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A Revision of the North American Moths of the Genus *Lomographa* (Lepidoptera, Geometridae)

FREDERICK H. RINDGE¹

ABSTRACT

The members of this genus have been referred to the name *Bapta* for many years; however, the correct generic assignment is *Lomographa* Hübner. Both genera have the same type species; *Lomographa* was published four years before *Bapta*. The four North American species are revised for the first time, and

keys are given for them. Each one is redescribed; both the adults and their genitalia are illustrated. Distributional maps show the known range for each species. One change in synonymy is made: *virginalis* Cassino and Swett is placed as a synonym of *glomeraria* Grote.

INTRODUCTION

For more than 60 years the North American members of this genus have been placed under the name *Bapta*. However, *Lomographa* was published before *Bapta* and is the correct generic name. The four North American species have never been revised; their genitalia have neither been described nor figured. In addition, the relationships of this genus have never been satisfactorily explored. These considerations led me to undertake the present revisionary study.

One of the major problems with this group has been the proper application of the correct generic name. For many years this assemblage in both the Old World and the New World was known primarily as *Bapta*, with *Lomographa* being applied to an entirely different group. Much of this usage probably followed Prout (1909, p. 280; 1915, p. 314); unfortunately, he did not have the correct type species for either *Bapta* or *Lomographa*, and so his use of the

two generic terms was incorrect. *Bapta* has been utilized by such workers as Barnes and McDunnough (1917, p. 111); McDunnough (1938, p. 156) and Forbes (1948, p. 274) in North America; Inoue (1956, p. 303) in Japan; Bleszynski (1966, p. 30) in Poland; Silva Cruz and Gonçalves (1977, p. 17) in Portugal; and Forster and Wohlfahrt ([1978], p. 200) in Europe. Kloet and Hincks (1972, p. 67) gave the correct usage and synonymy, namely that *Bapta* is a synonym of *Lomographa* because both generic names have the same type species and the former was published four years after *Lomographa*. Now that this typology has been established it will be necessary to review all species described under both these generic names to establish their proper placement. The present paper is a revision of the four species found in North America, north of Mexico.

Another problem has been the misidentifi-

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cation or incorrect use of other generic names. The North American species have been variously placed, incorrectly, in *Corycia*, *Orthofidonia*, *Deilinia*, *Cabera*, and *Macaria* as well as in *Bapta*—but never, until now, in *Lomographa*. Three of our species were described from females, with the males not being known until some time later. This, in itself, complicated the placing of these taxa in the proper genus, as males have more characters of generic value than do females. Barnes and McDunnough (1917, p. 111) were the first to correctly group the four species under a single generic heading.

Morphologically, the species form a compact and easily recognized group, as the adult characters and male genitalia are quite similar to one another. This is also true for the female genitalia of three of the four species. The three that occur in eastern North America have the papillae anales with slender tapering setae and with the apophyses attached anteriorly; the single western species (*elsinora*) has larger papillae anales with capitate setae and with the apophyses attached medially. The former represents the plesiomorphic condition, as it is found in the two Palearctic species (*bimaculata* and *temerata*) examined, as well as in practically all of the other species of *Lomographa* I have dissected from Middle and South America and from New Guinea, and in the members of the two other genera of the Baptini found in North America. Only one other species with apomorphic female genitalia has been studied in addition to *elsinora*; the former occurs in southern Mexico, and has large papillae anales with a single row of thick inwardly curving setae on each side, and with the apophyses attached medially.

The relationships of the *Lomographa* within the Baptini, at least in the New World, are poorly known; this is due in large part to an almost complete lack of study of the Neotropical Ennominae. Ferguson (personal commun.) has suggested that *Palyas* and *Phrygionis* should be placed in the Baptini. Superficially, the members of these primarily tropical genera do not look like the species of *Lomographa*; morphologically the adults are quite similar to

one another. Very little or nothing is known about the early stages of *Palyas* and *Phrygionis*, so comparisons of the immatures with *Lomographa* are not possible at this time; this should be done when material becomes available. Based on the material at hand, I am accepting Ferguson's placement of these genera in the Baptini.

The North American species usually are on the wing in late spring and early summer, with at least some of them being partial or primarily day flying. In the northern portion of their range, they are apparently basically single brooded; in the south it is possible that more than one generation per year is produced. Very little seasonal variation is present in the species of *Lomographa*. This also applies to individual and geographic variability, with the exception of *glomeraria*; this problem is discussed under that species.

As the included species are relatively easy to recognize, I am accepting most of the references in the literature as being valid. The majority of citations refer to geographic distribution; these I have listed chronologically under Distribution for each species. My distribution maps are based entirely on specimens I have examined, and do not include literature references.

During the course of this study, I have examined 1807 specimens (1153 males, 654 females) and 57 genitalic preparations (30 males, 27 females) of North American species. This includes the four primary types in North America (in AMNH, MCZ, and USNM). The three in the British Museum (Natural History) were not personally examined; color transparencies of them were kindly furnished me by D. S. Fletcher of that institution. In addition, I have studied a number of Neotropical and Old World specimens and their genitalia. The majority of the dissections were prepared by me; in addition, slide mounts of the antennae and legs were made of the North American and two Palearctic species. All the North American specimens studied by me at the American Museum of Natural History have had identification labels placed on their pins (with the exception of primary types). The majority of specimens

(1104) and slides (44) are in the collection of that institution.

The following abbreviations have been used:

AMNH, the American Museum of Natural History
CNC, the Canadian National Collection
MCZ, Museum of Comparative Zoology, Harvard University
USNM, National Museum of Natural History, Smithsonian Institution

ACKNOWLEDGMENTS

I acknowledge with thanks the cooperation and aid of the following colleagues who have allowed me to study types and specimens in their charge, who have furnished me with specimens and photographs, and who have been kind enough to answer many questions: Mr. André Blanchard, Houston, Texas; Mr. D. S. Fletcher for the Department of Entomology, British Museum (Natural History); Mr. K. B. Bolte for the Canadian National Collection; Mr. Julian P. Donahue for the Natural History Museum of Los Angeles County; Dr. D. C. Ferguson for the National Museum of Natural History, Smithsonian Institution; Dr. Alfred F. Newton, Jr., for the Museum of Comparative Zoology; and Dr. J. A. Powell for the California Insect Survey Collection. I am particularly indebted to Mr. Fletcher for furnishing me the information on the type species of the two generic names. I also thank Mrs. Marjorie Favreau for the preparation of the maps.

SYSTEMATIC DESCRIPTIONS

GENUS *LOMOGRAPHIA* HÜBNER

Lomographa Hübner, [1825], p. 311.

Corycia (misidentification, not Duponchel, 1829): Guenée, 1857, p. 57. Walker, 1861, p. 871. Packard, 1876, p. 300. Grote, 1882b, p. 47. Smith, 1891, p. 69. Gumpenberg, 1896, p. 221.

Bapta Stephens, 1829, p. 147. Anon., 1882, p. 23. Barnes and McDunnough, 1917, p. 111. McDunnough, 1938, p. 156. Forbes, 1948, p. 274.

Orthofidonia (misidentification, not Packard, 1876): Hulst, 1896, p. 324. Dyar, "1902" [1903], p. 304. Smith, 1903, p. 72.

DIAGNOSIS: The species of *Lomographa* can be distinguished from the other Baptni occur-

ring north of Mexico by the simple antennae of the males, by the much smaller socius in the male genitalia, and by the more elongate female genitalia.

ADULT: Head, eyes large, round; front flat or slightly swollen, extending beyond eyes for short distance, dorsal margin rounded or angulate; tongue elongate; palpi short, not quite reaching front; antennae of both sexes simple, with from about 45 to 60 segments. Thorax slender; patagia with numerous hairlike scales; fore tibia unarmed, process one-third to one-half length of segment in male, slightly shorter in female; hind tibia with two pairs of elongate spurs, not dilated and without hair pencil in male. Abdomen slender, without tufts and without row of setae on third segment of male, and eighth segment unmodified. Forewings broadly triangular, with 12 veins; with or without areole; R_1 shortly united with Sc , then either free to costa or shortly united with R_2 . R_5 from stalk before R_{3+4} ; M_1 from upper angle; u_{dc} and m_{dc} straight, l_{dc} weakly curved anteriorly; Cu_1 from below lower angle; fovea absent. Hind wings broad; frenulum strong; Sc approximate to R in basal portion of cell; R and M_1 from before upper angle; M_3 from lower angle; cell extending half width of wing; Cu_1 from one-tenth to one-third distance between angle and Cu_2 .

MALE GENITALIA: Uncus elongate, very slender, of even width, finely setose, curving ventrally, terminating in single spine; socius either rudimentary or elongate; gnathos with very slender margins, large, rectangular or subtriangular, without median enlargement; valves moderate or large in size, rounded apically, with rounded, inflatable, membranous sac at base covered with numerous, very long, slender setae, costa weakly or moderately developed, valvula simple or with weakly sclerotized ridge; transtilla present, either mostly membranous or strongly sclerotized; anellus weakly sclerotized, sagittate or subtriangular; cristae very long and slender; furca absent; tegumen elongate, sides either slender and tapering or swollen; saccus elongate, bluntly pointed or rounded anteriorly, anterior end curved ventrally and with ventrolateral projection on each side of central dig-

itate process; aedeagus simple, tubelike, either shorter than or subequal in length to combined lengths of tegumen and saccus; vesica either unarmed or with several to many spines.

FEMALE GENITALIA: Papillae anales either short, weakly convex, with slender setae and apophyses attached anteriorly, or larger, swollen medially, with capitate setae, and with apophyses attached medially; apophyses posteriores short to moderate in length; sterigma inconspicuous, membranous; lamella postvaginalis either absent or heavily sclerotized and prominent; ductus bursae short to very long, membranous or slightly sclerotized, not clearly differentiated from corpus bursae; ductus seminalis arising ventrally or ventrolaterally from posterior portion of corpus bursae; corpus bursae either with slender, elongate posterior portion and small globose or saclike anterior part, or rounded and rectangular; signum either present or absent.

EARLY STAGES: Partially and superficially described for *semiclarata*, *vestaliata*, and *glomeraria* (see references under these species, below).

FOOD PLANTS: Various members of the Rosaceae appear to be the preferred hosts. In addition, the members of the genus in North America are recorded as feeding on Aceraceae, Betulaceae, Caprifoliaceae, Fagaceae, and Salicaceae. (See references for *semiclarata*, *vestaliata*, and *glomeraria*, below; the food plant of *elsinora* is unknown.)

TYPE SPECIES: For *Lomographa*, *Geometra taminata* [Denis and Schiffermüller], 1775; by subsequent designation of Warren, 1899, p. 342. *Geometra taminata* is a junior subjective synonym of *Phalaena bimaculata* Fabricius, 1775.

For *Bapta*, *Phalaena bimaculata* Fabricius, 1775; by subsequent designation of Westwood, 1840, p. 103.

DISTRIBUTION: Holarctic, extending south into the tropics. In the New World, members of the genus occur from southern Canada to Argentina and southern Brazil. In the Old World, they occur from Japan to England, and south to at least New Guinea and Fergusson Island in the D'Entrecasteaux Islands.

REMARKS: The above description of the

adults and genitalia are based on the four North American species, and the Palearctic *bimaculata* and *temerata*.

KEY TO SPECIES

BASED ON COLOR AND MACULATION

1. All wings above shiny white, without maculation *vestaliata*
Not as above 2
2. Upper surface of forewings dark gray or grayish black, contrasting with shiny white hind wings *semiclarata*
Not as above 3
3. Upper surface of forewings evenly and finely speckled pale gray, with reduced maculation and dark gray fringe; hind wings white, with obsolescent extradiscal line; length of forewing 10 to 12 mm. *elsinora*
Upper surface of forewings coarsely speckled grayish brown to gray, rarely white, with cross lines and discal spot usually prominent; hind wings concolorous with, or slightly paler than forewings, usually with extradiscal line and discal dot; length of forewing 11 to 15 mm. *glomeraria*

BASED ON MALE GENITALIA

1. Aedeagus extremely narrow, 0.1 mm. or less in width; vesica unarmed *vestaliata*
Aedeagus wider, 0.2 to 0.3 mm. in width; vesica with spines 2
2. Vesica with broad band of 35 to 40 slender spines *semiclarata*
Vesica not as above 3
3. Combined lengths of tegumen and saccus 1.7 to 1.8 mm. in length *glomeraria*
Combined length of tegumen and saccus 1.1 to 1.2 mm. in length *elsinora*

BASED ON FEMALE GENITALIA

1. Papillae anales short, simple, with slender, tapering setae; signum present 2
Papillae anales larger, outer margin swollen, with capitate setae; signum absent. *elsinora*
2. Signum with short teethlike projections around outer margin *semiclarata*
Signum strongly dentate 3
3. Ductus seminalis arising at least 2.0 mm. from anterior margin of sterigma *vestaliata*
Ductus seminalis arising not more than 1.0 mm. from anterior margin of sterigma. *glomeraria*

Lomographa semiclarata (Walker), new combination

Figures 1, 2, 7, 11

Corycia semiclarata Walker, 1866, p. 1653. Packard, 1876, p. 302, pl. 10, fig. 24 (adult). Grote, 1882b, p. 47. Smith, 1891, p. 69. Hulst, 1894, p. 304. Gumpenberg, 1896, p. 223.

Bapta semiclarata: Anon., 1882, p. 23. Barnes and McDunnough, 1917, p. 111. McDunnough, 1938, p. 156. Forbes, 1948, p. 69.

Orthofidonia semiclarata: Hulst, 1896, p. 325. Dyar, "1902" [1903], p. 304. Smith, 1903, p. 72. Holland, 1919, p. 337, pl. 43, fig. 30 (adult).

Bapta viatica Harvey, 1874, p. 265, pl. 11, fig. 6 (adult). Packard, 1876, p. 302 (synonym of *semiclarata*).

DIAGNOSIS: The species is recognized by the forewings above being much darker than the shiny white hind wings. The genitalia are characterized, in the male, by the broad band of 35 to 40 slender spines in the vesica and, in the female, by the short toothlike projections around the outer margin of the signum.

MALE: Head with vertex having mixture of pale grayish white and brown scales; front slightly rounded, shiny white, dorsally rounded and with a few brown scales; palpi white, pale brown laterally. Thorax above with mixture of white and dark brown scales, shiny white below; legs white, with outer surfaces brown. Abdomen above with mixture of white and dark brown scales, below white.

Upper Surface of Wings: Forewings white, with brown and brownish black scales becoming more numerous distally, resulting in basal half of wing appearing grayish, outer half grayish black; t. a. line represented by large dark spot on costa two-fifths distance from base, by dark areas at middle of wing and at inner margin; discal spot elongate; t. p. line complete, broad, grayish black, arising three-fourths distance from base, darkened and tending to be outwardly projecting on veins, weakly S-shaped; s. t. area pale, more or less complete, most clearly represented as whitish costal dash and as area above inner margin; terminal area dark, concolorous with t. p. line; terminal line represented by dark venular spots; fringe concolorous with terminal area. Hind wings shiny white; intradiscal line absent; black discal

spot showing through from under surface; extradiscal line absent or weakly represented by a few dark brown scales on veins; terminal line with black venular spots, some specimens with very narrow grayish black line connecting spots; fringe long, concolorous with wing.

Under Surface of Wings: Forewings white, with brownish black or black maculation; discal spot large, elongate; t. p. and s. t. lines represented in anterior portion of wing; terminal line complete, thickened at veins; fringe dark gray, becoming paler posteriorly. Hind wings pure white, with black or brownish maculation; discal spot large; extradiscal line represented by venular dots and a few scattered dark scales in between; subterminal area, in some specimens, with a few scattered dark scales; terminal line complete, thickened at veins; fringe concolorous with wing.

Length of Forewing: 9 to 10 mm.

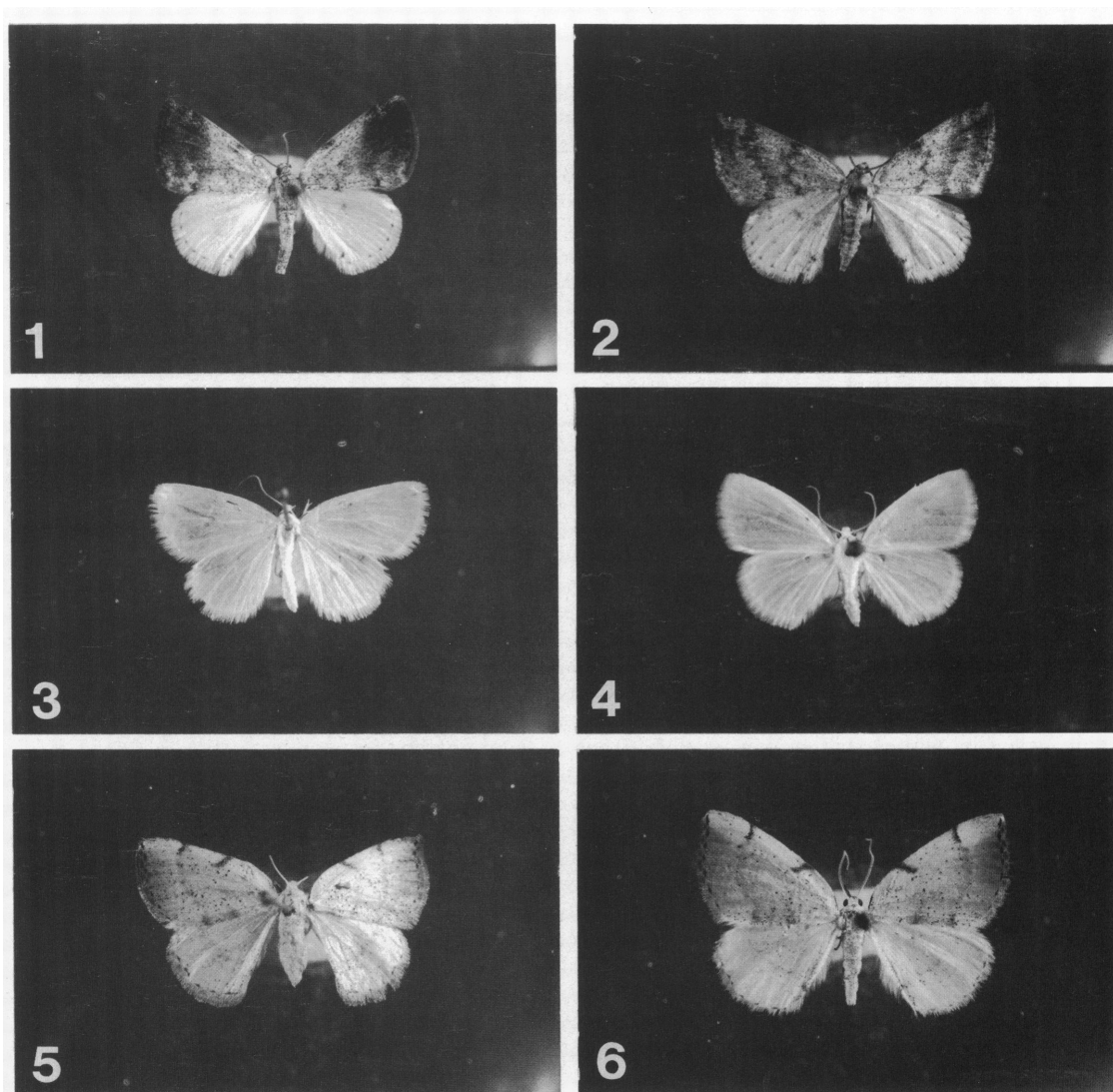
FEMALE: Similar to male, but tending to have slightly paler maculation.

Length of Forewing: 9 to 11 mm.

MALE GENITALIA: Socius moderately elongate; gnathos rectangular; valves widened medially, not extending posteriorly as far as end of uncus; transtilla sclerotized, complete; anellus sagittate, with posterolateral lobes; tegumen slightly longer than wide, sides slender; saccus rounded anteriorly, with ventrolateral projections and curved median end of about equal length; aedeagus equal in length to combined lengths of tegumen and saccus, slightly narrowed medially, posteroventral end lightly sclerotized, bluntly pointed; vesica with about 35 to 40 slender spines in broad band occupying about half length of aedeagus.

FEMALE GENITALIA: Papillae anales short, with slender, tapering setae, apophyses posteriores attached anteriorly and 0.9 to 1.0 mm. in length; ductus bursae slightly longer than wide; ductus seminalis arising ventrally near posterior end of corpus bursae; corpus bursae with slender, elongate, longitudinally striate posterior portion, and small globose anterior part; signum round at surface of corpus bursae, extending inwardly and becoming larger, outer margin with short, sharply pointed, toothlike projections.

EARLY STAGES: Descriptions of the eggs and



FIGS. 1-6. Adults of *Lomographa*. 1, 2. *L. semiclarata* (Walker), males. 1. Horseheads, New York, May 22, 1940 (L. R. Rupert; AMNH). 2. Wallace, Idaho, May 7, 1915 (O. Huelleman; AMNH). 3, 4. *L. vestaliata* (Guenée), males. 3. Lectotype, "Amérique septentrionale" (USNM). 4. West Englewood, New Jersey, June 3, 1954 (F. H. Rindge; AMNH). 5, 6. *L. elsinora* (Hulst). 5. Holotype, female, Elsinore, California, March 28, 1899 (Dietz; AMNH). 6. Male, Cloudburst Canyon, California, May 21, 1942 (AMNH). All $\times 1.7$.

first instar larvae have been given by Dyar (1904, p. 903), and the later instar caterpillars by Sugden (1968, p. 24).

FOOD PLANTS: Various members of the Rosaceae appear to be the favored hosts, with *Amelanchier*, *Aronia*, *Crataegus*, and *Prunus* having been cited by Bird (1927, p. 125), Jones

(1951, p. 124), Ferguson (1954, p. 307; 1975, p. 25), Prentice (1963, p. 394), and Sugden (1968, p. 24). The last two authors also list *Populus* (Salicaceae) and *Alnus* (Betulaceae). Sugden (*op. cit.*) gave *Pseudotsuga* (Pinaceae), but I think that this record needs to be verified as it is the only record for a conifer in the

genus. I have examined specimens reared from *Aronia* (USNM), *Prunus*, and *Sorbus* (CNC; Rosaceae).

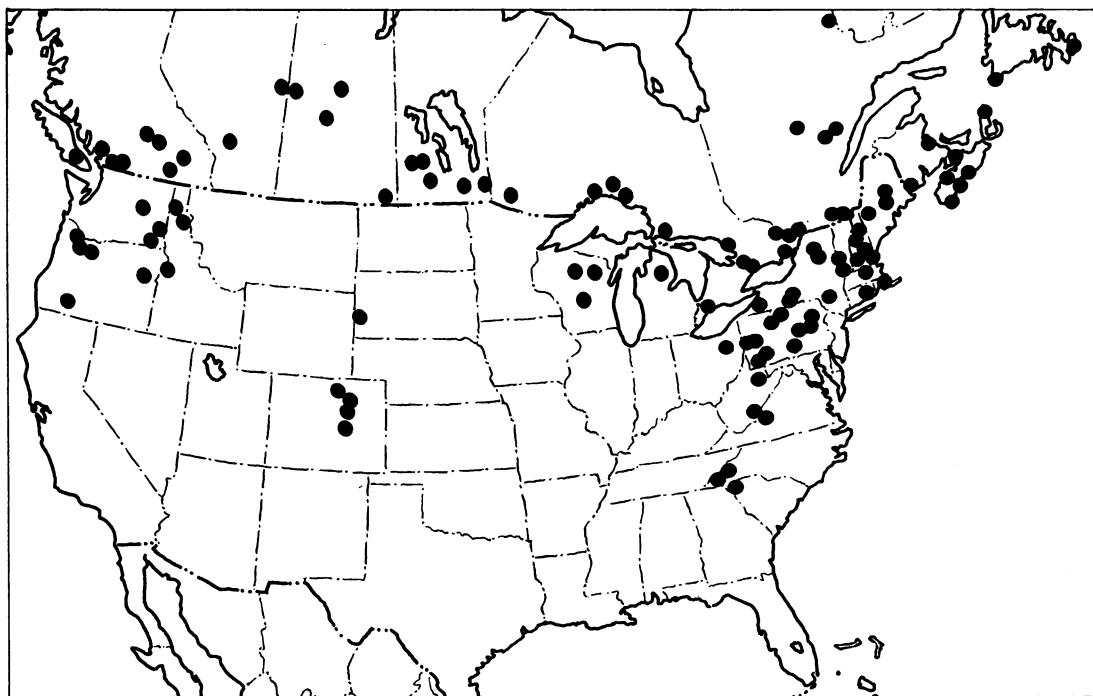
TYPES: Walker described *semiclarata* from a single female. The holotype is in the collection of the British Museum (Natural History).

Harvey had at least one specimen of each sex when he described *viatica*. Hulst (1894, p. 304) stated that the type was in the British Museum (Natural History), but did not give any details about the specimen or its locality. The syntype now in that collection is a male without locality data but bearing what is presumably Harvey's label for *viatica*. This specimen is hereby designated as the lectotype and has been so labeled.

TYPE LOCALITIES: North America (*semiclarata*); unknown, but either Catskill Mountains, New York, or Quebec, according to the original description (*viatica*).

DISTRIBUTION: Transcontinental (see map 1). In Canada, *semiclarata* occurs across the southern portion from Newfoundland and Nova Scotia to Vancouver Island, British Columbia.

The species has been caught as far north as 54°47' in eastern Quebec (CNC). In the continental United States, it ranges from the north-eastern states south in the Appalachian Mountains to North and South Carolina, and west to Washington and Oregon. The species occurs in the Black Hills of South Dakota and along the eastern face of the Front Range in Colorado. There are citations in the literature (see below) from New Jersey, Iowa, and Missouri; I do not have any material from these states before me. For records from specific areas see Smith, 1910, p. 500 (New Jersey); Bird, 1927, p. 125 (Manitoba); Blackmore, 1927, p. 40 (British Columbia); Forbes, 1928, p. 598 (New York); Brown, 1934, p. 243 (Ontario); Procter, 1938, p. 236, and 1946, p. 275 (Maine); Jerrell and Jaques, 1944, p. 465 (Iowa); Bowman, 1951, p. 149 (Alberta); Jones, 1951, p. 124 (British Columbia); Tietz, [1952], p. 132 (Pennsylvania); Ferguson, 1954, p. 307 (Nova Scotia); Moore, 1955, p. 67 (Michigan); Baker, "1959" [1960], p. 219 (Oregon); Prentice, 1963, p. 394, fig. 238 (Canada); Covell,



MAP 1. Distribution of *Lomographa semiclarata* (Walker).

1970, p. 174 (Wisconsin); Brower, 1974, p. 100 (Maine); Ward, Harmsen, and Hebert, "1974" [1975], p. 28 (Ontario).

FLIGHT PERIOD: Late March into July, with most of the moths examined having been caught in May and June.

REMARKS: Three hundred ninety-six specimens (296 males, 100 females) and 15 genitalic dissections (eight males, seven females) have been studied.

Walker's holotype of *semiclarata* is in good condition, although somewhat worn; the right hind wing has a deep tear along the anal margin. The lectotype of *viatica* is in excellent condition; there is no question that this name is a synonym of *semiclarata*.

There appears to be relatively little variability within the species. Moths from the northeastern United States appear to have the upper surface of the forewings slightly darker in color than do specimens from Canada and the western United States.

In the East, this species is primarily one that flies during the day, and seldom comes to light at night. I have never caught it in the western portion of its range, but I assume that it has similar flight habits. Because of its diurnal activity, it can be mistaken for some of the spring butterflies when on the wing.

Lomographa vestaliata (Guenée), new combination

Figures 3, 4, 8, 12

Corycia vestaliata Guenée, 1857, p. 59. Walker, 1861, p. 873. Packard, 1876, p. 301, pl. 10, fig. 23 (adult). Grote, 1882b, p. 47. Smith, 1891, p. 69. Gumpfenberg, 1896, p. 223. Oberthür, 1923, pp. 234, 287, pl. DLIII, fig. 4706 (lectotype male).

Bapta vestaliata: Anon., 1882, p. 23. Barnes and McDunnough, 1917, p. 111. McDunnough, 1938, p. 156. Forbes, 1948, p. 69.

Orthofidonia vestaliata: Hulst, 1896, p. 325. Dyar, "1902" [1903], p. 304. Smith, 1903, p. 72. Holland, 1919, p. 337, pl. 43, fig. 31 (adult).

DIAGNOSIS: This small species is recognized by the upper surface of the wings being shiny white and not having any maculation. The genitalia are characterized, in the male, by the aedeagus being extremely narrow and by the

unarmed vesica; the female structures by the more posterior origin of the ductus seminalis.

MALE: Head with vertex and front shiny white; front flat, dorsally rounded; palpi very small, ochraceous. Thorax and abdomen, above and below, shiny white; legs white, brownish on outer surface.

Upper Surface of Wings: All wings and fringes shiny white, without maculation.

Under Surface of Wings: All wings and fringes shiny white except for pale brownish costal region and anterior veins on forewings; without maculation.

Length of Forewing: 8 to 10 mm.

FEMALE: Similar to male, but with less brownish scaling on under surface of forewing.

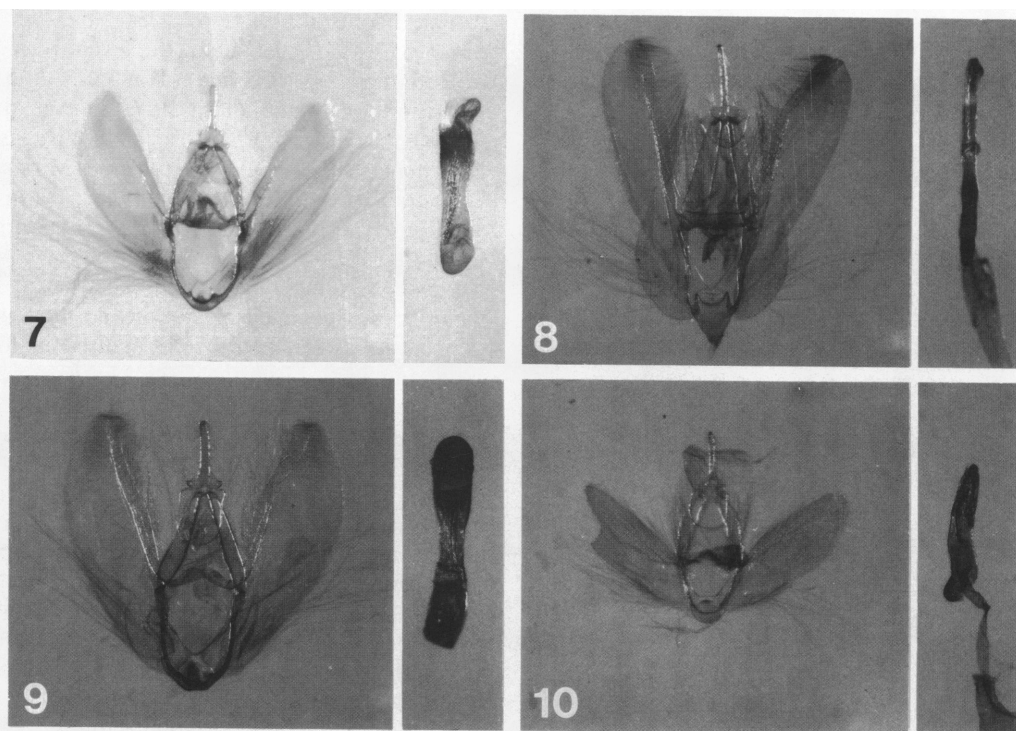
Length of Forewing: 9 to 11 mm.

MALE GENITALIA: Socius elongate; gnathos subtriangular; valves slender, not swollen medially, extending posteriorly as far as, or slightly beyond, end of uncus; transtilla weakly sclerotized, complete; anellus subtriangular, with weakly sclerotized posterior margin; tegumen attenuate, longer than wide, sides slender; saccus elongate, rounded or bluntly pointed anteriorly, curved median end reduced to rounded lip connecting prominent ventrolateral projections; aedeagus slightly shorter than combined lengths of tegumen and saccus, very slender, 0.1 mm. in width, posteroventrally weakly sclerotized, posterodorsally with slender, weakly sclerotized striate band; vesica unarmed.

FEMALE GENITALIA: Papillae anales short, with slender, tapering setae, apophyses posteriores attached anteriorly and 0.8 to 0.9 mm. in length; ductus bursae very long and slender, 1.5 to 2.0 mm. in length, scarcely differentiated from corpus bursae; ductus seminalis arising ventrolaterally, on right side near posterior end of corpus bursae; corpus bursae with slender, longitudinally striate posterior portion about equal in length to globose anterior portion, surface of latter finely reticulate; sterigma round at surface of corpus bursae, extending inwardly and becoming larger, outer margin strongly stellate.

EARLY STAGES: The egg and larvae were described by Dyar (1902, p. 336).

FOOD PLANTS: A number of different hosts have been reported, but various members of the



FIGS. 7-10. Male genitalia of *Lomographa*. 7. *L. semiclarata* (Walker), Estes Park, Colorado, 1938 (J. Moomaw; AMNH). 8. *L. vestaliata* (Guenée), Picton Island, New York, May 29, 1962 (B. Heineman; AMNH). 9. *L. glomeraria* (Grote), Mt. Mitchell State Park, North Carolina, June 22, 1975 (J. B. Sullivan; AMNH). 10. *L. elsinora* (Hulst), San Diego, California, April 12, 1908 (G. H. Field; AMNH; the left valve has been torn).

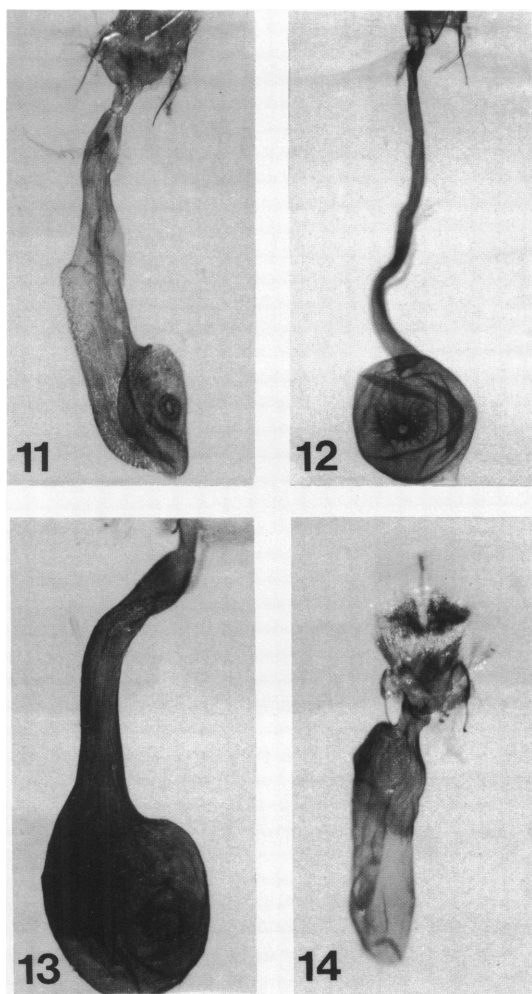
Rosaceae appear to be preferred; these include *Crataegus*, *Malus*, *Prunus*, and *Sorbus*. Other recorded food plants include *Carpinus* (Betulaceae), *Quercus* (Fagaceae), *Acer* (Aceraceae), and *Symphoricarpos* (Caprifoliaceae). For food plant references, see Bruce (1887, p. 48), Dyar (1902, p. 336), Smith (1910, p. 500), Forbes (1928, p. 598), Ferguson (1954, p. 308; 1975, p. 25), and Prentice (1963, p. 395). I have examined specimens reared from *Malus*, *Prunus*, and *Sorbus* (all in USNM).

TYPES: Guenée described *vestaliata* from two males, one in the collection of Zeller, the other in Guenée's. Oberthür (1923, pp. 234, 287, pl. DLIII, fig. 4706) illustrated the specimen from the Guenée collection. This specimen is now in the National Museum of Natural History, via the Oberthür and Barnes collec-

tions (see fig. 3). I hereby designate it as the lectotype, and have so labeled it.

TYPE LOCALITY: "Amérique septentrionale."

DISTRIBUTION: Eastern and central North America (see map 2). In Canada, *vestaliata* occurs across the southeastern portion from Nova Scotia into Manitoba; Prentice (reference below) recorded the species from Newfoundland. In western Canada, *vestaliata* is known from southwestern Alberta and southeastern British Columbia. In the continental United States it probably occurs in all the states east of the Rocky Mountains, although I have not seen any specimens from Alabama, eastern Montana, and eastern Wyoming. It flies in the Black Hills of South Dakota and along the eastern face of the Front Range in Colorado. I have seen one specimen labeled as being from central New Mexico, but this needs verifica-



FIGS. 11-14. Female genitalia of *Lomographa*. 11. *L. semiclarata* (Walker), Chimney Gulch, Colorado (Oslar; AMNH). 12. *L. vestaliata* (Guenée), Orient, New York, August 12, 1952 (R. Latham; AMNH). 13. *L. glomeraria* (Grote), Ohio (H. Edwards; AMNH). 14. *L. elsinora* (Hulst), Wheeler Hot Springs, California, April 12, 1958 (AMNH).

tion. For records from specific areas see Slosson, "1890" [1891], p. 17 (New Hampshire); Smith, 1910, p. 500 (New Jersey); Forbes, 1928, p. 598 (New York); Brown, 1934, p. 243 (Ontario); Procter, 1938, p. 236, and 1946, p. 279 (Maine); Jones and Kimball, 1943, p. 113 (Massachusetts); Jerrel and Jaques, 1944, p. 465 (Iowa); Tietz, [1952], p. 132 (Pennsyl-

vania); Ferguson, 1954, p. 308 (Nova Scotia); Moore, 1955, p. 67 (Michigan); Prentice, 1963, p. 395, fig. 239 (Canada); Kimball, 1965, p. 174 (Florida); McFarland, "1966" [1968], p. 15 (Kansas); Covell, 1970, p. 174 (Wisconsin); Heitzman, "1973" [1974], p. 173 (Missouri); Brower, 1974, p. 100 (Maine); Ward, Harmsen, and Hebert, "1974" [1975], p. 28 (Ontario).

FLIGHT PERIOD: From March into September; one November record has been seen. The majority of specimens from the northern portion of the range have been captured in May, June, and July. In northeastern Mississippi, the moths have been taken from March into September (specimens in AMNH). This indicates several generations per year in the southern portion of the range, compared with a single brood in the north.

REMARKS: Eight hundred forty-four specimens (565 males, 279 females) and 16 genitalic dissections (eight of each sex) have been studied.

The lectotype is in good condition, although it is slightly worn.

There is very little apparent variation within this widely ranging species.

This species commonly flies during the day, and it is also attracted to light at night.

Lomographa glomeraria (Grote), new combination

Figures 9, 13, 15-20

Deilinia glomeraria Grote, 1881a, p. 41; 1881b, p. 134; 1882a, p. 84. Smith, 1891, p. 69.

Deilinia (?) *glomeraria*: Grote, 1882b, p. 47.

Cabera glomeraria: Anon., p. 23.

Macaria glomeraria: Hulst, 1896, p. 331. Dyar, "1902" [1903], p. 311. Smith, 1903, p. 74. Holland, 1919, p. 340, pl. 44, fig. 3 (adult).

Bapta glomeraria: Barnes and McDunnough, 1917, p. 111. McDunnough, 1938, p. 156. Forbes, 1948, p. 69.

Bapta glomeraria ab. *merricki* Cassino and Swett, 1922, p. 179. McDunnough, 1938, p. 156. Forbes, 1948, p. 69.

Bapta virginalis Cassino and Swett, 1923, p. 23. McDunnough, 1938, p. 156. NEW SYNONYMY.

DIAGNOSIS: This relatively large species is recognized by the pale gray upper surface of the wings, with the forewings usually having

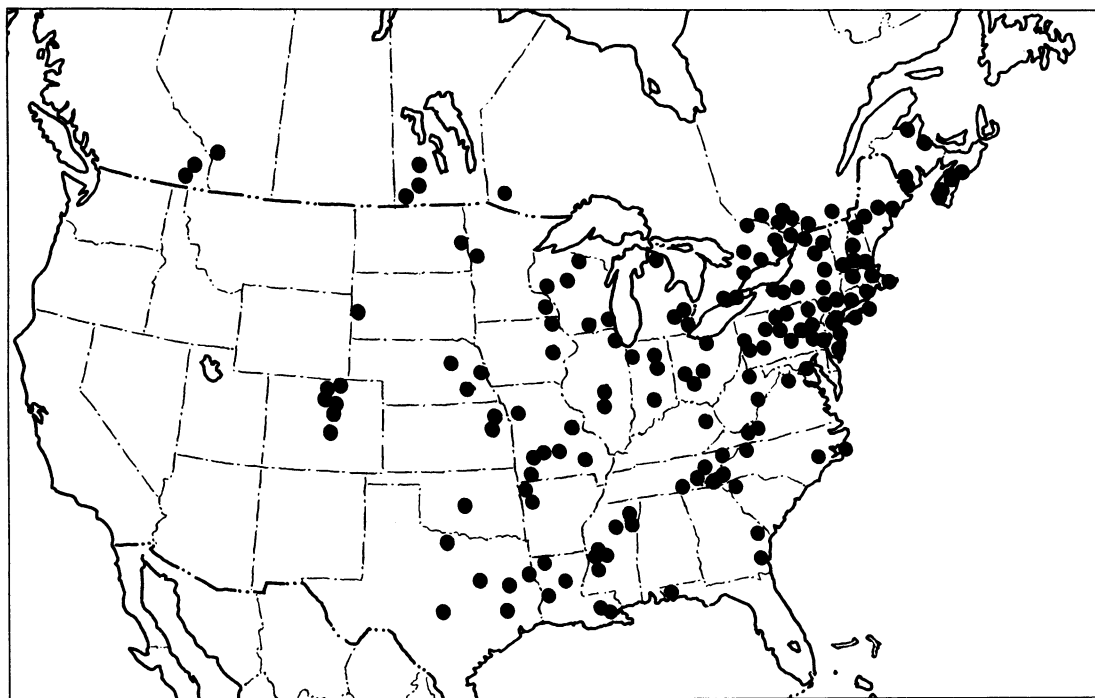
two cross lines and a discal spot. The genitalia are characterized, in the male, by their large size and by the confluent pair of spines in the vesica and, in the female, by the corpus bursae having an elongate, striate posterior portion and a strongly stellate signum.

MALE: Head with vertex shiny white; front flat, brown to dark brown; palpi concolorous with, or slightly paler than front. Thorax above white with scattered dark brown scales, below grayish white; legs white, brown on outer surfaces. Abdomen above white with scattered dark brown scales, below grayish white.

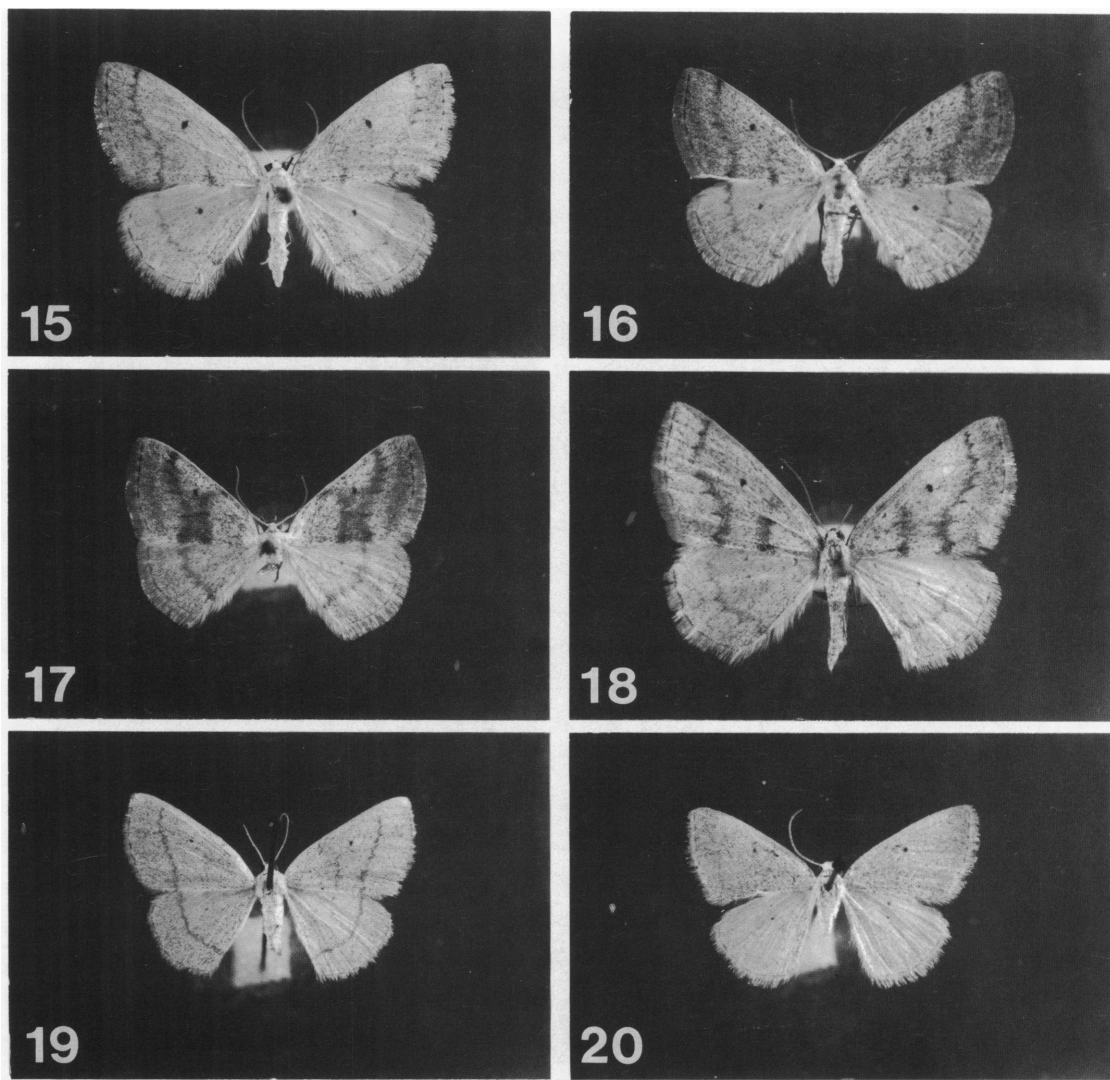
Upper Surface of Wings: Forewings white, more or less heavily and evenly covered with grayish brown and brown scales, outer portion of wing usually slightly darker than basal two-thirds; t. a. line obsolescent to prominent, when present dark, diffuse, appearing in discal cell and extending more or less straight to meet inner margin two-fifths distance from base; discal spot black, small; t. p. line arising as dull black dash 2.0 to 2.5 mm. from apex of wing,

broad, dark, diffuse, weakly S-shaped, meeting inner margin three-fourths distance from base; terminal line very slender, brown, interrupted by veins; fringe concolorous with wing. Hind wings white, with scattered grayish brown and brown scales except anteriorly; discal spot, black, small; extra discal line faint, more or less complete, brown; terminal line brown, slender; fringe concolorous with wing.

Under Surface of Wings: Forewings white or grayish white, anterobasal portion suffused with grayish brown, and with brown scales extending along costal area to outer margin; discal spot black, small; t. p. line usually clearly represented anteriorly, becoming obsolescent or absent posteriorly; terminal line brown, slender, narrowly interrupted by veins; fringe concolorous with wing. Hind wings white with scattered dark brown scales; discal spot black, small; extradiscal line represented by brownish black scales on veins, some specimens with complete line; terminal line and fringe similar to those of forewing.



MAP 2. Distribution of *Lomographa vestaliata* (Guenée).



FIGS. 15-20. Adults of *Lomographa glomeraria* (Grote). 15. Male, Halifax watershed area, Nova Scotia, May 8, 1957 (D. C. Ferguson; USNM). 16. Male, New Brighton, Pennsylvania, April 26, 1901 (H. D. Merrick; AMNH). 17. Form "merricki", holotype, male, New Brighton, Pennsylvania, April 21, 1902 (H. D. Merrick; USNM). 18. Male, Mt. Mitchell State Park, North Carolina, May 15, 1975 (J. B. Sullivan; AMNH). 19. *Bapta virginalis* Cassino and Swett, allotype, female, Kerrville, Texas, May, 1904 (MCZ). 20. *Bapta virginalis* Cassino and Swett, holotype, male, Kerrville, Texas, April 13 (H. Lacey; MCZ). All $\times 1.7$.

Length of Forewing: 12 to 15 mm.

FEMALE: Similar to male.

Length of Forewing: 11 to 15 mm.

MALE GENITALIA: Socius small; not prominent; gnathos rectangular, with anterior margin curved; valves widest medially, not extending

posteriorly as far as end of uncus; transtilla lightly sclerotized, reduced medially; anellus sagittate, with small posterolateral lobes; tegumen with length equal to width, tapering posteriorly, sides slender; saccus rounded anteriorly, with small ventrolateral projections and elon-

gate curved median end; aedeagus slightly longer than combined lengths of tegumen and saccus, weakly constricted medially, posteriorly lightly sclerotized and with sharply pointed apex; vesica with two confluent sclerotized spines, often appearing as one, one slightly longer than other, with longer being one-third length of aedeagus, and with from zero to five small, slender, shorter spines near posterior end of dual spines.

FEMALE GENITALIA: Papillae anales short, with slender, tapering setae, apophyses posteriores attached anteriorly and 1.0 to 1.2 mm. in length, ductus bursae short, two to three times as long as wide; ductus seminalis arising ventrally near posterior end of corpus bursae; corpus bursae with slender, elongate, curved, lightly sclerotized, longitudinally striate posterior portion, and small rounded anterior part; signum shallow, not extending deeply into corpus bursae, outer margin strongly stellate.

EARLY STAGES: While the species has been reared, apparently the only descriptive notes that have been published were by Ferguson (1954, p. 308).

FOOD PLANTS: *Prunus*, and possibly *Crataegus*, both Rosaceae (Ferguson, 1954, p. 308 and 1975, p. 25; Prentice, 1963, p. 396).

TYPES: Grote described *glomeraria* from at least two females. Hulst (1894, p. 304) stated that the type was in the British Museum (Natural History), but did not give any details about the specimen or its locality. The syntype now in that collection is the specimen from Ohio (Pilate); it is hereby designated as the lectotype, and has been so labeled.

The holotype, male, of "merricki" is in the National Museum of Natural History (see fig. 17); its genitalia are mounted on slide HWC 788.

The holotype, male, and allotype, female, of *virginalis* are MCZ 21809 (see figs. 19, 20). The genitalia of the holotype are mounted on Cassino's slide 2593, and have been examined. In the original description, the date of capture of the holotype is given as June 13; the specimen is labeled "IV-13."

TYPE LOCALITIES: Ohio (*glomeraria*); New Brighton, Beaver County, Pennsylvania ("merricki"); Kerrville, Kerr County, Texas (*virginalis*).

DISTRIBUTION: Eastern North America, extending west to between 95° and 100° W longitude (see map 3). The species occurs in southern Canada from Nova Scotia into eastern Manitoba. In the continental United States it extends from the northeast to western Florida, and west to central Texas, Missouri, and Wisconsin. For records from specific areas see Forbes, 1928, p. 598 (New York); Procter, 1938, p. 236, and 1946, p. 275 (Maine); Tietz, [1952], p. 132 (Pennsylvania); Ferguson, 1954, p. 308 (Nova Scotia); Moore, 1955, p. 67 (Michigan); Prentice, 1963, p. 396 (Manitoba); Kimball, 1965, p. 175 (Florida); Covell, 1970, p. 174 (Wisconsin); Heitzman, "1973" [1974], p. 173 (Missouri); Brower, 1974, p. 100 (Maine); Ward, Harmsen, and Hebert, "1974" [1975], p. 28 (Ontario).

FLIGHT PERIOD: From late February (in the south) into June. The majority of specimens examined have been taken in April, May and June.

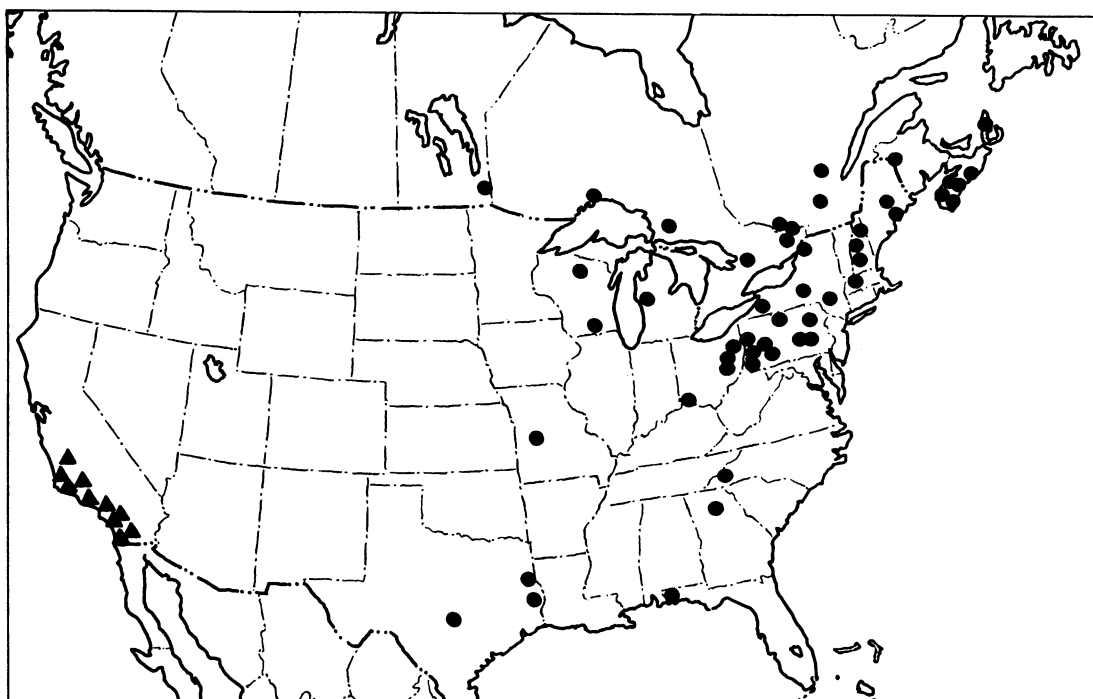
REMARKS: Three hundred ninety-one specimens (211 males, 180 females) and 15 genitalic dissections (eight males, seven females) have been studied.

The lectotype of *glomeraria* is in good condition, although the wings are somewhat rubbed. The t. p. and extradiscal lines, and discal spots are present, and so the species is easily recognized.

The holotype of "merricki" is also in good condition. This name represents the occasional specimen in which the median area of the upper surface of the forewings is partially darkened. Apparently this form may occur anywhere within the range of *glomeraria*.

The holotype of *virginalis* is in good condition. In their original description, Cassino and Swett stated "head in front of antennae dark." What they did not say is that the central and lower part of the front of the holotype has been rubbed and mostly denuded of scales. The description of the front should read brown to dark brown dorsally, becoming paler ventrally.

There is some geographical variation within this species. Specimens from the northeast (Nova Scotia, for example) tend to be paler and more lightly marked than do the ones from New England. The moths from the Appalachian Mountains (North Carolina, for instance) tend



MAP 3. Distribution of *Lomographa glomeraria* (Grote; circles) and *L. elsinora* (Hulst; triangles) in the United States.

to be rather large, more brownish, and to have less clearly defined maculation than more northern specimens. At the southern end of the range of the species (in Florida and Texas), specimens tend to become smaller, paler, and to have less prominent maculation. Cassino and Swett named *virginalis* from what is apparently the extreme end of the distribution, at Kerrville, Texas. Of the four specimens I have seen from this locality, two have the upper surface of the wings with the cross lines absent or only very weakly indicated (the holotype male and paratype female), whereas the other two (both females) have the outer lines slender but clearly represented, with the t. a. line being obsolescent. The two specimens from eastern Texas (one male, one female; both in the Blanchard collection) and the single female from western Florida (in AMNH) are intermediate between typical northern specimens and *virginalis*. There are no noticeable differences in the genitalia of *virginalis* (holotype male and two females, one a paratype, having been examined)

and those from elsewhere within the range of *glomeraria*. For these reasons, I have placed *virginalis* as a synonym of Grote's species.

Lomographa elsinora (Hulst), new combination

Figures 5, 6, 10, 14

Orthofidonia elsinora Hulst, 1900, p. 218. Dyar, "1902" [1903], p. 304. Smith, 1903, p. 72.

Bapta elsinora: Barnes and McDunnough, 1917, p. 111. McDunnough, 1938, p. 156.

DIAGNOSIS: This California moth is recognized by the upper surface of the forewings being pale gray and having reduced or obsolescent maculation, and white hind wings. The genitalia are characterized, in the male, by the single, large curved spine and the one or two very slender spines in the vesica and, in the female, by the papillae anales bearing numerous large, apically swollen capitate setae.

MALE: Head with vertex white or pale grayish white; front raised, flat, brown or

brownish black, dorsal margin angulate; palpi concolorous with front. Thorax above pale grayish white, some specimens with a few scattered black scales, below gray; legs white or grayish white, brown on outer surfaces. Abdomen, above and below, pale whitish gray with scattered black scales.

Upper Surface of Wings: Forewings pale whitish gray, with scattered black scales, becoming grayish brown distally; maculation weakly represented; t. a. and t. p. lines indicated by large, dull black costal spots at two-fifths and three-fourths length of costa, respectively, with obsolescent or weak lines extending to faint gray marks on inner margin; terminal line black, interrupted by veins; fringe concolorous with wing. Hind wings white, some specimens with a few scattered grayish black and black scales; without maculation except for faint, incomplete pale grayish brown extradiscal line; terminal line black, interrupted by veins; fringe pale grayish brown.

Under Surface of Wings: Forewings with basal two-thirds grayish brown, distal one-third gray, the two areas being separated by diffuse t. p. line; otherwise without maculation except for black cellular dots of terminal line; fringe dark gray. Hind wings white, with scattered dark brown and blackish brown scales; small black discal dot present; extradiscal line as on upper surface but more strongly represented; terminal line black, interrupted by veins; fringe white or pale grayish white.

Length of Forewing: 10 to 12 mm.

FEMALE: Similar to male.

Length of Forewing: 11 to 12 mm.

MALE GENITALIA: Socius small; gnathos more or less rectangular, anterior margin curved; valves broad, extended at greater angle than in other species, reaching posteriorly only to base of uncus; transtilla slender, angled posteriorly; anellus sagittate, anteriorly rounded, with posterolateral lobes; tegumen elongate, longer than wide, slender; saccus rounded anteriorly, with prominent median lobe and obsolescent ventrolateral projections; aedeagus slightly longer than combined lengths of tegumen and saccus, posterior end lightly sclerotized, sharply pointed; vesica with one thick, curved, heavily sclerotized spine slightly longer than one-half length of aedeagus, and with one

or two straight, lightly sclerotized, very slender spines of same length but situated slightly more posteriorly.

FEMALE GENITALIA: Papillae anales large, swollen medially, with capitate setae, apophyses posteriores attached medially and 0.6 to 0.7 mm. in length; ductus bursae with length about equal to width; ductus seminalis arising ventrally from posterior end of corpus bursae; corpus bursae roughly rectangular in outline, about three times longer than wide, posteroventrally lightly sclerotized internally and having finely dentate longitudinal striations; signum absent.

EARLY STAGES: Unknown. The shape of the ovipositor lobes is so different in *elsinora* that I would suspect quite divergent oviposition habits, as compared with other North American species.

FOOD PLANT: Unknown.

TYPE: Hulst described *elsinora* from a single female. The holotype (see fig. 5) is in the collection of the American Museum of Natural History (Rindge, 1955, p. 142).

TYPE LOCALITY: Elsinore, Riverside County, California.

DISTRIBUTION: Coastal California, from San Diego into San Luis Obispo counties (see map 3), and northwestern Baja California, Mexico.

FLIGHT PERIOD: From March into June with a very few specimens dated January, August, and September.

REMARKS: One hundred seventy-six specimens (81 males, 95 females) and 11 genitalic dissections (six males, five females) have been studied.

The holotype of *elsinora* is in excellent condition, and so there is no problem identifying this species.

There is some variability in the strength of the cross lines of the upper surface of the forewings. Many specimens have the lines clearly defined, but there are some in which their bands are reduced or obsolescent.

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