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ABSTRACT

The genus *Gabriola* Taylor is revised, and re-descriptions are given for the genus and the four presently included species. Two new species and four new subspecies are described. Keys and photographs are presented for all species and their genitalia. The genus is restricted in its distribution to western North America, extending from southern Alaska and British Columbia through the western United States to Durango, Mexico. Relationships with other genera in the Nacophorini are discussed.

INTRODUCTION

I have revised the nominate section of the Nacophorini, including the genera *Betulodes* Thierry-Mieg, *Phaeoura* Hulst, *Thyriniteina* Möschler, and *Holochroa* Hulst (Rindge, 1961). Of these, only *Betulodes* does not occur in North America north of Mexico; *Thyriniteina* is mainly tropical in its distribution, but one species does occur in southern Texas. At a later date I revised the members of this tribe from the Andes, with the majority of species being found in the cool and cold temperate regions of southern South America (Rindge, 1971; 1973); this group forms a different section of the tribe from that covered by my 1961 paper. The knowledge gained from studying the Andean species, with the variety and variability of the characters in the included genera, led me to reexamine some of our North American genera, including *Gabriola* Taylor. I now believe that this genus should be included in the Nacophorini. The purpose of the present paper is to revise *Gabriola* on the specific level and to discuss placement of the genus within this tribe.

The most noticeable differences between the characters of *Gabriola* and of the nominate section of the tribe are to be found in the male antennae and the hind legs. The species that are included in the other genera of the North American Nacophorini have male antennae in which the pectinations extend to the end of this structure, and each pectination has a strong apical seta; in *Gabriola* the terminal one-fourth of the antennae is simple, and the strong apical seta is

absent. Additional differences are to be found in the wings. They are of equal size in the two sexes of *Gabriola*, whereas in the other genera the females have larger and more elongate wings than do the males. In the forewings of *Gabriola* veins Sc and R₁ are not connected and there is no areole; in the other genera the two veins are connected and an areole is present. There is also a difference in the position of vein Cu₁ of the forewings; in *Gabriola* its origin is at the lower angle of the cell but in the other genera it arises from below the lower angle.

The genitalia of *Gabriola* fit the tribal description much better than do the above characters. In the male structures the gnathos is well sclerotized, and in some species the median process is shortly spinose; the pair of lateral processes are simple and tapering. In the females there appears to be a different point of attachment to the ovipositor lobes, as the apophyses posteriores are attached anteriorly. The female genitalia of the different species of *Gabriola* are so similar to one another that it has proved impractical to present a meaningful key based on these structures.

Based on the characters discussed above it appears that *Gabriola* is not particularly closely allied to the nominate section of the Nacophorini; instead, it fits in better with the other section. The second part of the tribe has heretofore been known only from Venezuela to southern Chile and Argentina; it has not been reported from either Central or North America. However, *Gabriola* does not appear to be particularly closely related to any of the genera included in that section. I have already pointed out (Rindge, 1971, p. 309) that there does not appear to be any clear-cut pattern of primitive or advanced forms in this section, and so the relationships of *Gabriola* to the other seven included genera is not easily defined.

During the course of this study I have examined 1106 specimens, including the primary types of all the described species. In addition, I have studied 76 genitalic dissections (53 males and 23 females); all but 11 of these were prepared by me. I also made 57 slides (36 males and 21 females) of antennae and legs, including speci-

mens of both sexes from every named population.

More than half of the specimens studied are in two collections: the American Museum of Natural History with 328, and the Natural History Museum of Los Angeles County with 310. The next largest collection is in the California Academy of Sciences with 98 moths.

All the photographs in this revision were taken by the author. Whenever possible, material from the collection of the American Museum of Natural History was used. Some of the adults and genitalia are from other collections and this is specifically noted. The following abbreviations have been used:

AMNH, the American Museum of Natural History
CNC, Canadian National Collection, Ottawa
LAM, Natural History Museum of Los Angeles County
USNM, National Museum of Natural History, Smithsonian Institution

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GENUS *GABRIOLA* TAYLOR

Gabriola Taylor, 1904, p. 255. Barnes and McDunnough, 1917, p. 119. McDunnough, 1938, p. 166; 1945, p. 101.

Diagnosis. Distinguished by the antennae of the male having the terminal one-fourth simple,

by the lack of an elongate terminal seta on each pectination, by antennae of the female being simple or feebly serrate, and by the presence of two pairs of spurs on the hind tibia of both sexes. The male genitalia are recognized by the simple, elongate valves and by the prominent, posteriorly curving, pointed lateral processes of the anellus. The female genitalia have the ductus bursae about twice as long as wide and an elongate tubular corpus bursae without a signum.

Adult. Head, tongue absent; palpi short, just attaining front; antennae of from 42 to 61 segments, male with terminal 10 to 18 segments simple, each pectination without long terminal seta, being from 6.5 to 9.0 times as long as basal segment, female with simple or feebly serrate antennae, without paired terminal setae on segments. Thorax above with large posterior tuft of scales; fore tibia with process of male arising just basad of middle, in female more basad of center, in both extending to end of segment only; hind tibia with two pairs of spurs. Abdomen with prominent dorsal tufts. Forewings relatively short and broad, alike in both sexes; without areole, Sc and R_1 not connected, R_{1+2} stalked or separate, Cu_1 from lower angle. Hind wings broad, outer margin smoothly rounded to weakly concave between veins; Sc approximate to R for about one-half length of cell; R and M_1 from before, at, or after upper angle; Cu_1 from near lower angle and M_3 .

Upper surface of forewings various shades of gray, grayish brown, pale or dark brown, with median area often paler; cross lines prominent, black, complete, very similar in course in each species; hind wings paler than forewings, with indistinct maculation. Under surface gray or grayish brown, with reduced maculation.

Male Genitalia. Gnathos well sclerotized, each side slightly tapering ventrally, with small median enlargement; valves simple; anellus with pair of lateral, posteriorly curving processes; juxta with posteromedian projection; aedeagus a simple tube; vesica, when exerted, extending at obtuse angle to aedeagus, with area of longitudinal, sclerotized striations or with row of small spines.

Female Genitalia. Ovipositor lobes with apophyses attached to membranous anterior portion; sterigma membranous or weakly sclerotized, scarcely differentiated; ductus bursae sclerotized,

longer than wide; ductus seminalis arising mid-ventrally at posterior end of corpus bursae; corpus bursae a simple, membranous, elongate structure; signum absent.

Early Stages. The caterpillar of one species (*dyari* Taylor) has been described (Sugden, 1968).

Food Plants. The one species that has been reared appears to be a general feeder on conifers (Sugden, *op. cit.*).

Type Species. *Gabriola dyari* Taylor; by original designation and sole included species.

Distribution. Western North America, from southern Alaska and British Columbia to Arizona and California, and south into the Mexican state of Durango.

Remarks. This genus does not appear to be particularly closely related to the other North American Nacophorini; see Introduction.

KEY TO SPECIES
BASED ON EXTERNAL CHARACTERS
AND DISTRIBUTION

- 1. Forewings with upper surface pale brown 2
 - Forewings with upper surface dark brown, grayish brown, or gray 3
- 2(1). Upper surface of forewings with t. a. line evenly curved, and with t. p. line more or less smoothly S-shaped; coastal California *dyari pruina*
 - Upper surface of forewings with t. a. line biangulate, and with t. p. line tending to be outwardly dentate on veins; Durango *tenuis*
- 3(1). Forewings with upper surface dark brown; coastal area, southern Alaska to California 4
 - Forewings with upper surface grayish brown or gray; Sierra, Cascade, and Rocky Mountain chains 5
- 4(3). Forewings with upper surface tending to be dark brown or blackish brown; antennae of male with from 44 to 50 segments, of female with from 46 to 51 segments *dyari dyari*
 - Forewings with upper surface medium brown; antennae of male with from 49 to 61 segments, of females with from 54 to 57 segments *sierrae baliola*
- 5(3). Forewings usually with contrasting white tornal area; Sierra, Cascade, and north-

- ern Rocky Mountains 6
 - Forewings without contrasting white tornal area; southern Rocky Mountains . . 8
- 6(5). Antennae of male with from 44 to 50 segments, having 31 to 37 pectinate and from 10 to 14 terminal nonpectinate segments; female antennae with from 46 to 51 segments; eastern British Columbia, northern Rocky Mountains, south to eastern Oregon . . *dyari bakeri*
 - Antennae of male with from 50 to 61 segments, having 37 to 47 pectinate and from 11 to 14 terminal nonpectinate segments; female antennae with from 54 to 57 segments; California 7
- 7(6). Forewings with median area pale gray, contrasting with basal and outer areas; Sierra and Cascade mountains
 - *sierrae sierrae*
 - Forewings with median area heavily suffused with dark gray scales, scarcely contrasting with basal and outer areas; mountains of southern California
 - *sierrae australis*
- 8(5). Forewings with upper surface dark gray; t. a. line without broad basal shade band *minima*
 - Forewings with upper surface pale gray to grayish brown; t. a. line with broad (1 mm. wide) basal shade band 9
- 9(8). Forewings with upper surface pale gray; t. a. line with broad black shade band *minor*
 - Forewings with upper surface grayish brown; t. a. line with broad dark brown shade band *regularia*

BASED ON MALE GENITALIA

- 1. Aedeagus very slender, 0.12 to 0.15 mm. in width *tenuis*
 - Aedeagus broader, 0.25 to 0.35 mm. in width 2
- 2(1). Gnathos with apex of median enlargement broadly U-shaped or truncate, 0.17 to 0.25 mm. in width 3
 - Gnathos with apex tapering to blunt point 4
- 3(2). Uncus triangular, with small convex area on each side above base; sacculus reduced, rounded *minor*
 - Uncus triangular, with more or less straight or concave sides above base; sacculus well developed, biangulate . . . *regularia*

- 4(2). Aedeagus 1.2 to 1.4 mm. in length; uncus with width of base 0.40 to 0.45 mm., and with apical portion slightly constricted medially *dyari*
 Aedeagus 1.5 to 1.8 mm. in length; uncus with width of base 0.50 to 0.55 mm., and apical portion not constricted medially 5
 5(4). Vesica with row of small, slender spines *sierrae*
 Vesica without spines *minima*

Gabriola dyari Taylor

Gabriola dyari Taylor, 1904, p. 256.

Diagnosis. Antennae of the male have from 44 to 50 segments, with 31 to 37 pectinate and from 10 to 14 terminal, nonpectinate ones; of the female, from 46 to 51 segments. The upper surface of the forewings varies from pale ochre, dark brown, or grayish brown, with the tornal area more or less broadly white in most populations.

Males. Head with vertex and front with mixture of grayish white, dark gray, and dark brown scales; palpi grayish brown, with terminal segment more or less grayish white; antennae with average of 46.1 (range, 44 to 50) segments, 33.6 (31 to 37) pectinate and terminal 12.5 (10 to 14) segments simple, with average length of longest pectination 1.4 mm. (1.2 to 1.5 mm.). Thorax above pale gray to grayish brown, collar black distally, patagia with indistinct median cross band, posterior tuft with scales darkened apically; below pale gray or gray; legs with outer surfaces grayish black to black, banded with grayish white, tarsi with ends of segments narrowly grayish white, and hind tibia with upper pair of spurs equal in size to lower pair. Abdomen above with mixture of grayish white and dark brown scales, tufts grayish white basally, becoming blackish brown distally; below mostly grayish white.

Upper Surface of Wings. Forewings variable in color, pale brown to blackish brown, dark brown, blackish gray or dark gray; median area tending to be slightly paler; tornal area in most specimens more or less broadly suffused with grayish white; cross lines black, prominent; t. a. line arising on costa one-third distance from base, weakly curving across wing; median line absent;

discal dot small, obsolescent, or absent; t. p. line arising on costa two-thirds distance from base, curved or angled outwardly to middle of cell, then swinging basally in large arc to anal vein, proceeding at right angle to inner margin; subterminal area in lower portion of wing broadly suffused with black or grayish black scales; s. t. line white or grayish white in most specimens, appearing as elongate spot on costa before apex and as prominent linear to rounded blotch above tornus; terminal line black or grayish black, interrupted by veins; fringe concolorous with wing. Hind wings grayish white to gray, variably suffused with dark gray, grayish brown and grayish black scales; maculation obsolescent; faint discal dot present; intradiscal line weakly suggested in some specimens; extradiscal band nebulous, rather broad and incomplete; terminal line complete; fringe concolorous with wing, with narrow, pale line along base.

Under Surface of Wings. Forewings pale to dark gray, variably spotted or striate with grayish white or gray scales; hind wings grayish white, variably suffused with dark gray and grayish brown scales; maculation of upper surface faintly indicated on all wings.

Length of Forewing. 11 to 16 mm.

Female. Similar to male but larger; antennae with from 46 to 51 segments.

Length of Forewing. 12 to 16 mm.

Male Genitalia. Uncus with slender angulate base, 0.40 to 0.45 mm. in width, with apical portion slightly constricted medially; gnathos tapering to blunt point, medially flattened and with weak posterior ridge; valves with each apex bluntly rounded, sacculus sclerotized, angular, with distal constriction, and having sclerotized band extending posteriorly near base of valve; anellus elongate, with raised ridge around anterior end, posteriorly tapering to blunt point near gnathos; each lateral process with base 0.25 mm. wide, tapering and curving posteriorly to pointed apex, with margins varying from smooth to irregular; aedeagus 1.2 to 1.4 mm. in length and 0.3 mm. in width; vesica with a few small spines.

Female Genitalia. Sterigma membranous; ductus bursae longer than wide, 0.5 mm. in length, variable in width and shape, anterolateral portions appearing more heavily sclerotized than remainder of ductus bursae; corpus bursae up to

2.7 mm. in length; apophyses posteriores 1.1 to 2.0 mm. in length.

Early Stages. The mature larva has been described by Sugden (1968); two color phases are reported, one being creamy buff marked with brown and black, the other similar but lacking the black markings and with dull orange replacing the brown.

Food Plants. This species is apparently a more or less general feeder on conifers, as various species of *Tsuga*, *Pseudotsuga*, *Abies*, *Thuja*, *Picea*, *Pinus*, and *Larix* have been reported as hosts (McDunnough, 1945; Prentice, 1963; Sugden, 1968).

Distribution. From southern Alaska, coastal and interior British Columbia, south to central California along the coast, and in Idaho, Montana, eastern Washington, and eastern Oregon.

Remarks. This species occurs in three named subspecies. One, with dark brown wings, extends along the coastal plains from southern Alaska to central California. A second has pale brown wings, occurs in the Monterey area of California, and looks like the species found in the mountains of Durango. The third has gray wings, flies in the interior mountains of British Columbia, Idaho, Montana, eastern Washington, and eastern Oregon, and looks very similar to *sierrae* McDunnough.

Gabriola dyari dyari Taylor

Figures 1, 2, 9, 11, 13

Gabriola dyari Taylor, 1904, p. 256. Barnes and McDunnough, 1917, p. 119 (*partim*). Blackmore, 1919, p. T13, pl. II (male). McDunnough, 1938, p. 166 (*partim*); 1945, p. 101 (*partim*). Prentice, 1963, p. 470, fig. 296 (distribution in Canada; *partim*). Sugden, 1968, p. 27 (*partim*).

Diagnosis. The upper surface of the forewings varies from dark brown to blackish brown; the tornal area may be either strongly marked with a broad whitish patch or reduced to a narrow, inconspicuous ochreous dash.

Male. Forewings with upper surface dark brown to blackish brown; basal area lightly suffused with grayish white or pale brown scales in some specimens; median area varying from slightly paler to being concolorous with adjacent areas; s. t. line usually present on costa either as

large prominent whitish tornal patch or narrow pale brown dash. Hind wings gray, suffused with dark gray and grayish brown scales. Under surface of forewings dark gray to brown, sparsely marked with gray scales; hind wings grayish white, heavily suffused with darker scales.

Length of Forewing. 12 to 14 mm.

Female. Similar to male but with upper surface of forewings more variable in color, being concolorous with males to dark grayish brown or grayish black, and with median area concolorous with remainder of wing to contrastingly pale gray.

Length of Forewing. 14 to 16 mm.

Male Genitalia. As described for the species.

Female Genitalia. As described for the species.

Early Stages. Sugden (1968) described the larva; whether his description was based on this subspecific population or the one found in interior British Columbia, or both, is not known.

Food Plants. Coniferous trees of seven genera have been listed as hosts for the species (McDunnough, 1945; Prentice, 1963; Sugden, 1968). How many of these pertain to this subspecies is not known; I have examined specimens reared from *Tsuga*, *Pseudotsuga*, and *Thuja* in the Canadian National Collection.

Types. Taylor described *dyari* "from four male specimens in my own collection." Three are labeled as cotypes and are in the collections of the American Museum of Natural History, the Canadian National collection, and the National Museum of Natural History. The moth bearing Taylor's type label is in the last institution; it is hereby designated as the lectotype. Its genitalia are mounted on slide HWC 377.

Type Locality. Gabriola Island, opposite Nanaimo, British Columbia.

Distribution. This subspecies occurs along the coastal regions of southern Alaska and British Columbia, south through Washington and Oregon into central California, with San Mateo County being the southernmost record known to me. For British Columbia localities, see Prentice, 1963, page 470, figure 296 (*partim*); for those from Washington, Oregon, and California, see my figure 13. This subspecies occupies the coastal plains and western slopes of the bordering mountains.

Flight Period. April through November in California; June through October in Oregon; June, July, and August in Washington and British Columbia.

Remarks. One hundred fifty-six specimens (146 males and 10 females) and 14 genitalic dissections (12 males and two females) have been studied, including the type and its genitalia.

Specimens from California, especially in Marin and Sonoma counties, tend to have the white s. t. area and tornal spot reduced or obsolescent.

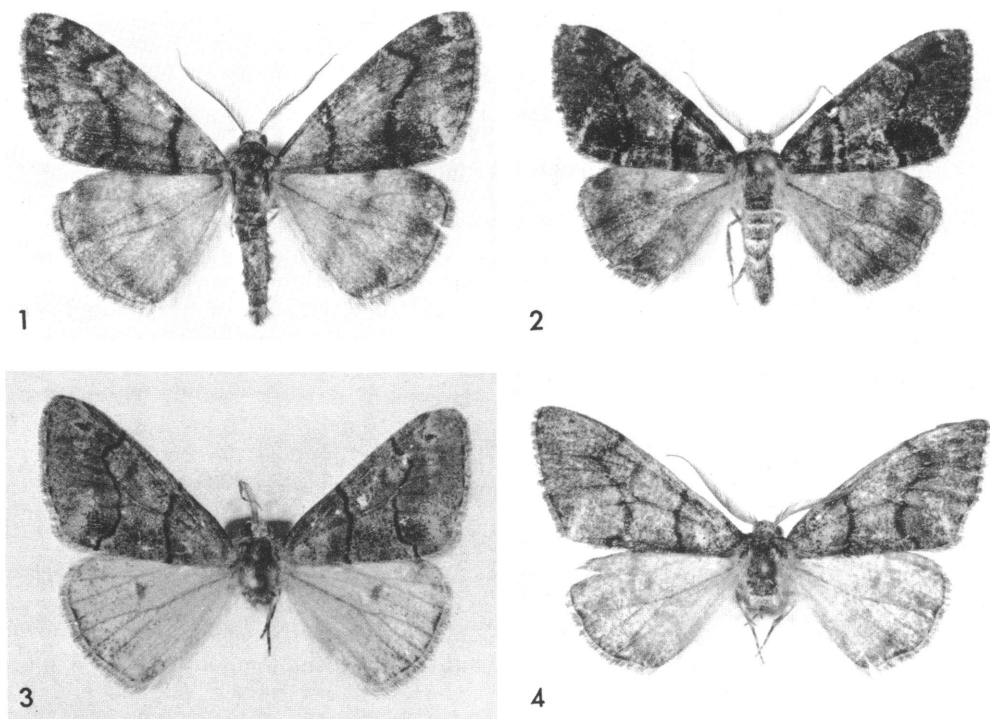
***Gabriola dyari pruina*, new subspecies**

Figures 3, 13

Diagnosis. The upper surface of the forewings is pale brown or light grayish brown, as compared with the deep brown or brownish black of

nominate *dyari* or the dark gray of the following subspecies.

Male. Head, thorax, and abdomen paler than those of nominate *dyari*. Forewings with upper surface pale gray or grayish white, variously suffused and striate with ochreous brown and scattered black scales; basal area broadly pale gray and grayish white, with scattered brown and black scales; t. a. line broadly bordered basally by brown band 1.0 to 1.2 mm. in width; median area varying from paler than to concolorous with adjacent wing areas, and varying from unicolorous to mottled; s. t. line usually incomplete, marked basally below costa by from one to three black cellular dashes, then appearing as large, nebulous white tornal patch. Hind wings pale grayish white, lightly marked with gray and grayish black scales. Under surface of wings pale gray,



FIGS. 1-4. Males of *Gabriola dyari* Taylor. 1, 2. *G. dyari dyari* Taylor. 1. Hartsook Inn, California, June 6, 1939 (G. H. and J. L. Sperry; AMNH). 2. Two miles east of Elsie, Oregon, July 16-17, 1965 (S. G. Jewett, Jr.; AMNH). 3. *G. dyari pruina*, new subspecies, holotype, Cambria Pines, California, April 4, 1964 (R. H. Leuschner; AMNH). 4. *G. dyari bakeri*, new subspecies, holotype, Spring Creek, Oregon, August 17, 1949 (J. H. Baker; AMNH). All X2.

lightly suffused with dark gray scales; hind wings white or pale grayish white, each with distinct, large discal dot.

Length of Forewing. 11 to 16 mm.; holotype, 14 mm.

Female. Similar to male.

Length of Forewing. 12 to 16 mm.; allotype, 16 mm.

Male Genitalia. As described for the species.

Female Genitalia. As described for the species.

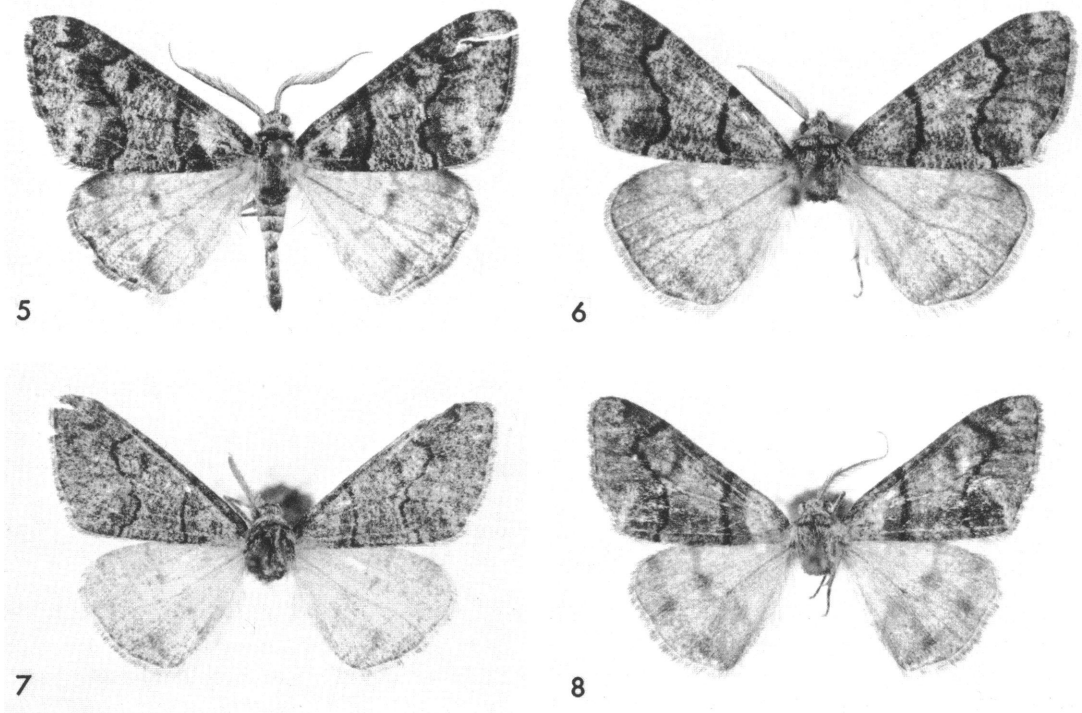
Early Stages. Unknown.

Food Plant. Unknown.

Types. Holotype, male, Cambria Pines, San Luis Obispo County, California, April 4, 1964 (R. H. Leuschner); allotype, female, same data but June 23, 1961; both specimens are from R. H. Leuschner's collection. The genitalia of the

holotype are mounted on slide FHR 17193, and of the allotype on 17174. Paratypes, all from California: same data as holotype, April 4, 1964, June 23, 1961, September 11, 1961, October 22, 1963, December 31, 1962 (R. H. Leuschner), 33 males and seven females; Carmel, Monterey County, April 4, 1960, May 29, 1969 (R. H. Leuschner), 14 males; same locality, various dates in every month of the year except July, 1925-1933, 1935, 1938, 1940 (L. S. Slevin), 54 males and 27 females; Paraiso Springs, [Monterey County], May 3, 1922 (L. S. Slevin), one female; Monterey County, one male.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, the California Academy of Sciences,



FIGS. 5-8. Males of *Gabriola sierrae* McDunnough. 5, 6. *G. sierrae sierrae* McDunnough. 5. Holotype, Mammoth Camp, California, August 4, 1942 (W. P. Medlar; CNC). 6. Hat Creek Ranger Station, California, June 23, 1947 (F. H. Rindge; AMNH). 7. *G. sierrae australis*, new subspecies, holotype, Upper Santa Ana River, California, July 21, 1946 (G. H. and J. L. Sperry; AMNH). 8. *G. sierrae baliola*, new subspecies, holotype, Spring Mountain, California, September 19, 1946 (W. R. Bauer; AMNH). All X2.

the Canadian National Collection, the National Museum of Natural History, the Natural History Museum of Los Angeles County, J. H. Baker, and R. H. Leuschner.

Distribution. Monterey and San Luis Obispo counties, California (see fig. 13). This corresponds to part of the Santa Cruzian division of the Pacific Maritime Province (Schick, 1965).

Flight Period. Probably during every month of the year, although no specimens from July have been seen.

Remarks. One hundred thirty-eight specimens (102 males and 36 females) and five genitalic dissections (three males and two females) have been examined.

The adults are rather variable in the color and amount of brown and black scaling on the upper surface of the wings. When alive, these moths are greenish, but they quickly fade after being killed (Leuschner, in letter). Specimens from this south coastal population are easily distinguished from typical *dyari* in all cases, as none has been seen that have the much darker coloration of the nominate subspecies.

Etymology. The specific name is from the Latin *pruina*, hoar frost, in reference to the general appearance of the upper surface of the forewings.

***Gabriola dyari bakeri*, new subspecies**

Figures 4, 13

Gabriola dyari: Dyar, 1904b, p. 910. Barnes and McDunnough, 1917, p. 119 (*partim*). McDunnough, 1938, p. 166 (*partim*); 1945, p. 101 (*partim*). Prentice, 1963, p. 470, fig. 296 (distribution in Canada; *partim*). Sugden, 1968, p. 27 (*partim*).

Gabriola sierrae auct. nec McDunnough: Baker, "1959" [1960], p. 220.

Diagnosis. The upper surface of the forewings varies from gray to dark gray or faintly dark brownish gray, and the tornal area is broadly and conspicuously marked with a large white patch.

Male. Forewings with upper surface gray, dark gray, or faintly dark brownish gray; basal area suffused with grayish white scales; median area varying from contrasting pale gray to being almost concolorous with adjacent wing areas, and varying from unicolorous to mottled; s. t. line

usually complete and prominent, with costal dash and large, prominent whitish tornal patch. Hind wings pale gray, lightly suffused with dark gray scales. Under surface of forewings unicolorous or mottled gray; hind wings grayish white, with relatively distinct maculation.

Length of Forewing. 12 to 15 mm.; holotype, 14.5 mm.

Female. Similar to male but with the median area tending to be paler than adjacent wing areas in some specimens.

Length of Forewing. 13 to 15 mm.; allotype, 14 mm.

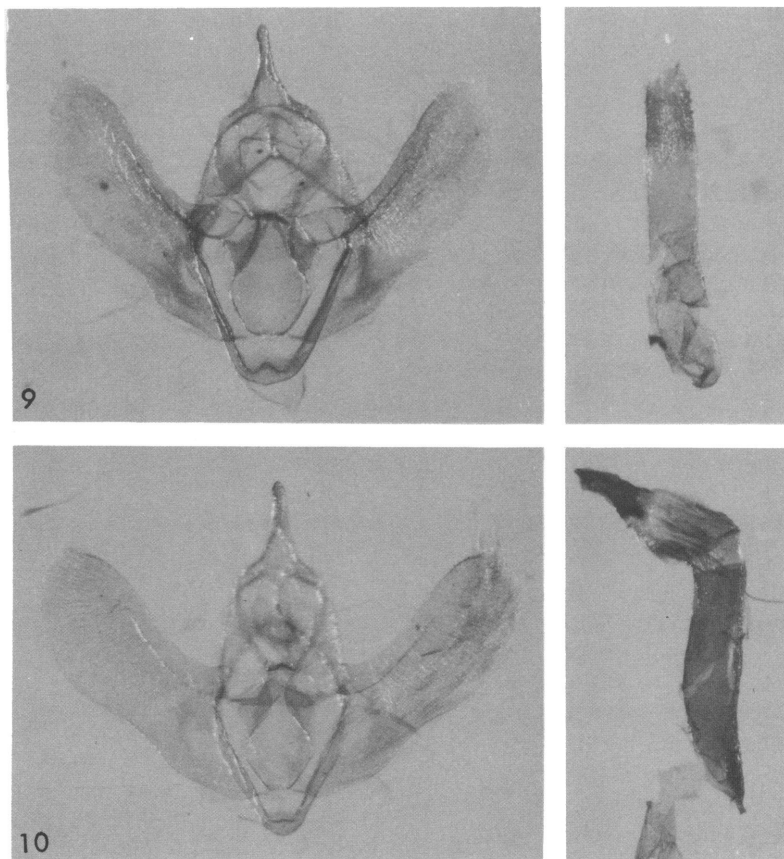
Male Genitalia. As described for the species.

Female Genitalia. As described for the species.

Early Stages. See discussion under nominate subspecies.

Food Plants. See discussion under nominate subspecies. The only reared specimen examined was from *Pseudotsuga*.

Types. Holotype, male, Spring Creek, near Baker, [Baker County], Oregon, [elevation 4000 feet], August 17, 1949 (J. H. Baker); allotype, female, Suttle Lake, 14 miles northwest of Sisters, [Jefferson County], Oregon, elevation 3400 feet, August 29-31, 1963 (W. C. Cook). The genitalia of the holotype are mounted on slide FHR 3709, and of the allotype on 17164. Paratypes: *Oregon*: same data as holotype, various dates in July, August, and September, 1956 through 1972, 18 males; Pine Creek, near Baker, [Baker County], August 24, 1952 (J. H. Baker), one male; Bear Springs, Wasco County, August 15, 1966 (J. H. Baker), one male; Chief Joseph Mountain, near Joseph, [Wallowa County], August 17-22, 1949, 1950 (G. H. and J. L. Sperry), seven males; Wallowa Lake State Park, Wallowa County, September 1, 1962 (D. Mays), eight males; same data as allotype, two males. *Washington*: Rimrock, Tieton Canyon, [Yakima County], July 23 to September 1, 1956 (A. I. Good), five males; River Bend Forest Camp, near Rimrock, [Yakima County], elevation 2500 feet, August 1-4, 1963 (W. C. Cook), four males; Walla Walla, Walla Walla County, August 14, 1956, August 12, 1966 (W. C. Cook), two males; 19 miles northwest of Newport, [Pend Oreille County], elevation 2850 feet, August 25, 1961 (D. F. Hardwick), one male. *Montana*: Lee Creek Camp, 1 mile south of Lolo Hot Springs, Missoula



FIGS. 9, 10. Male genitalia of *Gabriola*. 9. *G. dyari dyari* Taylor, 2 miles northeast of Inverness, California, May 19, 1970 (J. Powell; AMNH). 10. *G. sierrae sierrae* McDunnough, Davis Creek, California, July 30 (AMNH).

County, elevation 4000 feet, August 4, 1956 (F. and P. Rindge), one male. *Idaho*: Wallace, [Shoshone County], August 18, 1943, August, August 2, August 16, and 1915 (O. Huellemann), four males and one female; Twin Creek Camp, 5 miles north of Gibbonsville, Lemhi County, elevation 5200 feet, July 30, 1956, August 1, 1956 (F. and P. Rindge), 16 males; Priest Lake, Bonner County, elevation 2400 feet, August 11-28, 1971 (O. B. Howell), 10 males and two females; Shoshone Bay, Priest Lake, Bonner County, August 9, 1968 (D. Howell), seven males; "Arargie," one male. *British Columbia*: Kaslo (J. W. Cockle), three males; 3 miles west of Nelson, elevation 2100 feet, July 31, 1960 (D. F. Hardwick), one male; 10 miles east of Cranbrook, elevation 2700

feet, July 28, 1960 (D. F. Hardwick), one male; 34 miles north of Creston, elevation 1900 feet, July 30, 1960 (D. F. Hardwick), one male; Aberdeen Mountain, reared from *Pseudotsuga taxifolia*, emerged July 18, 1955, one female.

The holotype is in the collection of the American Museum of Natural History, and the allotype in that of the Natural History Museum of Los Angeles County; paratypes are in the collections of those two institutions, the Canadian National Collection, the Museum of Comparative Zoology, the National Museum of Natural History, and J. H. Baker.

Distribution. South central British Columbia, Idaho, Montana, eastern Washington, and eastern Oregon. For the distribution in British Columbia,

see Prentice, 1963, page 470, figure 296 (*partim*); for the United States distribution, see my figure 13.

Flight Period. July, August, and September.

Remarks. One hundred specimens (94 males and six females) and eight genitalic dissections (six males and two females) have been studied.

Baker's reference ("1959" [1960]) to *sierrae* is the result of my misidentifying some of his specimens. His citation of *dyari* is in error; there are no identified specimens of this species from Baker County in his collection.

Etymology. This subspecies is named in honor of my friend and colleague of many years, James H. Baker, of Baker, Oregon, who collected part of the type series.

Gabriola sierrae McDunnough

Gabriola sierrae McDunnough, 1945, p. 102.

Diagnosis. The antennae of the male have from 49 to 61 segments, with 37 to 47 pectinate and from 11 to 14 terminal, nonpectinate ones; of the female, from 54 to 57 segments. The upper surface of the forewings varies from medium to dark gray, with one population having brown wings; the tornal area varies from broadly white to scarcely marked.

Male. Head similar to that of *dyari*; antennae with average of 52.9 (range, 49 to 61) segments, 40.3 (37 to 47) pectinate and terminal 12.6 (11 to 14) segments simple, with average length of longest pectination 1.3 mm. (1.2 to 1.4 mm.). Thorax and abdomen similar to those of *dyari* but tending to be more contrastingly colored; legs less contrastingly marked; hind tibia with upper pair of spurs equal in size to lower pair.

Upper Surface of Wings. Forewings variable in color, medium gray, blackish gray, grayish brown, or brown; median area weakly contrasting or concolorous with adjacent areas of wing; tornal area varying from more or less broadly suffused with grayish white to unmarked; cross lines black, similar in course to those of *dyari*; s. t. line varying from more or less complete, grayish white, and tending to become enlarged above tornus to obsolescent or absent; terminal line and fringe similar to those of *dyari*. Hind wings similar in color and maculation to those of *dyari*, but tending to have slender extradiscal line slightly more strongly represented.

Under Surface of Wings. Similar to that of *dyari*, but with distinct maculation.

Length of Forewing. 13 to 16 mm.

Female. Similar to male but larger; antennae with from 54 to 57 segments.

Length of Forewing. 14 to 17 mm.

Male Genitalia. Similar to those of *dyari*, differing mainly as follows: uncus with width of base greater, 0.50 to 0.55 mm., and apical portion not constricted; gnathos tending to be slightly more elongate; lateral processes with width of each base varying from 0.20 to 0.30 mm., basal portion broader with curved portion nearer apex, and with margins tending to be smooth; aedeagus longer, 1.5 to 1.8 mm. in length; vesica with row of from five to eight small spines.

Female Genitalia. Similar to those of *dyari*, differing mainly as follows: sterigma tending to be weakly sclerotized; ductus bursae 0.5 to 0.7 mm. in length; corpus bursae up to 3.0 mm. in length; apophyses posteriores 1.4 to 1.9 mm. in length.

Early Stages. Unknown.

Food Plant. Unknown.

Distribution. The mountains of California, with one population in the San Gabriel and San Bernardino mountains, a second in the Sierra and Cascade ranges of California and adjacent Nevada, and a third in Lake and Napa counties, California.

Remarks. The two subspecies from the inland mountain ranges are both gray in color, and appear somewhat similar to *dyari bakeri*. The population from Lake and Napa counties has brown wings, and can be confused with *dyari dyari*.

Gabriola sierrae sierrae McDunnough

Figures 5, 6, 10, 12, 13

Gabriola sierrae McDunnough, 1945, p. 102.

Diagnosis. The upper surface of the forewings is medium to dark gray, or faintly brownish gray, with the median area paler, and the tornal area usually strongly marked with a broad whitish patch.

Male. Forewings with upper surface varying from medium to dark gray, or faintly brownish gray; basal area narrowly to broadly suffused with grayish white scales; median area contrast-

ingly paler to concolorous with adjacent areas; s. t. line present on costa and shaded irregularly on basal side by several black marks, often obsolescent in middle of wing, then broadly enlarged above tornus. Hind wings gray, suffused with dark gray scales. Under surface of forewings medium to dark gray; hind wings grayish white, lightly suffused with darker scales, and with maculation more strongly represented than on upper surface.

Length of Forewing. 13 to 15 mm.

Female. Similar to male but with upper surface of forewings more variable in color.

Length of Forewing. 14 to 16 mm.

Male Genitalia. As described for the species.

Female Genitalia. As described for the species.

Early Stages. Unknown.

Food Plant. Unknown.

Type. Holotype, male, CNC 5571.

Type Locality. Mammoth Camp, Mono County, California.

Distribution. The Sierra and Cascade mountains of California and adjacent Nevada. The localities range from northern Kern County north to Modoc and Siskiyou counties in California; in Nevada the moths are known from Douglas and Washoe counties. (See fig. 13.)

Flight Period. From May until early October.

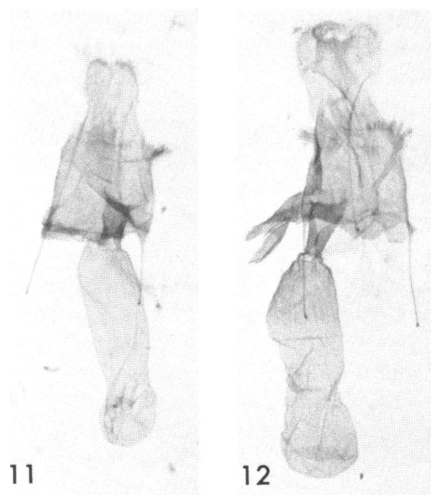
Remarks. Two hundred fifteen specimens (176 males and 39 females) and 10 genitalic dissections (eight males and two females) have been studied.

Some of the specimens from the eastern side of the Sierra Nevada Range, especially from Mono County (including the type series), tend to be more crisply and contrastingly marked than do most of the moths of this population. Occasional specimens will have the upper surface of the forewings with a faint to moderate brownish tinge.

***Gabriola sierrae australis*, new subspecies**

Figures 7, 13

Diagnosis. The upper surface of the forewings is dark gray, with the median area tending to be concolorous; the tornal area varies from having a narrow, pale whitish streak to streak being obsolescent or completely lacking.



FIGS. 11, 12. Female genitalia of *Gabriola*. 11. *G. dyari dyari* Taylor, Dayton, Oregon, July 24, 1960 (R. Albright; AMNH). 12. *G. sierrae sierrae* McDunnough, 4 miles west of Pinecrest, California, July 16, 1961 (J. G. Rozen; AMNH).

Male. Forewings with upper surface dark gray; basal area widely suffused with grayish white scales; median area either concolorous with, or faintly paler than, adjacent wing areas; s. t. line absent or obsolescent. Hind wings grayish white, lightly suffused with grayish brown scales. Under surface of forewings pale gray; hind wings grayish white, lightly suffused with darker scales, with maculation slightly more strongly represented than on upper surface.

Length of Forewing. 12 to 15 mm.; holotype, 14 mm.

Female. Similar to male but with upper surface more variable in color; under surface with maculation more heavily represented.

Length of Forewing. 13 to 17 mm.; allotype, 17 mm.

Male Genitalia. As described for the species.

Female Genitalia. As described for the species.

Early Stages. Unknown.

Food Plant. Unknown.

Types. Holotype, male, Upper Santa Ana River, San Bernardino County, California, July 21, 1946 (G. H. and J. L. Sperry); allotype, female, same data but July 18, 1947. The genitalia of the holotype are mounted on slide FHR 3707,

and of the allotype on 17098. Paratypes, all from southern California: *San Bernardino County*: same data as types, July 16, 22, 1946, July 26, 1947, August 3, 4, 1947, five females; Santa Ana River, elevation 5500 feet, August 8, 1907 (J. Grinnell), one male; Bluejay, near Lake Arrowhead, July 11, 1956, July 11, 1959, August 9-10, 1956, August 10, 1957 (N. McFarland), three males and one female; Big Bear, August 3, 1942 (M. L. Walton), one female; Big Bear Lake, August 17, 1967, August 5, 6, 8, 11, 1968 (J. Wilcox), six males and three females; Camp O-ongo, near Running Springs, elevation 6300 feet, August 7-14, 1965 (C. L. Hogue), five males and seven females; Lake Arrowhead, elevation 5600 feet, August 12, 1961 (R. Leuschner), one male; Rimforest, 3 miles southwest of Lake Arrowhead, elevation 5600 feet, July 11, 1959 (R. Leuschner), one male and one female. *Los Angeles County*: Eagle Rock, May 30, 1959 (C. L. Hogue), one female; Wrightwood, elevation 7000 feet, July 14, 16, 1964 (C. Hill), August 2, 1964 (R. Leuschner), elevation 6100 feet, May 15, 1964 (C. Hill), three males and two females; north fork, San Gabriel Canyon, July 29, 1945 (D. Meadows), one male; Crystal Lake, San Gabriel Canyon, August 3, 1946 (J. A. Comstock and L. M. Martin), one female; Mint Canyon, June 19, 1954 (C. A. Hill), one male; Mt. Lowe, (one specimen labeled 5000 feet), July 6, 7, 1924 (E. Piazza), September 8, 9, 1920 (K. R. Coolidge), July 7, 1924, August 6, 1920, August 1, 1924, May 1, August 1, 15 males and three females; Mt. Wilson, July 29, 1921, August 1, 1918, two males.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, the California Academy of Sciences, the Museum of Comparative Zoology, the National Museum of Natural History, the Natural History Museum of Los Angeles County, and R. H. Leuschner.

Distribution. Southern California, in the San Gabriel and San Bernardino mountains of Los Angeles and San Bernardino counties (see fig. 13).

Flight Period. May, June, July, and August.

Remarks. Sixty-five specimens (39 males and 26 females) and three genitalic dissections

(one male and two females) have been studied.

The moths of this population tend, on the average, to be slightly smaller than specimens of typical *sierrae*. There is a moderate amount of variation in the color and maculation of the upper surface of the forewings, more so than is to be found in the Sierran population.

Etymology. The specific name is from the Latin *australis*, southern, as this is the southernmost known population of the species.

***Gabriola sierrae baliola*, new subspecies**

Figures 8, 13

Diagnosis. The upper surface of the forewings varies from a unicolorous medium brown to a darker brown with brownish black shading in the lower portion of the wing; the median area is concolorous with the remainder of the wing; the tornal area varies from having a narrow, pale brownish gray streak to streak being faint or absent.

Male. Forewings with upper surface varying from unicolorous medium brown to dark brown or dark grayish brown; some specimens with brownish black shading across lower portion of wing, particularly distad of t. p. line; basal area rather broadly suffused with grayish white scales; median area tending to be concolorous with remainder of wing; s. t. line either obsolescent or weakly indicated at costa and tornus by narrow, pale grayish brown streak. Hind wings grayish white, variably suffused with grayish brown, and with maculation weakly indicated. Under surface of forewings dark gray or dark grayish brown; hind wings grayish white, variably suffused with grayish brown, with well-developed maculation.

Length of Forewing. 13 to 16 mm.; holotype, 13 mm.

Female. Similar to male.

Length of Forewing. 15 to 16 mm. (allotype).

Male Genitalia. As described for the species.

Female Genitalia. As described for the species.

Early Stages. Unknown.

Food Plant. Unknown.

Types. Holotype, male, Spring Mountain, Napa County, California, September 19, 1946 (W. R. Bauer); allotype, female, same data but May

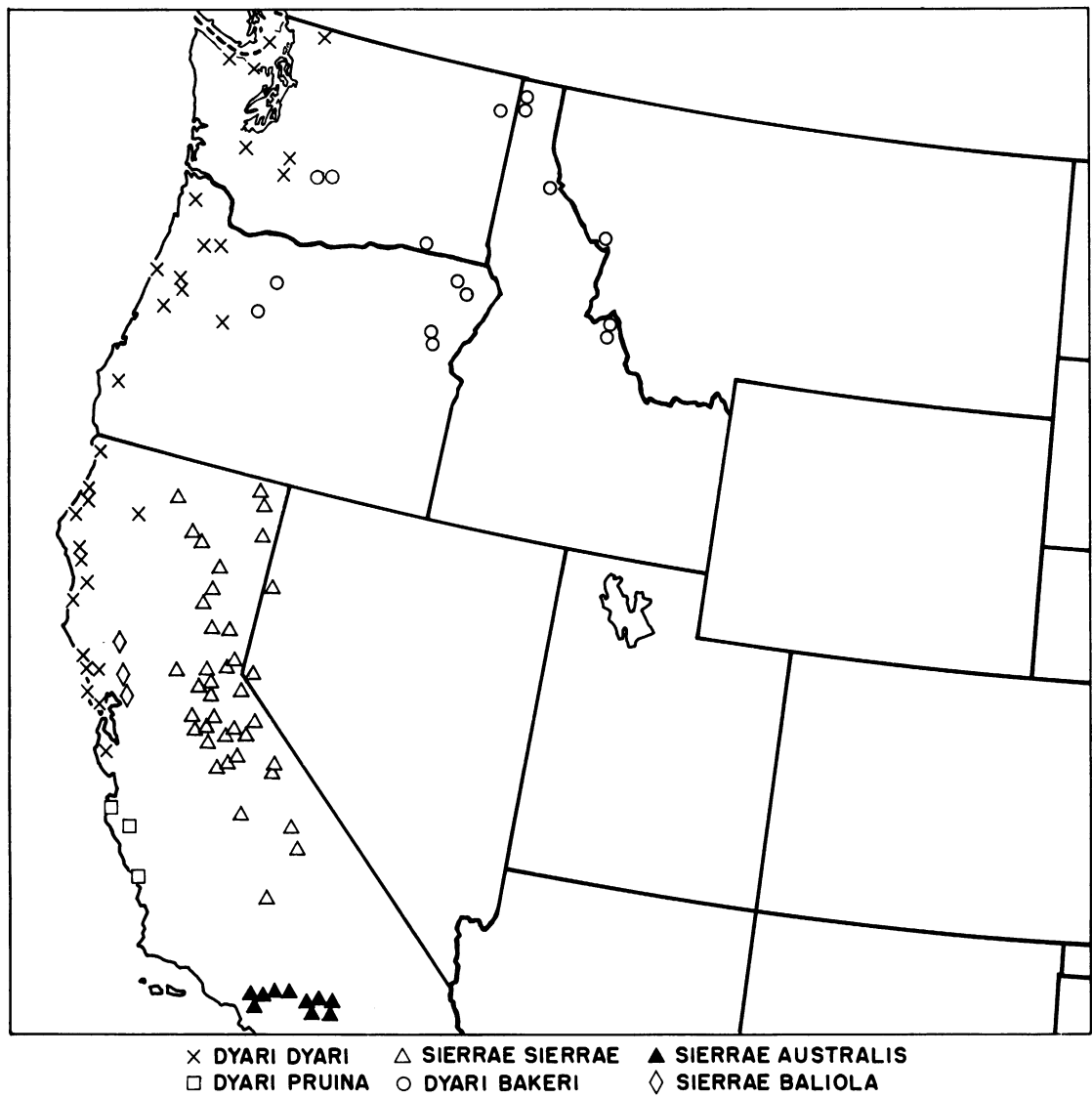


FIG. 13. The distribution of *Gabriola dyari* Taylor and *G. sierrae* McDunnough in the United States.

20, 1947. The genitalia of the holotype are mounted on slide FHR 17187, and of the allotype on 17094. Paratypes, all from California: same data as types, September 19, 1946, October 3, 1947 (W. R. Bauer), "11-5-39" (E. C. Johnston), three males; Mt. St. Helena, Napa County, June 9, 1918 (E. P. Van Duzee), one male; Anderson Springs, Cobb Mountain, Lake County,

various dates in June, July, August, and September, 1946-1955 (W. R. Bauer, W. R. Bauer and J. S. Buckett, C. A. Hill, and R. H. Leuschner), 11 males and one female.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, the California Academy of Sciences,

the Canadian National Collection, the Natural History Museum of Los Angeles County, J. H. Baker, and R. H. Leuschner.

Distribution. The mountainous regions of Napa and Lake counties, California. See figure 13.

Flight Period. From May into early November.

Remarks. Nineteen specimens (17 males and two females) and four genitalic dissections (three males and one female) have been studied.

The adults of this population, with their brown wing color, may easily be mistaken for specimens of *dyari dyari*. Specimens of *baliola* tend to be larger and paler than the moths of *dyari* from coastal California. In addition, the structural details of the antennae and, to a lesser extent the genitalia, can be used to separate the two species.

Etymology. The specific name is from the Latin *baliolus*, chestnut-colored, in reference to the color of the wings.

Gabriola minima (Hulst)

Figures 14, 18, 22, 26

Nacophora minima Hulst, 1896, p. 360. Dyar, "1902" [1903], p. 329; 1904a, p. 226. Smith, 1903, p. 77. Grossbeck, 1907, p. 151. Barnes and McDunnough, 1912, p. 43, pl. 20, fig. 12 (male). Rindge, 1955, p. 148.

Gabriola minima: Barnes and McDunnough, 1917, p. 119. McDunnough, 1938, p. 166; 1945, p. 101.

Chesiadodes bidisata Dyar, 1903, p. 226. Barnes and McDunnough, 1916, p. 184 (placed as synonym of *minima*).

Diagnosis. The upper surface of the forewings is gray, more or less heavily suffused with black scales, and the tornal area is without the grayish white patch that is found in *dyari* and *sierrae*.

Male. Head with vertex, front and palpi grayish black to dull black, with a few paler scales; antennae with average of 51.0 (range, 48 to 53) segments, 38.5 (36 to 40) pectinate and terminal 12.5 (12 to 14) segments simple, with average length of longest pectination 1.3 mm. (1.3 to 1.4 mm.). Thorax above with mixture of grayish white and black scales, collar black distally; below pale gray to gray; legs gray, with variable amount of black scaling, ends of tarsal segments white, and hind tibia with upper pair of spurs

tending to be smaller than lower pair. Abdomen above grayish black, with scattered gray and black scales, tufts narrowly grayish white basally, becoming black distally; below mostly grayish white.

Upper Surface of Wings. Forewings gray, more or less evenly suffused with black scales; median area tending to be slightly paler or concolorous with adjacent wing areas; tornal area unmarked; cross lines black, prominent, course as in those of *dyari*, but with t. a. line less curved and tending to be angled basally above inner margin; s. t. line absent; terminal line black, narrowed or interrupted by veins; fringe concolorous with wing. Hind wings grayish white, variably suffused with dark gray scales, with wing becoming darker distally, maculation obsolescent, with discal spot vaguely indicated; terminal line complete; fringe grayish black, with narrow, pale line along base.

Under Surface of Wings: Forewings gray, variably suffused with dark gray; hind wings grayish white, with some gray and black scaling; maculation of upper surface weakly indicated on all wings, with extradiscal line usually present.

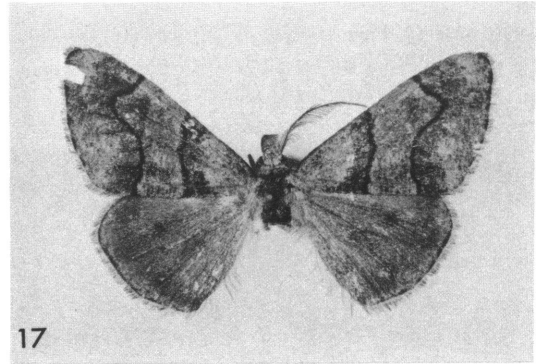
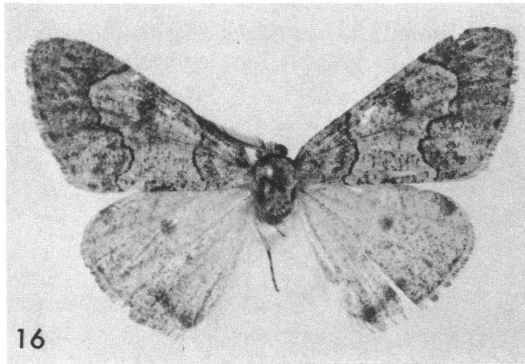
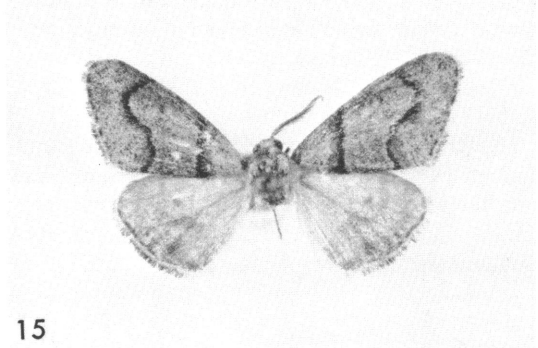
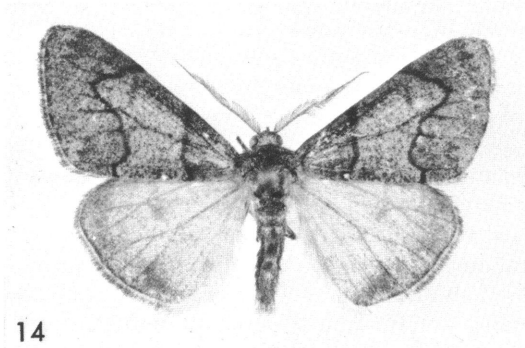
Length of Forewing. 12 to 15 mm.

Female. Similar to male but larger; antennae with from 46 to 54 segments.

Length of Forewing. 14 to 16 mm.

Male Genitalia. Similar to those of *dyari*, differing mainly as follows: uncus more triangular, evenly tapering, without angulate lateral sides of base, width of base 0.50 mm., and with slightly more elongate and slender apical portion; gnathos tending to have lateral arms slightly thinner, to be more elongate, and to have slightly broader median enlargement with a number of minute teeth; valve with sacculus without basal angle, tending to be almost straight or weakly curved from base; lateral processes with width of each base 0.25 mm., evenly tapering, curved near apex, with margins tending to be smooth; aedeagus longer, 1.6 to 1.7 mm. in length; vesica unarmed.

Female Genitalia. Similar to those of *dyari*, differing mainly as follows: sterigma tending to be weakly sclerotized; ductus bursae 0.3 to 0.5 mm. in length, tending to have more parallel sides and with more elongate lateral sclerotized portions tending to extend almost entire length of ductus bursae; corpus bursae up to 2.8 mm. in



FIGS. 14-17. Males of *Gabriola*. 14. *G. minima* (Hulst), Big Springs Ranch, Colorado, July 28, 1960 (T. C. Emmel; LAM). 15. *G. minor*, new species, holotype, Southwestern Research Station of the American Museum of Natural History, Arizona, July 11, 1958 (M. A. Cazier; AMNH). 16. *G. tenuis*, new species, holotype, 10 miles west of El Salto, Durango, June 10, 1964 (J. E. H. Martin; CNC). 17. *G. regularia* McDunnough, holotype, Santa Catalina Mountains, Arizona, August 20, 1938 (Bryant; CNC). All $\times 2$.

length; apophyses posteriores 1.3 to 1.9 mm. in length.

Early Stages. Unknown.

Food Plant. Unknown

Types. Hulst described *minima* from at least two females; the exact number was not specified in the original description. One of these specimens is in the collection of the American Museum of Natural History (Rindge, 1955); this specimen is hereby designated as the lectotype. Its genitalia are mounted on slide FHR 17122. No other specimens have been located.

Dyar described *bidisata* from one male; it is type USNM 6730.

Type Localities. "Colorado, from Mr. Bruce"

(*minima*); Williams, Coconino County, Arizona (*bidisata*).

Distribution. The four southern Rocky Mountain states (see fig. 26). In Colorado, most of the records are from the Front Range; the species has also been taken at Glenwood Springs and in Mesa Verde National Park. In Utah, the majority of the specimens are from the general area of Bryce Canyon National Park. The Arizona records are from the northern and eastern part of the state; the species apparently does not occur south of the Mogollon Rim. In New Mexico the species has been collected more commonly in the northern part of the state, with some southern records in the higher mountains.

Those specimens with altitude data on the labels show that *minima* has been taken at elevations of from 5400 to 9500 feet.

Flight Period. June, July, August, and September.

Remarks. Two hundred ninety specimens (251 males and 39 females) and 13 genitalic dissections (seven males and six females) have been studied, including the types of both names, and the genitalia of the lectotype.

***Gabriola minor*, new species**

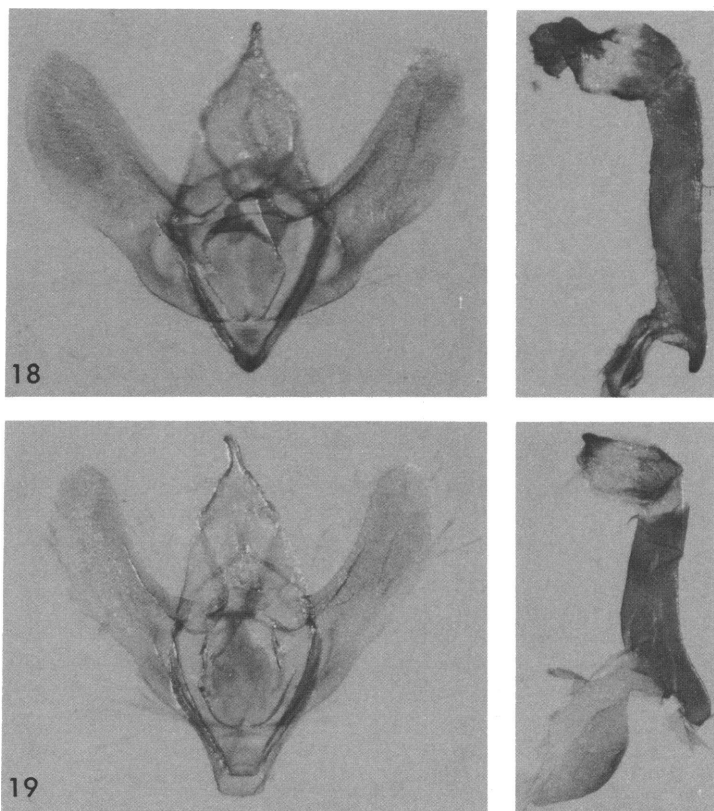
Figures 15, 19, 23, 26

Diagnosis. This species is similar to *minima*, but smaller. The upper surface of the forewings

tends to have the t. a. line straighter and with a broad black basal band.

Male. Head with vertex, front and palpi similar to those of *minima*; antennae with an average of 52.3 (range, 49 to 55) segments, 36.0 (31 to 40) pectinate and terminal 16.3 (10 to 18) segments simple, with average length of longest pectination 1.1 mm. (1.0 to 1.1 mm.). Thorax above and below, and legs, similar to those of *minima*. Abdomen similar to that of *minima*, but paler.

Upper Surface of Wings. Forewings pale gray, variably suffused with dark gray and black scales; median area tending to be paler than adjacent wing areas; tornal area unmarked; cross lines black, prominent, course similar to those in *dyari*; t. a. line straight, not curved basad above



FIGS. 18, 19. Male genitalia of *Gabriola*. 18. *G. minima* (Hulst), Rock Creek Canyon, Colorado, July 4, 1963 (M. May; AMNH). 19. *G. minor*, new species, holotype, Southwestern Research Station of the American Museum of Natural History, Arizona, July 11, 1958 (M. A. Cazier; AMNH).

inner margin as in *minima*, with broad black basal band, 0.5 to 1.0 mm. in width, increasing in size posteriorly; s. t. line absent; terminal line dark gray or grayish black, interrupted by veins; fringe concolorous with wing. Hind wings similar to those of *minima*.

Under Surface of Wings. Similar to that of *minima* but with t. p. and extradiscal lines tending to be slightly more clearly represented.

Length of Forewing. 11 to 13 mm.; holotype 12 mm.

Female. Similar to male; antennae feebly serrate, with from 48 to 53 segments.

Length of Forewing. 13 to 15 mm.; allotype, 14 mm.

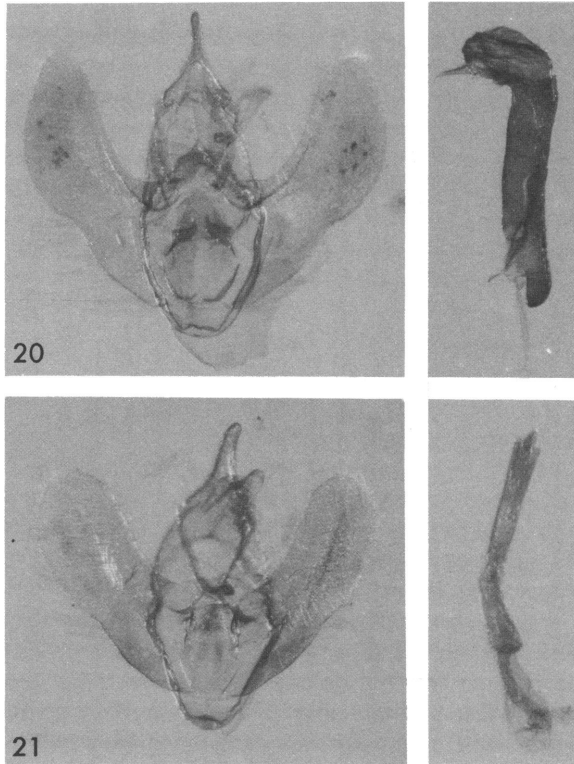
Male Genitalia. Similar to those of *dyari*, differing mainly as follows: uncus triangular, with small convex area on each side above base, width

of base about 0.4 mm., and with slender apical portion; gnathos with broad median enlargement, bluntly rounded, and with sacculus reduced, somewhat flattened; lateral processes with each base 0.15 to 0.20 mm. wide, evenly tapering and evenly curving to sharp, narrow apex, with smooth margins; aedeagus 1.4 to 1.5 mm. in length; vesica with four or five slender spines.

Female Genitalia. Similar to those of *dyari*, differing mainly as follows: sterigma with slight raised anterior rim; ductus bursae 0.4 mm. in length, tending to have parallel sides and with lateral sclerotized portions extending entire length of ductus bursae; corpus bursae up to 2.0 mm. in length; apophyses posteriores 1.2 to 1.3 mm. in length.

Early Stages. Unknown.

Food Plant. Unknown.



FIGS. 20, 21. Male genitalia of *Gabriola*. 20. *G. regularia* McDunnough, 17 miles north of McNary, Arizona, September 1, 1949 (N. Crickmer; AMNH). 21. *G. tenuis*, new species, holotype, 10 miles west of El Salto, Durango, June 10, 1964 (J. E. H. Martin; CNC).

Types. Holotype, male, Southwestern Research Station of the American Museum of Natural History, 5 miles west of Portal, Cochise County, Arizona, elevation 5400 feet, July 11, 1958 (M. A. Cazier); allotype, female, same data but July 12, 1957 (M. Statham). The genitalia of the holotype are mounted on slide FHR 17111, and of the allotype on 17114. Paratypes, all from southern Arizona: *Cochise County*: same data as types, various dates in late May, June, July, and September, 1955-1967 (Gertsch, Schrammel, and Ordway; M. Statham; M. A. Cazier; C. and M. Cazier; Cazier and Ordway; C. W. Kirkwood; J. Wilcox), 29 males and five females; 1 mile west of Portal, Chiricahua Mountains, September 10, 1950 (Gertsch and Cazier), one male; upper camp, Pinery Canyon, Chiricahua Mountains, July 6, 1956 (Martin, Comstock, and Rees), one male; Chiricahua Mountains, elevation 9000-9800 feet, July 18, 1927 (J. A. Kusche), one male; Fly Peak, Chiricahua Mountains, elevation 9785 feet, July 20, 1927 (J. A. Kusche), one male; Chiricahua National Monument, elevation 5000 feet, November 11, 1958 (R. H. Leuschner), one male; Cave Creek, east side of Chiricahua Mountains, elevation 5000 feet, October 12, 1970 (R. H. Leuschner), one male; Paradise, June, July, October 1-7, six males; Carr Canyon, Huachuca Mountains, August 28, 1968 (R. F. Sternitzky), one male; Ramsey Canyon, Huachuca Mountains, various dates in May, July, August, and September, 1964-1968 (R. F. Sternitzky), six males; Sunnyside, west side of Huachuca Mountains, July 8, 1958 (L. M. Martin), one male. *Santa Cruz County*: Sonoita Creek, 10 miles south of Patagonia, September 29, 1964 (R. F. Sternitzky), one male; Hidden Spring Canyon, 9 miles east of Sonoita, July 5, 1964 (R. F. Sternitzky), two females; Madera Canyon, elevation 5000 feet, October 13, 1970 (R. H. Leuschner), one male.

The holotype and allotype are in the collection of the American Museum of Natural History; paratypes are in the collections of that institution, the California Academy of Sciences, the Museum of Comparative Zoology, the National Museum of Natural History, the Natural History Museum of Los Angeles County, J. W. Baker, and R. H. Leuschner.

Distribution. Southern Arizona (see fig. 26).

This species is known only from Santa Cruz County, and the Huachuca and Chiricahua Mountains of Cochise County.

Flight Period. From May into October. Most specimens have been collected in June and July; there is apparently a second generation in the fall.

Remarks. Sixty specimens (52 males and eight females) and eight genitalic dissections (five males and three females) have been studied.

The males of this species tend to be noticeably smaller than the females; in *minima* the two sexes are more nearly equal in size.

Etymology. The specific name is from the Latin *minor*, smaller, in reference to the size.

Gabriola regularia McDunnough

Figures 17, 20, 24, 26

Gabriola regularia McDunnough, 1945, p. 102.

Diagnosis. This species is similar to *minor* but the upper surface of the wings is browner; the t.a. line is more irregular in course and is broadly shaded basally by a dark brown band.

Male. Head with vertex and front having mixture of pale gray and dark brown scales; palpi tending to be slightly darker; antennae with average of 44.6 (range, 42 to 46) segments, 34.0 (32 to 37) pectinate and terminal 10.6 (10 to 13) segments simple, with average length of longest pectination 1.4 mm. (1.1 to 1.5 mm.). Thorax above grayish white, with scattered brownish black scales, and with end of collar, narrow transverse band across patagia, and ends of scales in posterior tuft brownish black; below pale gray; legs gray, with variable amounts of dark brown and brownish black scaling, tarsi with ends of segments broadly pale gray, and hind tibia with upper pair of spurs tending to be smaller than lower pair. Abdomen above pale gray, with scattered brown and brownish black scales, tufts gray basally, becoming black distally; below grayish white.

Upper Surface of Wings. Forewings pale gray, variably suffused with dark gray, grayish brown and dark brown scales and striations; median area paler than or concolorous with, adjacent areas of wing; tornal area vaguely marked with diffuse pale area; cross lines black, prominent, course as in those of *dyari*; t. a. line weakly curved,

broadly shaded basally by dark brown band about 1 mm. wide; s. t. line absent or vaguely indicated by wide, very diffuse pale band; terminal line dark brown or brownish black, narrowly interrupted by veins; fringe concolorous with wing. Hind wings gray, more or less heavily suffused with darker gray or brownish gray scales, becoming darker distally, forming broad, rather nebulous outer band; maculation obsolescent, with discal spot weakly indicated; terminal line complete; fringe grayish brown, with narrow, pale line along base.

Under Surface of Wings. Forewings gray, variably suffused with dark gray and brownish gray; hind wings grayish white, with dark gray and brownish gray scaling becoming heavier distally; maculation of upper surface weakly indicated on all wings, with extradiscal line obsolescent.

Length of Forewing. 12 to 16 mm.

Female. Similar to male.

Length of Forewing. 13 to 14 mm.

Male Genitalia. Similar to those of *dyari*, differing mainly as follows: uncus with triangular base, 0.4 mm. wide and with elongate, slender apical portion; gnathos with broad median enlargement, bluntly rounded apically, about 0.25 to 0.30 mm. across; valves with sacculus biangulate, distal portion elongate, and with reduced

transverse strip across base of valve; lateral processes with each base 0.15 to 0.20 mm. wide, variable in width, narrowing above base or evenly tapering to pointed apex, with smooth or slightly irregular margins; aedeagus 1.4 mm. in length; vesica either without spines or with two or three slender ones.

Female Genitalia. Similar to those of *dyari*, differing mainly as follows: sterigma with anterolateral folds; ductus bursae short and broad, 0.3 mm. in length, 0.2 mm. in width; corpus bursae up to 2.0 mm. in length; apophyses posteriores 1.6 mm. in length.

Early Stages. Unknown.

Food Plant. Unknown.

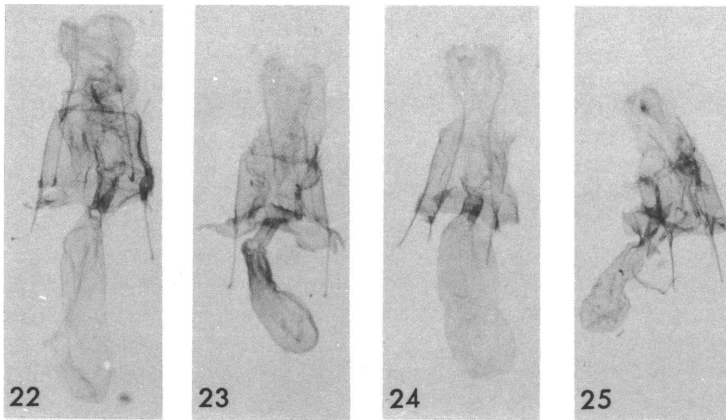
Type. Holotype, male CNC 5570. The genitalia of the type are mounted on McDunnough's slide Ga 2.

Type Locality. Santa Catalina Mountains, Pima County, Arizona.

Distribution. Arizona, New Mexico, and Utah (see fig. 26).

Flight Period. June, July, August, and September.

Remarks. Thirty-eight specimens (34 males and four females) and seven genitalic dissections (six males and one female), including the holotype and its genitalia, have been studied.



FIGS. 22-25. Female genitalia of *Gabriola*. 22. *G. minima* (Hulst), lectotype, Colorado (Bruce; AMNH). 23. *G. minor*, new species, allotype, Southwestern Research Station of the American Museum of Natural History, Arizona, July 12, 1957 (M. Statham; AMNH). 24. *G. regularia* McDunnough, 6 miles northeast of Santa Fe, New Mexico, July 31, 1964 (F., P., and M. Rindge; AMNH). 25. *G. tenuis*, new species, allotype, 10 miles west of El Salto, Durango, July 16, 1964 (W. C. McGuffin; CNC).

The moths from Arizona tend to be relatively large and brown; the type series, two males from near McNary, and two specimens from the higher elevations (8500 to 9800 feet) of the Chiricahua Mountains are browner than the single moth from Yavapai County and the series from 17 miles north of McNary. The specimens from New Mexico (nine males and two females) and the single male from Utah are all smaller and grayer than are the Arizona series. More material is needed before the problem of individual and geographic variation within this species can be settled.

***Gabriola tenuis*, new species**

Figures 16, 21, 25

Diagnosis. This species is similar to *regularia* but the upper surface of all wings is much paler, with the forewings being a pale brownish gray.

Male. Head with vertex and front having mixture of white, grayish brown, and brownish black scales; palpi grayish brown; antennae with average of 50.5 (range, 49 to 52) segments, 37.5 (37 to 38) pectinate and terminal 13.0 (12 to 14) segments simple, with average length of longest pectination 1.3 mm. Thorax above white or grayish white with scattered grayish brown scales, with end of collar and narrow band across patagia black, and with ends of scales of anterior portion of posterior tuft grayish brown, of posterolateral portion black or grayish black; below grayish brown; legs pale gray, with variable amount of brown and brownish black scaling, tarsi with ends of segments broadly grayish white, and hind tibia with upper pair of spurs tending to be reduced, outer spur being about one-half size of inner one. Abdomen above with segments white or grayish white anteriorly, broadly pale grayish brown posteriorly, tufts pale gray basally, becoming dark gray to grayish black distally; below gray or grayish brown.

Upper Surface of Wings. Forewings pale grayish brown, variably suffused with dark grayish brown and a few black scales; median area paler than adjacent areas of wing; tornal area broadly but indistinctly marked with grayish white; cross lines black, coarse as in those of *dyari*, but with t. a. line tending to be somewhat S-shaped and with t. p. line more concave between veins; t. a.

line broadly and evenly shaded basally by dark grayish brown band about 1 mm. wide; distal portion of wing with veins, at least in middle of wing, shaded with grayish brown scales; s. t. line appearing as series of pale gray dots between veins, enlarged posteriorly above tornus; terminal line black, represented by series of intravenular dots; fringe concolorous with wing. Hind wings white, with variable number of gray, grayish brown, and grayish black scales; diffuse discal spot present; outer shade band variably represented, reduced, or absent in middle of wing; terminal line more or less represented, often obsolescent; fringe grayish white basally, grayish brown distally.

Under Surface of Wings. Forewings pale grayish white; hind wings white; both wings with variable number of dark gray, grayish brown, and dull black scales; maculation of upper surface indicated on all wings, with anterior portion of t.p. line geminate, and with partial extradiscal line present.

Length of Forewing. 14 to 15 mm.; holotype, 15 mm.

Female. Similar to male; antennae weakly serrate, having 49 to 50 segments.

Length of Forewing. 15 to 18 mm.; allotype, 16 mm.

Male Genitalia. Similar to those of *dyari*, differing mainly as follows: uncus with triangular base, 0.4 mm. across, and with slender apical portion; gnathos tapering to elongate median point, weakly spiculate posteriorly; valves with each costa broadly sclerotized and scarcely differentiated, apex broadly rounded, sacculus poorly defined, rounded; lateral processes with each base 0.15 to 0.20 mm. wide, narrowed above base, tapering and sharply curved apically, with smooth margins; aedeagus 1.2 to 1.3 mm. in length, very narrow, 0.12 to 0.15 mm. wide, and with posterior end slightly swollen; vesica with several minute spines.

Female Genitalia. Similar to those of *dyari*, differing mainly as follows: sterigma with membranous anterior lip; ductus bursae small, 0.3 mm. in length, slender, tapering anteriorly; corpus bursae up to 1.3 mm. in length; apophyses posteriores 1.3 to 1.4 mm. in length.

Early Stages. Unknown.

Food Plant. Unknown.

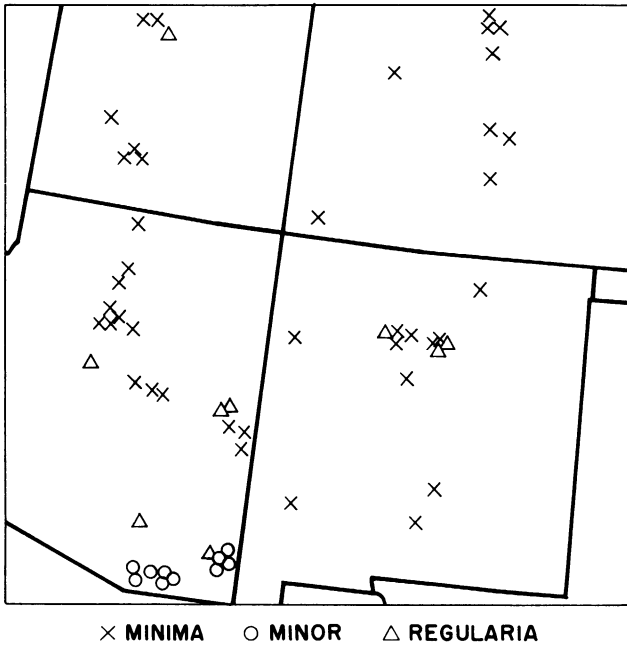


FIG. 26. The distribution of *Gabriola minima* (Hulst), *G. minor*, new species, and *G. regularia* McDunnough.

Types. Holotype, male, 10 miles west of El Salto, Durango, Mexico, elevation 9000 feet, June 10, 1964 (J. E. H. Martin); allotype, female, same locality but July 16, 1964 (W. C. McGuffin). The genitalia of the holotype are mounted on slide FHR 17129, and of the allotype on 17130. Paratypes, all from Durango, Mexico: same data as holotype, various dates between June 6 and August 11, 1964 (J. E. H. Martin and W. C. McGuffin), 12 males and eight females, elevation 8800 feet, July 30, 1964 (J. A. Chemsak and J. Powell), one male; Las Rusias, 12 miles east of La Ciudad, elevation 9200 feet, August 14, 1972 (J. Powell, D. Veirs, and C. D. MacNeill), two males.

The holotype and allotype are in the Canadian National Collection; paratypes are in the collections of that institution, the American Museum of Natural History, and the California Insect Survey.

Distribution. The high mountains of the Sier-

ra Madre de Occidental in the State of Durango, Mexico. Specimens have been captured at elevations of from 8800 to 9200 feet.

Flight Period. June, July, and August.

Remarks. Twenty-five specimens (16 males and nine females) and four genitalic dissections (two males and two females) have been studied.

In coloration this species is quite similar to *dyari pruina*; the former is from the high mountains of Durango and the latter from the coastal region of central California. The two may be separated by the male genitalia and by the course of the cross lines on the upper surface of the forewings. In *dyari pruina* the t. a. line is evenly curved and the t. p. line is more or less smoothly S-shaped; in *tenuis* the t. a. line is biangulate and the t. p. line tends to be outwardly toothed on the veins.

Etymology. The specific name is from the Latin *tenuis*, slender, in relation to the width of the aedeagus.

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