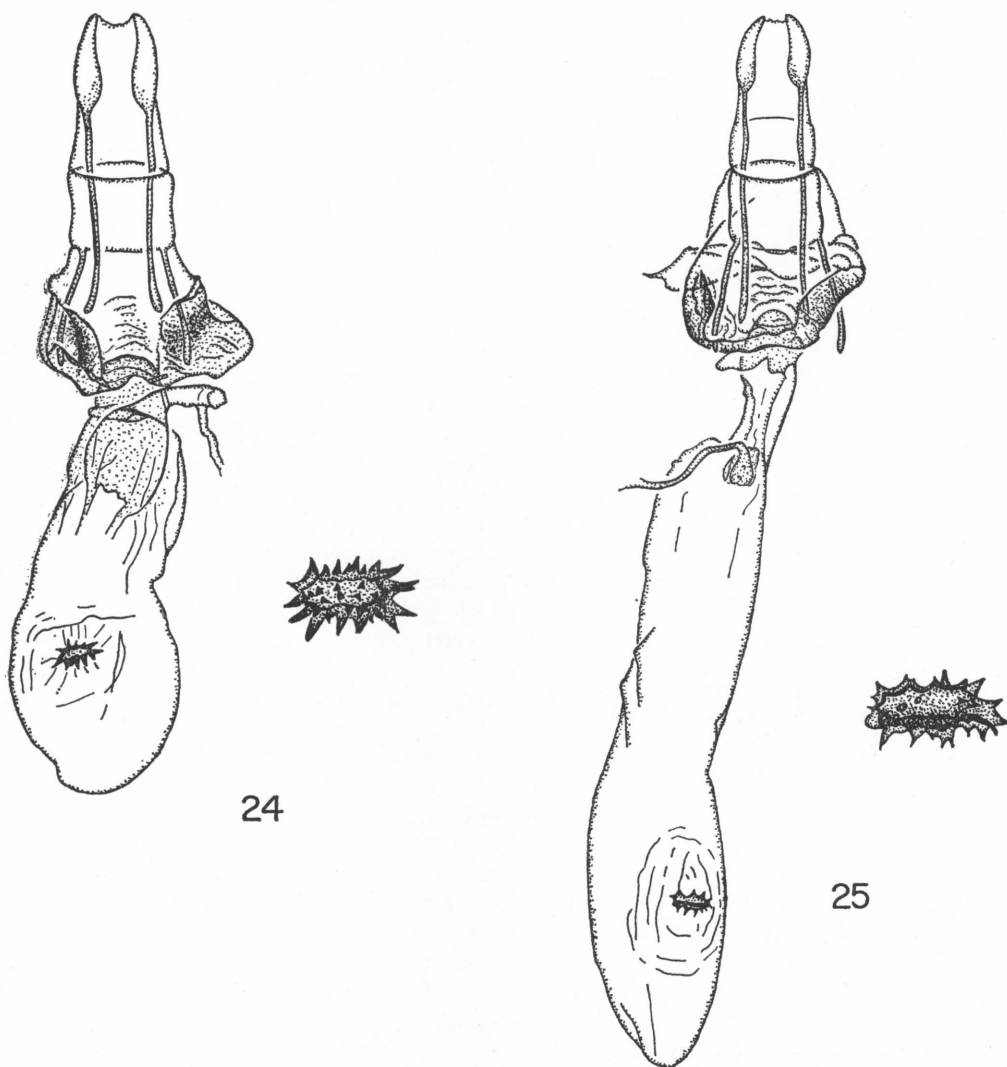
TYPES: Packard described *plumosaria* from two males, but only one of them is in the collection of the Museum of Comparative

Zoölogy. This specimen is hereby designated as the lectotype; it is M.C.Z. No. 14596.

TYPE LOCALITY: Demopolis, Marengo County, Alabama.

RANGE: Mississippi, Alabama, Tennessee, and New Jersey (see fig. 17). The adults have been taken in May, July, and August.

REMARKS: Six specimens (including the lectotype) and four genitalic dissections have been studied. This species, poorly represented



FIGS. 24, 25. Female genitalia, with enlarged view of signum. 24. *Glena interpunctata interpunctata* (Barnes and McDunnough), Prescott, Yavapai County, Arizona, July 21, 1961 (R. F. Sternitzky). 25. *G. plumosaria* (Packard), Norris Dam, Anderson County, Tennessee, May 27, 1938 (J. W. Cadbury).



in most collections, can be recognized by the dark, grayish brown wings, by the fact that the straight t. p. line ends in a hook or curve at the upper end, and by the prominent brown shading distal to the t. p. line.

The male genitalia of this species are similar to those of the preceding species but lack the heavy spine in the aedeagus. The vesica is armed with a deciduous group of fine spines, like those that are found in *nigricaria*, *cribrataria*, and *cognataria*.

The female genitalia are distinctive in having a very long ductus bursae and an asymmetrical posterior end of this structure. The signum is intermediate between that of the flat spinose type and the plainer V-shaped ones.

***Glena quinquelinearia* (Packard)**

Figures 20, 22, 26

*Cymatophora 5-linearia* PACKARD, 1874, p. 51.

*Alcis 5-linearia*: HULST, 1896, p. 345.

*Cymatophora quinque-linearia*: PACKARD, 1876, p. 432, pl. 11, fig. 18 (male).

*Ectropis quinque-linearia*: GUMPPENBERG, 1892, p. 336.

*Cymatophora quinquelinearia*: GROTE, 1882, p. 49.

*Boarmia quinquelinearia*: ANON., 1882, p. 24.

*Alcis quinquelinearia*: DYAR, "1902" [1903], p. 321. SMITH, 1903, p. 76.

*Monroa quinquelinearia*: WARREN, 1904, p. 555. BARNES AND McDUNNOUGH, 1917b, p. 240 (*partim*, not figures).

*Cleora quinquelinearia*: BARNES AND McDUNNOUGH, 1917a, p. 117.

*Glena quinquelinearia*: McDUNNOUGH, 1920, p. 24 (*partim*, not pl. 3, fig. 5); 1938, p. 164; 1945, p. 66. SPERRY, 1952, p. 72, pl. 15 (adults).

*Glena (Glena) quinquelinearia*: FORBES, 1948, p. 55 (*partim*).

This species has a banded abdomen, gray or grayish brown wings, a heavy t. p. line, and the discal dots are present on all the wings above. This taxon is known only from Texas and New Mexico.

**MALE:** Head, vertex white or whitish gray, with narrow band of blackish brown scales between bases of antennae; front brownish black, with narrow band of pale gray scales across bottom; palpi short, attaining front, concolorous with, or slightly paler than, front; antennae with pectinations on inner

side of shaft slightly shorter than those on outer side, with longest pectinations about 1.0 mm. in length. Thorax grayish white above, with scattered grayish brown scales, collar brownish gray, and with anterior end of thorax brown; below paler; legs pale ochraceous white, with anterior part of forelegs darker. Abdomen grayish white above, with scattered grayish brown scales, posterior portions of segments with narrow black and white bands; below paler.

**UPPER SURFACE OF WINGS:** Forewings with ground color grayish white, more or less heavily overlain with brownish gray and brown scales, particularly in basal and outer portions of wing; cross lines moderate to heavy, black; t. a. line extending from cubital vein to inner margin, paralleling costa, shaded inwardly by dark brown or grayish brown band in some specimens; median line weakly represented in most specimens, extending from, or near, cubital vein to inner margin, paralleling t. p. line; discal spot present; t. p. line prominent, extending from vein  $M_1$ , slightly curved to vein  $M_2$ , then going straight to inner margin basal to middle, the line shaded distally by wide, dark brown or brownish gray band; outer portion of wing darker than median area, and bisected by rather nebulous s. t. line; terminal line black, narrow, either complete or obsolescent at veins, and with small intravenular spots; fringe concolorous with wing. Hind wings concolorous with forewings; intradiscal line broad, present in lower portion of wing; discal spot present; extradiscal line similar to t. p. line, extending from vein  $M_1$  to anal margin, and with broad, brown or brownish gray band distally; outer portion of wing similar to that of forewing.

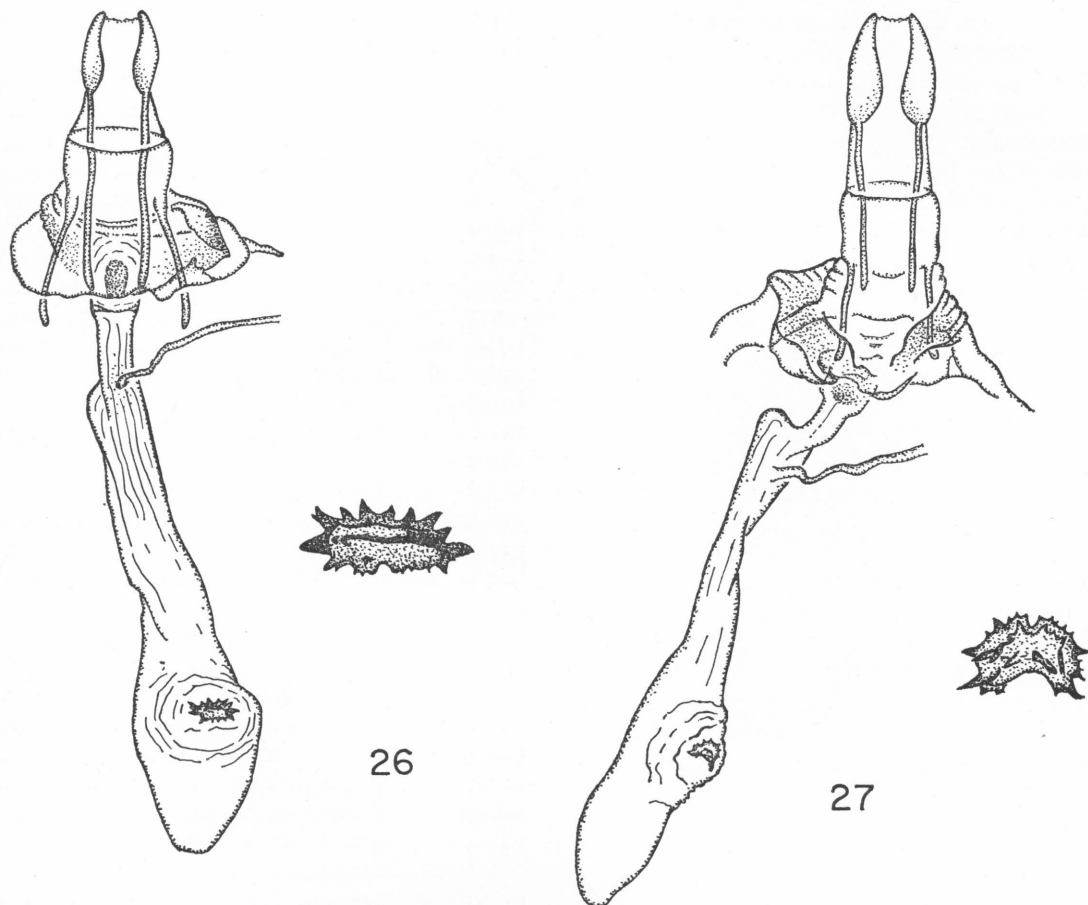
**UNDER SURFACE OF WINGS:** Forewings pale grayish white, with scattered pale brown or pale grayish brown scales, and with faintly ochraceous brown costa; hind wings whitish gray; all wings without maculation except for small discal spots and very narrow terminal line; veins faintly ochraceous.

**LENGTH OF FOREWING:** 12 to 16 mm.

**FEMALE:** Similar to male but with less brown scaling.

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

**MALE GENITALIA:** Similar to those of



FIGS. 26, 27. Female genitalia, with enlarged view of signum. 26. *Glana quinquelinearia* (Packard)' Kerrville, Texas, June 14, 1948 (O. Buchholz). 27. *G. mcdunnougharia mcdunnougharia* Sperry, allotype, Granite Well, California, May 25, 1939 (G. H. and J. L. Sperry).

*plumosaria*, differing mainly as follows: uncus with length of apical portion ranging from about three-tenths to two-fifths of maximum width of base of uncus; process of sacculus long and slender, capitate, with spining on terminal enlargement only, this not extending to margin of valve, spinose portion from 0.2 to 0.3 mm. in length.

**FEMALE GENITALIA:** Similar to those of *plumosaria*, differing mainly as follows: sterigma more heavily sclerotized, and with median area elliptical or oval in outline; ductus seminalis arising from striated area at junction of ductus bursae and corpus bursae; corpus bursae with anterior end gently swollen, and posterior end with longitudinal stri-

ations; signum with posterior side tending to be more strongly dentate than anterior side.

**EARLY STAGES:** Unknown.

**FOOD PLANT:** Unknown.

**TYPES:** Packard described *quinquelinearia* from one male and one female; both are in the Museum of Comparative Zoölogy, and are type No. 14605. The male is hereby designated as the lectotype.

**TYPE LOCALITY:** Texas.

**RANGE:** Texas and New Mexico. This species is found in the Blackland Prairies, the Edwards Plateau, and in the Trans-Pecos area of the former state (see fig. 20). The moths have been taken in March, April, May, June, and July. Records for the occurrence of

this species in Colorado, Arizona, and Ontario are in error (Haight, 1906, p. 96; Barnes and McDunnough, 1917b, p. 240; McDunnough, 1920, p. 24; Forbes, 1948, p. 55).

REMARKS: Thirty-seven specimens (including the lectotype) and seven genitalic dissections have been studied. This species has been misidentified by several workers in the past. It differs from all the preceding species in this revision by the presence of prominent black and white bands on the upper surface of the abdomen; this character, however, is also to be found in the following species. *Glena quinquelinearia* also can be recognized by the lightly gray wings that are heavily overlain with brownish scaling, and by the heavy, straight cross lines.

The male genitalia of *quinquelinearia* are similar to those of *plumosaria* in that both have the deciduous clump of setae in the vesica. The process of the sacculus of the present species is capitate, while in the preceding species it is linear.

The female genitalia of this species are also similar to those of *plumosaria*, differing mainly in the more heavily sclerotized areas of the sterigma.

***Glena mcdunnougharia* Sperry**

*Glena mcdunnougharia* SPERRY, 1952, p. 73, pl. 15 (adults).

This species is closely allied to *quinquelinearia*. It can be identified by the longer pectinations of the male antennae, the paler coloration, and its distribution. This species occurs in two subspecific populations in the southern Rocky Mountains states and southern California.

***Glena mcdunnougharia mcdunnougharia* Sperry**

Figures 23, 27, 28

*Monroa quinquelinearia* auct. nec Packard: BARNES AND MCDUNNOUGH, 1917b, p. 240 (*partim*), pl. 25, fig. 8 (adult).

*Glena quinquelinearia*: MCDUNNOUGH, 1920, p. 24 (*partim*).

*Glena (Glena) quinquelinearia*: FORBES, 1948, p. 55 (*partim*).

*Monroa interpunctata* auct. nec Barnes and McDunnough: BARNES AND MCDUNNOUGH, 1917b, pl. 30, fig. 3 (male genitalia; the captions of figs. 3 and 4 are reversed).

*Glena mcdunnougharia* SPERRY, 1952, p. 73, pl. 15 (adults).

This taxon can be separated from the preceding one by its larger size and its paler coloration. It occurs in the southern Rocky Mountain states and southeastern California.

MALE: Head, vertex white; front blackish brown or grayish black, with narrow white band across top and with broader, white or grayish white area across bottom, the latter occupying one-fifth to one-fourth of front; palpi short, attaining front, paler than front; antennae similar to those of *quinquelinearia* but with longest pectinations from 1.5 to 1.7 mm. in length. Thorax and abdomen similar to those of *quinquelinearia*.

UPPER SURFACE OF WINGS: Forewings with ground color whitish gray, overlain with grayish brown and brown scales, these tending to be concentrated in outer part of wing; cross lines as in *quinquelinearia* but with t. a. line tending to be more heavily shaded basally by brown band, and with distal shade band of t. p. line brown; discal spot present, small; outer portion of wing similar to that of *quinquelinearia*; terminal line prominent, complete, without intravenular dots. Hind wings concolorous with forewings, similar to those of *quinquelinearia*.

UNDER SURFACE OF WINGS: Similar to that of *quinquelinearia* but paler; discal dots absent in most specimens.

LENGTH OF FOREWING: 15 to 18 mm.

FEMALE: Similar to male but with less brown scaling.

LENGTH OF FOREWING: 15 to 19 mm.

MALE GENITALIA: Similar to those of *quinquelinearia*, differing mainly as follows: uncus with apical portion very slender, in length about one-fourth of maximum width of base of uncus; process of sacculus long and slender, capitate, with spinose area 0.2 to 0.4 mm. in length.

FEMALE GENITALIA: Very similar to those of *quinquelinearia*, differing mainly as follows: sterigma slightly larger; corpus bursae with few longitudinal striations posteriorly; signum V-shaped in cross section, posterior margin more or less dentate, anterior margin tending to be slightly concave.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

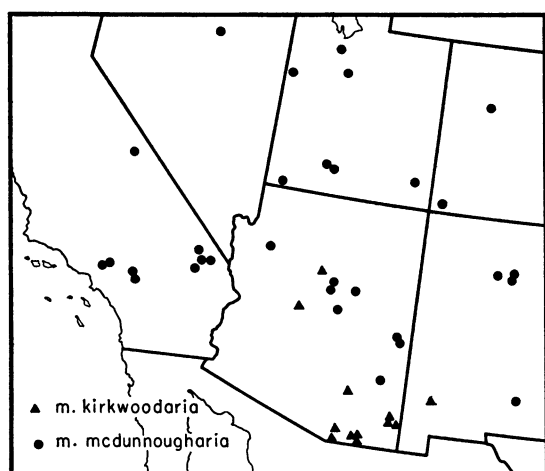


FIG. 28. Distribution of *Glena mcdunnougharia* Sperry.

**TYPES:** The holotype, male, and allotype, female, are in the collection of the American Museum of Natural History. The holotype is the right-hand specimen of the two figured by Sperry with the original description.

**TYPE LOCALITY:** Granite Well, San Bernardino County, California.

**RANGE:** The semi-arid regions of southern California, Nevada, Arizona, Utah, Colorado, and New Mexico (see fig. 28). The adults have been taken from March through August. Notwithstanding the length of the flight period, we do not have enough data from any one locality to tell whether or not this population is single- or double-brooded.

**REMARKS:** Ninety-three specimens (including the type) and 25 genitalic dissections have been studied. *Glena mcdunnougharia* is closely allied to *quinquelinearia*, and the two have been confused in the past. There are a number of differences between these two species, including their distribution. The pectinations of the antennae are about one-half again as long in this species as in the Texas one. The present species is larger, has paler wings, and has a stronger terminal line than are found in *quinquelinearia*.

The male genitalia of *mcdunnougharia* show a very close resemblance to those of *quinquelinearia*. In the present species the apical portion of the uncus tends to be longer and more slender, and the area of spining at the end of the process of the sacculus tends

to be longer than in the Texas species.

The female genitalia are also very much like those of *quinquelinearia*. The differences are outlined above.

Two of Sperry's paratypes are labeled Paradise, Cochise County, Arizona, May 8-15 and May 24-30; they are in the collection of the United States National Museum. The author has examined extensive material from Cochise County, and has not seen any specimens that resemble these two paratypes. It is considered likely that they bear incorrect locality data.

***Glena mcdunnougharia kirkwoodaria*,  
new subspecies**

*Glena quinquelinearia* auct. nec Packard: McDUNNOUGH, 1920, p. 24 (*partim*), pl. 3, fig. 5 (male genitalia).

*Glena (Glena) quinquelinearia*: FORBES, 1948, p. 55 (*partim*).

*Glena interpunctata* auct. nec Barnes and McDunnough: BARNES AND McDUNNOUGH, 1917b, p. 240 (*partim*), pl. 30, fig. 3 (male genitalia). SPERRY, 1952, p. 72, pl. 15 (male and female adults).

*Glena [interpunctata] var. kirkwoodaria* SPERRY, 1952, p. 72, pl. 15.

This subspecies is smaller than typical *mcdunnougharia*, and the upper surface of the wings is grayer and more unicolorous. It is known from Arizona and New Mexico.

**MALE:** Head, vertex white, some specimens with scattered brown or brownish black scales; front dark grayish brown, with narrow white or whitish gray band across top and wider band of same color across bottom; palpi concolorous with, or slightly paler than, front; antennae with longest pectinations about 1.2 mm. in length. Thorax and abdomen similar to those of nominate subspecies; most specimens with banded abdomens, some with banding reduced or absent.

**UPPER SURFACE OF WINGS:** Forewings with ground color whitish gray, lightly overlain with pale brownish gray scales; cross lines as in nominate *mcdunnougharia* but less strongly represented, and with t. a. and t. p. lines only weakly shaded by brownish gray bands, in a few specimens these bands dark brown or blackish brown and prominent; discal spot present, of moderate size; outer portion of wing concolorous with median area, slightly

darkened in some specimens, with s. t. line absent or obsolescent; terminal line black, narrow, interrupted by veins, enlarged into small, intravenular spots in some specimens. Hind wings concolorous with forewings, similar to those of typical subspecies but with cross lines less strongly defined and with very little outer shading to extradiscal line in most specimens.

UNDER SURFACE OF WINGS: Similar to that of nominate subspecies.

LENGTH OF FOREWING: 11 to 16 mm.; holotype, 14 mm.

FEMALE: Similar to male but tending to be slightly darker gray in color and to have maculation slightly less clearly defined.

LENGTH OF FOREWING: 12 to 17 mm.; allotype, 14 mm.

MALE GENITALIA: Very similar to those of nominate *mcduunnougharia*, but tending to be slightly smaller and to have outer portion of valve slightly narrower.

FEMALE GENITALIA: Like those of nominate *mcduunnougharia*.

EARLY STAGES: Unknown.

FOOD PLANT: Unknown.

TYPES: The holotype and allotype of the subspecies *kirkwoodaria* Rindge are the same as those of variety *kirkwoodaria* Sperry. The former is from Madera Canyon, Santa Rita Mountains, Arizona, August 2, 1947 (J. A. Comstock and L. M. Martin); this specimen is in the collection of the American Museum of Natural History, and it is the right-hand specimen of the two figured by Sperry. The allotype is from the same locality but is dated July 19, 1947; it is in the Los Angeles County Museum. The following examples of this subspecies are paratypes: same data as types, various dates in March, April, May, June, July, August, and September, 1947-1962 (J. A. Comstock, W. Hammer, C. Hill, C. W. Kirkwood, L. M. Martin, R. H. Reid), 22 males and 27 females. The paratypes are in the collections of the American Museum of Natural History, the Canadian National Collection, the Los Angeles County Museum, and of C. W. Kirkwood.

RANGE: Central and southern Arizona and

southwestern New Mexico (see fig. 28). The species must have more than one generation per year, as the adults have been taken from March through September.

REMARKS: Three hundred ten specimens and 36 genitalic dissections have been studied. This subspecies can be recognized by its smaller size, and by the more or less unicolorous gray wings with moderately distinct cross lines.

Within this population there is a fair amount of variability. A long series of both males and females have been collected at the Southwestern Research Station of the American Museum of Natural History, 5 miles west of Portal, Cochise County, Arizona, in every month from mid March through mid August. Specimens caught in the spring months tend to be noticeably larger than those taken in June, July, and August. Throughout the year there is considerable variation in the strength and course of the t. p. line, as it varies from being very prominent, with a strong band shading it on the outside, to being completely absent. In most specimens this line is straight or virtually so; in some examples the line is curved.

There may be some confusion regarding the usage of this subspecific name and its author. Sperry, when proposing *kirkwoodaria*, designated it as "var. n."; this is repeated in the caption to plate 15, where the moths are illustrated. In the introductory portion of his article, Sperry refers to this population as a "form"; when discussing the male genitalia he cites it as "sp. n." Apparently there was some doubt in his mind as to the exact status of this population, but it was formally proposed as a variety. The status of an infra-specific name, such as a variety, is that it must rank for purposes of priority from the date and authorship of its elevation. This was decided upon by the Thirteenth International Congress of Zoology at Paris in 1948, and was in effect at the time of Sperry's publication of the varietal name. Therefore this name must date from the publication of the present revisionary paper, with Rindge as the author.

LIST OF THE NEARCTIC SPECIES OF THE GENUS *GLENA*  
WITH THEIR KNOWN DISTRIBUTION

(Synonymic names are indented below valid names.)

GROUP I

- |  |                                |
|--|--------------------------------|
| 1. <i>grisearia</i> (Grote)              | Arizona, New Mexico, Chihuahua |
| <i>pexata</i> (Swett)                    |                                |
| 2a. <i>furfuraria furfuraria</i> (Hulst) | Colorado, New Mexico, Texas    |
| <i>alpinata</i> Cassino                  |                                |
| b. <i>furfuraria minor</i> Sperry        | Texas, Oklahoma                |

GROUP II

- |  |                             |
|--|-----------------------------|
| 3. <i>arcana</i> Rindge                      | Arizona, New Mexico         |
| <i>furfuraria</i> auct.                      |                             |
| 4. <i>nigricaria</i> (Barnes and McDunnough) | Western North America, from |
| <i>rusticaria</i> (Barnes and                | British Columbia to         |
| McDunnough)                                  | Morelos                     |
| 5. <i>cribrataria</i> (Guenée)               | Eastern North America, from |
| <i>fuliginaria</i> (Hulst)                   | Minnesota and Ontario to    |
|  | Florida and Mississippi     |
| 6. <i>cognataria</i> (Hübner)                | Eastern North America, from |
| <i>acidaliaria</i> (Walker)                  | Nova Scotia to Florida      |
| <i>infixaria</i> (Walker)                    |                             |
| <i>crassata</i> (Hulst)                      |                             |
| <i>muricolor</i> (Hulst)                     |                             |
| <i>umatillaria</i> (Strecker)                |                             |
| <i>insaria</i> (Dyar)                        |                             |

GROUP III

- |   |                              |
|---|------------------------------|
| 7a. <i>interpunctata interpunctata</i>    | Arizona, New Mexico, Texas   |
| (Barnes and McDunnough)                   |                              |
| <i>quinquelinearia</i> auct.              |                              |
| b. <i>interpunctata thomasaria</i> Sperry | Arizona, Utah, Colorado,     |
| <i>quinquelinearia</i> auct.              | New Mexico, Wyoming          |
| 8. <i>zweifeli</i> , new species          | Coahuila                     |
| 9. <i>plumosaria</i> (Packard)            | Mississippi, Alabama,        |
|   | Tennessee, New Jersey        |
| 10. <i>quinquelinearia</i> (Packard)      | Texas, New Mexico            |
| 11a. <i>mcdunnougharia mcdunnougharia</i> | California, Nevada, Arizona, |
| Sperry                                    | Utah, Colorado, New Mexico   |
| <i>quinquelinearia</i> auct.              |                              |
| <i>interpunctata</i> auct.                |                              |
| b. <i>mcdunnougharia kirkwoodaria</i> ,   | Arizona, New Mexico          |
| new subspecies                            |                              |
| <i>quinquelinearia</i> auct.              |                              |
| <i>interpunctata</i> auct.                |                              |



## BIBLIOGRAPHY

- ANON.  
1882. Check list of the Macro-Lepidoptera of America, north of Mexico. Brooklyn, Brooklyn Entomological Society, iv+25 pp.
- BARNES, WILLIAM, AND J. H. McDUNNOUGH  
1913. New N. Am. Lepidoptera with notes on described species. Contributions to the natural history of the Lepidoptera of North America. Decatur, Illinois, the Review Press, vol. 2, pp. 93-164, pls. 1-9.  
1916. Synonymic notes on North American Heterocera. *Op. cit.* Decatur, Illinois, the Review Press, vol. 3, pp. 156-211, pls. 12-15.  
1917a. Check list of the Lepidoptera of boreal America. Decatur, Illinois, Herald Press, viii+392 pp.  
1917b. New species and varieties of Geometridae. Contributions to the natural history of the Lepidoptera of North America. Decatur, Illinois, the Review Press, vol. 3, pp. 213-298, pls. 16-33.
- BEUTENMÜLLER, WILLIAM  
1890. Catalogue of Lepidoptera found within fifty miles of New York City with their food plants. Ann. New York Acad. Sci., vol. 5, pp. 199-230.  
1892. List of types of Lepidoptera in the Edwards collection of insects. Bull. Amer. Mus. Nat. Hist., vol. 4, pp. 167-198.
- BLACKMORE, E. H.  
1927. Check-list of the Macrolepidoptera of British Columbia. Victoria, British Columbia, Provincial Museum of Natural History, 47 pp.
- BOISDUVAL, [J. B. A. D. DE], AND [A.] GUENÉE  
1958. Histoire naturelle des insectes. Species général des lépidoptères. Uranides, phalénites, siculides. Paris, atlas, pp. 1-6, 1-4, pls. 1, 1-22, 1.
- CASSINO, SAMUEL E.  
1927. New geometrids. The Lepidopterist, vol. 4, pp. 73-80.
- COMSTOCK, JOHN ADAMS  
1956. The larva of *Stenoporpia grisearia* (Grt.) (Lepidoptera: Geometridae). Bull. Southern California Acad. Sci., vol. 55, pp. 116-117.
- DARLINGTON, EMLÉN P.  
1952. Notes on blueberry Lepidoptera in New Jersey. Trans. Amer. Ent. Soc., vol. 78, pp. 33-57.
- DYAR, HARRISON G.  
"1902" [1903]. A list of North American Lepidoptera and key to the literature of this order of insects. Bull. U. S. Natl. Mus., no. 52, xix+723 pp.  
1909. New species of American Lepidoptera. Proc. Ent. Soc. Washington, vol. 11, pp. 19-29.
- FERGUSON, D. C.  
1954. The Lepidoptera of Nova Scotia. Proc. Nova Scotian Inst. Sci., vol. 23, pp. 161-375, 16 pls.
- FORBES, WILLIAM T. M.  
1928. Order Lepidoptera. In Leonard, Mortimer Demarest, A list of the insects of New York with a list of the spiders and certain other allied groups. Mem. Cornell Univ. Agr. Exp. Sta., no. 101, pp. 532-687.  
1948. Lepidoptera of New York and neighboring states. Part II. *Ibid.*, no. 274, 263 pp., 255 figs.
- GROSSBECK, JOHN A.  
1917. Insects of Florida. IV. Lepidoptera. Bull. Amer. Mus. Nat. Hist., vol. 37, pp. 1-147.
- GROTE, AUG. R.  
1882. New check list of North American moths. New York, 74 pp.  
1883. New species and notes on structure of moths and genera. Canadian Ent., vol. 15, pp. 121-133.
- GUENÉE, A.  
1857. Histoire naturelle des insectes. Species général des lépidoptères. Paris, vol. 9, lvi+514 pp.
- GUMPPENBERG, C. FREIH. V.  
1892. Systema geometrarum zonae temperatioris septentrionalis. Fünfter Teil. Nova Acta Deutschen Akad. Naturf., Halle, vol. 58, no. 4, pp. 223-359.
- HAIGHT, D. H.  
1906. Noctuid and geometrid moths taken at Temagami Lake. Canadian Ent., vol. 38, pp. 94-96.
- HEMMING, FRANCIS  
1937. Hübner. London, Royal Entomological Society of London, vol. 1, pp. v-xxxiv, 1-605.
- HÜBNER, JACOB  
"1825" [1824-1831]. Beiträge zur Sammlung exotischer Schmettlinge [sic]. Augsburg, Drittes hundert, 48 pp., figs. 401-600.
- HULST, GEO. D.  
1888a. New species of Geometridae. (No. 4). Ent. Amer., vol. 3, pp. 213-217.

- 1888b. Notes on Geometridae. No. 4. *Ibid.*, vol. 4, pp. 49-51.
1896. A classification of the Geometrina of North America, with descriptions of new genera and species. *Trans. Amer. Ent. Soc.*, vol. 23, pp. 245-386, pls. 10, 11.
- JONES, FRANK MORTON, AND CHARLES P. KIMBALL  
1943. The Lepidoptera of Nantucket and Marthas Vineyard Islands, Massachusetts. *Publ. Nantucket Maria Mitchell Assoc.*, vol. 4, 217 pp.
- JONES, J. R. J. LLEWELLYN  
1951. An annotated check list of the Macrolepidoptera of British Columbia. *Occas. Paper Ent. Soc. British Columbia*, no. 1, v+iii+148 pp.
- KIMBALL, CHARLES P.  
1939. The Lepidoptera of Nantucket. *Publ. Nantucket Maria Mitchell Assoc.*, vol. 3, no. 3, pp. 1-53.
- KIRKWOOD, CARL W.  
"1957" [1958]. The status of two geometrid names. *Bull. Southern California Acad. Sci.*, vol. 56, pp. 167-168, pl. 37.
- MCDUNNOUGH, J.  
1920. Studies in North American Cleorini (Geometridae). *Dominion of Canada, Dept. Agr., Ent. Branch, Tech. Bull.*, no. 18, pp. 1-64, pls. I-XI.
1927. The Lepidoptera of the Seton Lake region, British Columbia. *Canadian Ent.*, vol. 59, pp. 266-277.
1938. Check list of the Lepidoptera of Canada and the United States of America. *Mem. Southern California Acad. Sci.*, vol. 1, pp. 1-275.
1945. Results from an examination of geometrid types in the Cambridge Museum of Comparative Zoölogy. *Canadian Ent.*, vol. 77, pp. 62-68.
- MOORE, SHERMAN  
1955. An annotated list of the moths of Michigan exclusive of Tineoidea (Lepidoptera). *Misc. Publs. Mus. Zool., Univ. Michigan*, no. 88, pp. 1-87.
- MORRIS, JOHN G.  
1860. Catalogue of the described Lepidoptera of North America. Washington, D. C., Smithsonian Institution, viii+68 pp.
- PACKARD, A. S., JR.  
1874. Descriptions of new North American Phalaenidae. *Sixth Rept. Peabody Acad. Sci.*, pp. 39-53.
1876. A monograph of the geometrid moths or Phalaenidae of the United States. *In* Hayden, F. V., Report of the United States Geological Survey of the territories. Washington, vol. 10, 607 pp., 12 pls.
1890. Insects injurious to forest and shade trees. *Fifth Rept. U. S. Ent. Comm.*, viii+957 pp., 40 pls.
- PROCTER, WILLIAM  
1938. Biological survey of the Mount Desert region. Part VI. The insect fauna. Philadelphia, Wistar Institute of Anatomy and Biology, 496 pp.
1946. Biological survey of the Mount Desert region. Part VII. Philadelphia, Wistar Institute of Anatomy and Biology, 566 pp.
- RINDGE, FREDERICK H.  
1955. The type material in the J. B. Smith and G. D. Hulst collections of Lepidoptera in the American Museum of Natural History. *Bull. Amer. Mus. Nat. Hist.*, vol. 106, pp. 91-172.
1956. Descriptions of and notes on North American Geometridae (Lepidoptera). *Amer. Mus. Novitates*, no. 1784, pp. 1-19, figs. 1-19.
- 1958a. Descriptions of and notes on North American Geometridae (Lepidoptera), no. 2. *Ibid.*, no. 1872, pp. 1-23, figs. 1-29.
- 1958b. Descriptions of and notes on North American Geometridae (Lepidoptera), no. 3. *Ibid.*, no. 1910, pp. 1-24, figs. 1-26.
- SMITH, JOHN B.  
1890. Catalogue of insects found in New Jersey. *In* Final Report of the State Geologist. Trenton, New Jersey, vol. 2, pt. 2, pp. 1-486.
1891. List of the Lepidoptera of boreal America. Philadelphia, American Entomological Society, v+124 pp.
1903. Check list of the Lepidoptera of boreal America. Philadelphia, American Entomological Society, v+136 pp.
1909. A report of the insects of New Jersey. *Ann. Rept. New Jersey State Mus.*, for 1909, 888 pp., 340 figs.
- SPERRY, JOHN L.  
1952. Notes on the genus *Glena* Hulst and descriptions of new species. *Bull. Southern California Acad. Sci.*, vol. 51, pp. 71-78, pl. 15.
- STRECKER, HERMAN  
1899. Lepidoptera, Rhopaloceres and Heteroceres, indigenous and exotic. Reading, Pennsylvania, suppl. 2, 11 pp.

SWETT, LOUIS W.

1907. Geometrid notes. Jour. New York Ent. Soc., vol. 15, pp. 53-54.

WALKER, FRANCIS

1860. List of the specimens of lepidopterous insects in the collection of the British Museum. Geometrites. London, pt. 21, pp. 277-498.

1862. List of the specimens of lepidopterous insects in the collection of the British Museum. Geometrites. London, pt. 26, pp. 1479-1796.

WARREN, WILLIAM

1904. New American Thyrididae, Uraniidae, and Geometridae. Novitates Zool., vol. 11, pp. 493-582.









