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A Study of the Blastobasinae of Nova Scotia, with Particular Reference to Genitalic Characters (Microlepidoptera, Blastobasidae)

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The present paper results from an attempt to determine a small collection of Blastobasidae collected in various localities in Nova Scotia. Early in this study it became evident that very little had been published on the genitalia of the species included in this family. The value of these organs as a means of determining both genera and species is now well understood by all workers in Microlepidoptera thanks largely to the efforts of Busck and Heinrich, and no study of a group is considered complete that does not deal with the structure of both the male and female organs.

The only articles known to the author that contain genitalic figures are two published by Heinrich (1921, Jour. Agr. Res., vol. 20, no. 11; 1921, Proc. U. S. Natl. Mus., vol. 57, no. 2306). The male genitalia of two new species of *Holcocera* as well as those of *H. ochrocephala* Dietz are figured, and figures of the same organ in *Zenodochium citricolella* Chambers and of a species described as new, *Eubolepia gargantuella*, are also included. Species belonging to these two latter genera are not known to occur in Canada.

The Dietz revision of the Blastobasidae (1910, Trans. Amer. Ent. Soc., vol. 36, pp. 1-72, pls. 1-4) is the only complete revision of our North American species. The seven genera comprised in what was called the

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subfamily Blastobases are based entirely on venational characters. In consequence, several genera proposed by Walsingham (1907, Proc. U. S. Natl. Mus., vol. 38, p. 200) were discarded as invalid, "being based on secondary sexual characters," and the species contained in them were transferred to the genus *Holcocera* which, in consequence, became a so-called dumping ground for species with little relationship apart from similarity of venation.

Forbes (1924, Mem. Cornell Agr. Exp. Sta., no. 68, p. 309) has followed the Dietz revision, restricting the number of genera of the Blastobasinae occurring in the eastern states to five, viz., *Blastobasis*, *Euresia*, *Valentinia*, *Calosima*, and *Holcocera*, the last-named genus being divided into several groups based on the size or the entire absence of the basal notch in the male antennae.

In the very limited material at my disposal, it was found that the genera *Blastobasis*, *Valentinia*, and *Holcocera* were represented, as far as venational characters were concerned, and also that in the genus *Holcocera* representatives belonging to the Forbes subsections were also present. As a preliminary to further generic studies, it was deemed very essential to secure specimens of the generotypes of the above genera for dissection. Through the courtesy of Mr. J. Bradley of the British Museum (Natural History), male and female specimens of *phycidella* Zeller and a male specimen of *inunctella* Zeller, the generotypes of *Blastobasis* and *Hyapatopa*, respectively, were secured. From the Canadian National Collection specimens of *chalcofrontella* Clemens, the generotype of *Holcocera*, were lent through the kind offices of Mr. T. N. Freeman. Specimens of *glandulella* Riley, the generotype of *Valentinia*, were available in the material in the Nova Scotia Museum of Science.

Further studies of the genitalia of our museum material in connection with the generotypic species showed clearly that the genera under present consideration could be readily split into two groups. The first group comprises the genera *Blastobasis*, *Valentinia*, and *Hyapatopa*, the last-named genus showing characters quite at variance with those of *Holcocera* and establishing the fact that the lack of a notch in the male antennae is a valid means of separation. In the male genitalia of the above genera, the arms of the gnathos extend transversely a short distance below the uncus, joining in the median area; a short caudad projection may or may not be present. The vinculum is very broad and rounded. The distal end of the aedeagus is furnished with small spines. In the female genitalia the distal section of the very narrow ductus bursae is finely spiculate, somewhat sinuate, and occasionally forming a single convolution before entering the bursa. The signum is a single curved spine or may be entirely lacking. In

the second group, comprising *Holcocera* of the Dietz and Forbes classification, in the male genitalia the arms of the gnathos extend obliquely cephalad, their median point of contact being far removed from the uncus. The vinculum is much narrower. The distal end of the aedeagus is unspined. In the female genitalia the ductus bursae is broader and very strongly convoluted before entering the bursa; spiculation may be present or absent and there is much variation in the character of the signum. Such variation points to the fact that all the included species are not congeneric.

In the following section the individual generic characters are discussed in more detail, and the included species, as far as the species from Nova Scotia are concerned, are listed. No attempt is made to include correctly all the species of the Dietz revision. Such a major study must be left for some worker capable of examining all the type material from the genitalic standpoint.

The types of the new species described in this paper are in the author's collection for the present.

SYSTEMATIC SECTION

GROUP I

BLASTOBASIS ZELLER

Figures 1, 2, 11

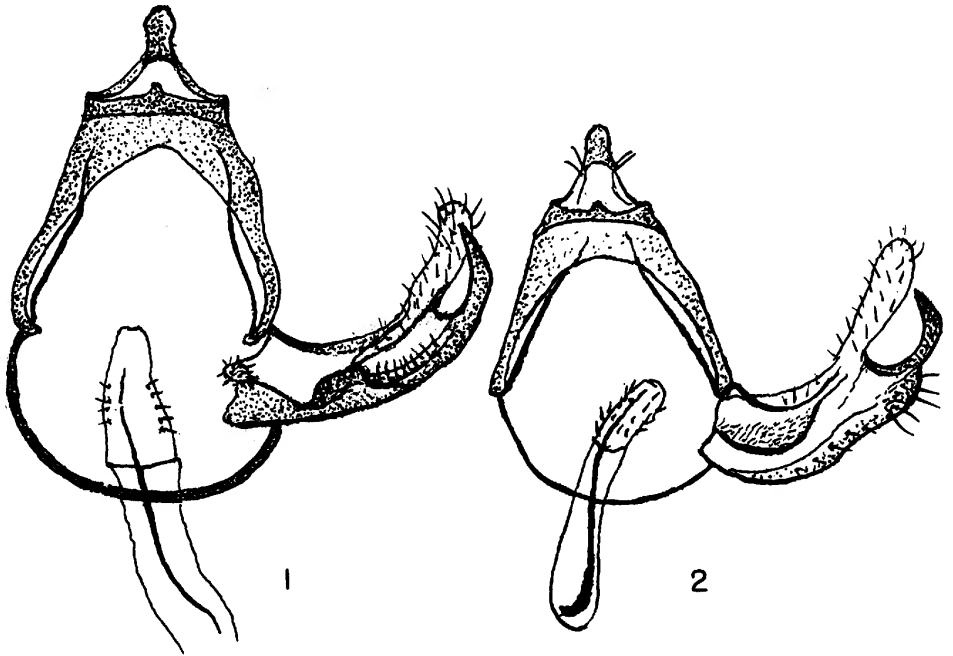
Blastobasis ZELLER, 1855, *Linnaea entomologica*, vol. 10, p. 171; 1873, *Verhandl. Zool.-Bot. Gesell. Wien*, vol. 23, p. 295. WALSINGHAM, 1897, *Proc. Zool. Soc. London*, p. 91; 1907, *Proc. U. S. Natl. Mus.*, vol. 38, pp. 200, 202. DIETZ, 1910, *Trans. Amer. Ent. Soc.*, vol. 36, p. 5, pl. 1. FORBES, 1924, *Mem. Cornell Agr. Exp. Sta.*, no. 68, pp. 309, 314.

GENEROTYPE: *Blastobasis phycidella* Zeller.

The genus is primarily characterized by the lack of vein 4 on the secondaries, a figure of the venation of the generotype being given by Dietz (1910, pl. 1, figs. 1, 1a). Male antennae with a distinct but rather shallow notch above the base, which does not distort the shaft and is partially covered by a small, pointed plate; basal plate with well-marked pecten; shaft shortly ciliate. Female antennae simple. Labial palpi long, upturned as in the whole group.

MALE GENITALIA (BASED ON *phycidella*): Uncus short, with parallel sides and somewhat truncate apex. Gnathos arms directed transversely, joining in the median area which shows a small projection from the caudal margin. Vinculum very broad and strongly rounded. Clasper of the same general type as occurs throughout the group, the costa being produced as a narrow, membranous, feebly setose arm, the sacculus terminating in

a strongly sclerotized, pointed hook, bent inward apically and touching the apex of the costa. The basal half of the clasper is concave and unmarked. The sclerotized sacculus shows a small, rounded, setose area at its extreme base, then narrows sharply, again bulging inward in the median section to form a rounded, setose projection; the area between this projection and the base of the hook again narrows, is somewhat concave, and shows a row of setae somewhat inward from the ventral margin.



FIGS. 1, 2. Male genitalia of *Blastobasis*. 1. *B. phycidella* Zeller. 2. *B. maritimella*, new species, paratype.

Aedeagus of the type found throughout the group, consisting of a long, membranous tube through which a long, thin cornutus runs. The distal section, which forms a species of hood over the basal section, is furnished with lateral rows of small, widely spaced spines.

FEMALE GENITALIA: Ovipositor very strongly extensile, as is characteristic for the whole group. Genital plate a lightly sclerotized rectangle, higher than broad, which appears, as far as can be told, to show no specific or generic characters. Ductus bursae a long, thin, membranous tube, the proximal portion of which is very difficult to examine; the distal section is the most characteristic, being weakly spiculate and convolute immediately before entering the oval bursa. Signum a small spine with

broader lunate base, arising from a more heavily spiculate section of the bursa membrane than found elsewhere.

Under this generic heading Dietz includes seven species. Of these *guilandinae* Busck from Florida and *plummerella* Dietz from Maryland are stated to show a strong basal notch on the male antenna. In *sagitella* Dietz from Pennsylvania and *yuccaecoella* Dietz from Texas, no notch is mentioned. The other three species are based on females. Forbes includes only *plummerella* and *sagitella* in the genus, stating that "our species have male antennae without a notch." He must have misidentified *plummerella*.

Seven male specimens taken at light on Boulderwood, a suburban area of Halifax, Nova Scotia, by D. Ferguson, match in antennal structure and in genitalia those of *phycidella* except for a few minor details in the clasper. The maculation of the primaries does not agree well with any of Dietz's figures on plate 1, coming closest to *hulstella* Dietz, described from a single female from an unknown locality in Texas, possibly one of Boll's or Bel-frage's collection. As the series is considered to belong to an undescribed species, the following description is appended.

Blastobasis maritimella, new species

Figure 2

Labial palpi upturned, the second joint tinged with smoky outwardly, the third joint pale grayish, very pointed. Antennae with pecten on basal joint; shaft grayish, finely ciliated, with basal notch as in *phycidella*. Head and thorax smoky. Primaries with ground color dull whitish, shaded with smoky in the basal area. A broad, blackish, median band, bordered sharply on its basal side by a narrow upright band of the whitish ground color but diffuse outwardly and partially enclosing a black spot in the cell. In worn specimens the band is reduced in width, and the cellular spot is more distinct. The two black discal spots appear joined and, together with a small costal spot and a similar one on inner margin, form a narrow, somewhat broken, subterminal band. Terminal area with a small, pre-apical, black spot and a series of seven smaller black spots along the margin of the wing. Secondaries narrow and somewhat pointed apically, light smoky. Expanse, 10–11 mm.

MALE GENITALIA: Slightly smaller than those of *phycidella* but quite similar in structure of uncus, vinculum, and gnathos. Clasper also similar in general appearance but differing in minor structural details. The sacculus lacks the rounded, setose area at base; instead there is a slightly raised, setose area subbasally, bordered ventrally by a curved, strongly sclerotized margin. The terminal hook is shorter and more spoon-shaped; there is a faintly spiculate area at its base. The aedeagus shows the same

long cornutus as in *phycidella*, but the hood-like distal section is shorter, and the spines are more scattered over the entire surface instead of occurring only laterally.

TYPE MATERIAL: Holotype, male, Boulderwood, Halifax, County, Nova Scotia, August 14, 1959 (D. Ferguson). Paratypes, Six males, same locality, August 11, 14, 1959.

BLASTOBASOIDES, NEW GENUS

Similar in venational characters to *Blastobasis*, vein 4 of the secondaries lacking. Palpi upturned, the third joint long and slender. Antennae with basal joint showing distinct pecten; no notch at the base of the shaft in the male sex, the ciliation being longer than in *Blastobasis*. Male and female genitalia with characters distinct from those of *Blastobasis*; these are treated in detail in the description of the generotype.

GENEROTYPE: *Blastobasoides differtella*, new species.

Blastobasoides differtella, new species

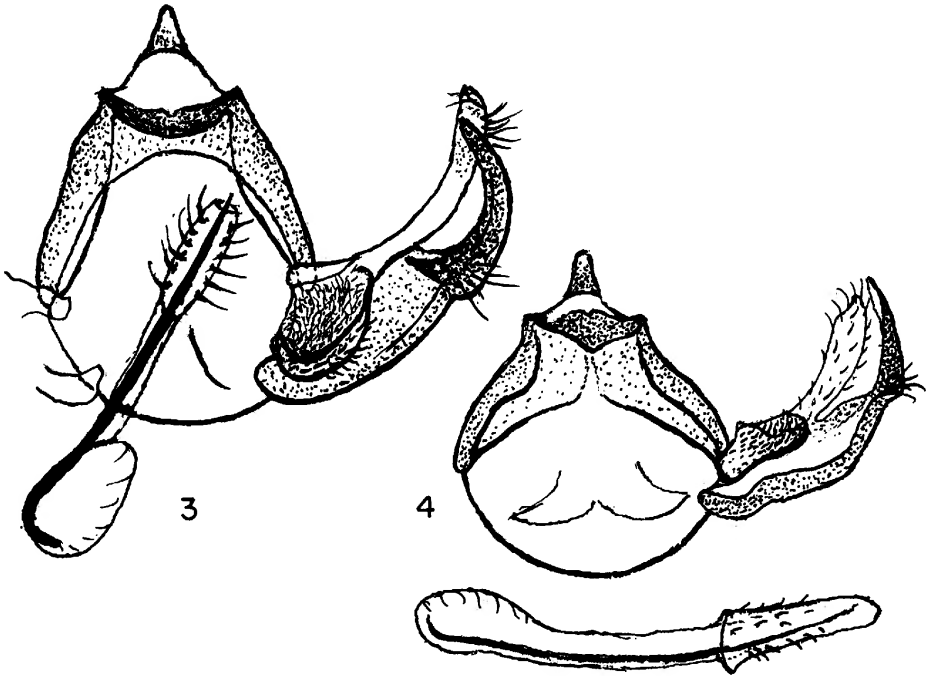
Figures 3, 12

Labial palpi smoky in color, long, thin, upturned, the third joint pointed and about two-thirds of the length of the second. Antennae with the basal joint covered with closely appressed, white scales and with distinct pecten; the shaft smoky, with much longer ciliations in the male sex than in *Blastobasis*. Head white, rather shiny. Thorax mostly smoky, with patagia tipped with white. Primaries of a dull white ground color sprinkled lightly with smoky atoms. Maculation very similar to that of *Blastobasis maritimella*. Base of wing shaded lightly with smoky, especially at costa and inner margin. An antemedian upright dark band, bordered inwardly by a narrow area of the ground color, outwardly diffuse and partially concealing a small black spot in the cell. The two black discal spots at the end of the cell are more or less fused; there are small blackish patches above and below them on the costal and inner margins and traces of a similar patch beyond them in the median area. The usual terminal row of small, black spots is quite weak. Secondaries pale smoky, considerably broader than in *B. maritimella*. Expanse, 15–16 mm.

MALE GENITALIA: Uncus short, the sides gradually converging to a blunt point, gnathos arms directed transversely, joined and broadened in the median area, with a slight indentation on the caudal margin but without the projection of *Blastobasis*. Vinculum broad and gently rounded.

Clasper with the basal two-thirds thickly clothed with very fine hairs, this area being bordered on the ventral side by a lunate, sclerotized band,

narrowing towards costa and sparsely clothed with small spines. Sacculus rounded at base, then narrowing and produced distally into a long sclerotized hook, bent inward apically and partially covering the costal arm; at its base the inner margin is produced into a short, raised spine, and the outer margin shows a cluster of short hairs. Aedeagus membranous, with the usual long cornutus arising from a bulbous proximal area. The distal hood-like section shows lateral series of quite long, spine-like hairs, much longer than in *Blastobasis*.



FIGS. 3, 4. Male genitalia. 3. *Blastobasoides differtella*, new species, holotype. 4. *Hypatopa inunctella* Zeller, generotype.

FEMALE GENITALIA: Genital plate lightly sclerotized, oblong with scattered hairs on caudal margin. Proximal portion of ductus bursae (as far as can be judged) narrow, straight, and membranous, leading into an enlarged, bulb-shaped section, beyond which the tube again narrows and becomes lightly spiculate and slightly twisted before entering the membranous bursa which is narrowly oval with a long neck and no signum.

TYPE MATERIAL: Holotype, male, White Point Beach, Queens County, Nova Scotia, June 28, 1953 (J. McDunnough). Allotype, female, same data, July 15, 1953. Paratypes: Two males, same data, July 11 and 12, 1953; one female, same data, July 6, 1955.

Other specimens not included in the type series are: one male, Parrsboro, Nova Scotia, June 22, 1954; one female, Boulderwood, Halifax County, August 18, 1959; and one male, Topsail, Avalon Peninsula, Newfoundland, July 23, 1954; all collected by D. Ferguson.

REMARKS: In order to avoid a nomenclatorial tangle by basing the generotype of the new genus on a misidentification, it has been considered as better policy to name the species, especially as it did not match well with any of Dietz's figured specimens in the genus *Blastobasis*.

HYPATOPA WALSINGHAM

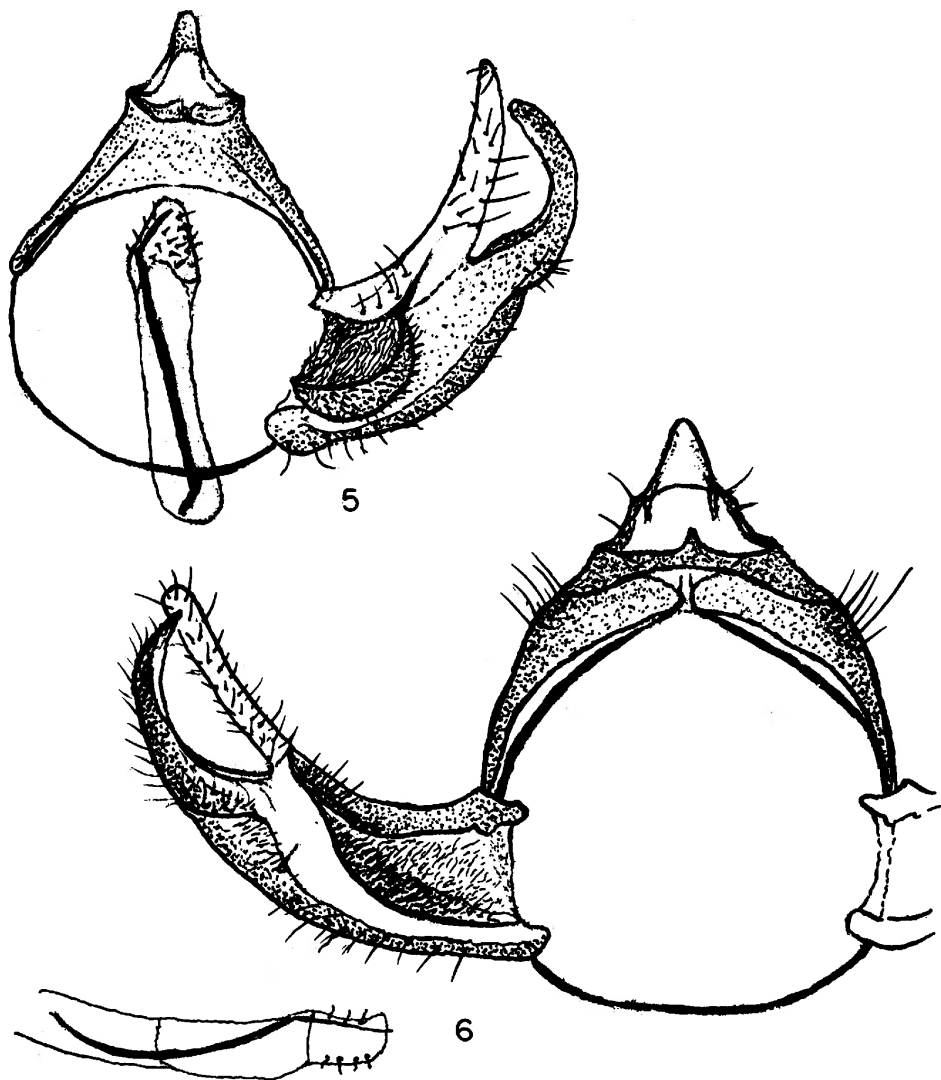
Figure 4

Hypatopa WALSINGHAM, 1907. Proc. U. S. Natl. Mus., vol. 33, pp. 200, 211.
DIETZ, 1910, Trans. Amer. Ent. Soc., vol. 36, p. 23 (as synonym of *Holcocera*).

GENEROTYPE: *Blastobasis inunctella* Zeller.

Walsingham's characterization of the genus is contained in the key given on page 200 of his synoptic table of genera. The main characters are as follows: Hind wing with eight veins, veins 3 and 4 stalked, vein 5 free. Male antennae without basal notch. Dietz considered it a synonym of *Holcocera* as already noted. Whether all the species without notch on the male antennae, following caption 21 of his "Table of Species" (p. 25), fall into the genus *Hypatopa* cannot be decided until genitalic slides can be made from the Dietz material. The male genitalia of the generotype, *inunctella*, as herewith figured (fig. 4), show considerable resemblance to those of *Blastobasoides differtella*, but the tegumen and vinculum are much broader, the terminal hook of the sacculus lacks the basal spine, and the spining of the hood-like section of the aedeagus is very weak, being composed of irregularly placed, very short spines.

A large species, of which two males and three females are in the collection of the Nova Scotia Museum of Science, falls into *Hypatopa* on characters above mentioned. By Dietz's key it runs to *punctiferella* Clemens and shows considerable resemblance to his figure (pl. 4, fig. 33a) of *Hypatima subsenella* Zeller (1873, Verhandl. Zool.-Bot. Gesell. Wien, p. 302) described from a male from Dallas, Texas, and which Dietz considered to be merely a variety of *punctiferella*. The much larger size of the museum specimens, the greater prominence of the dark antemedian band, and the fact that all the specimens were taken in areas distinctly Hudsonian in character make a placement under *subsenella* distinctly unsatisfactory, and it is considered best to describe the species as new.



FIGS. 5, 6. Male genitalia. 5. *Hypatopa titanella*, new species, holotype. 6. *Valentinia glandulella* Riley.

Hypatopa titanella, new species

Figures 5, 13

Palpi thin, upturned, blackish, the third joint pointed and about two-thirds of the length of the second one. Antennae black, the cilia in the male sex quite short. Head dull, whitish gray. Thorax smoky, with the patagia tinged with white. Primaries of a dull whitish ground color, faintly shaded with smoky and with the veins in the terminal area out-

lined in black. The basal area is obscurely smoky; antemedian blackish band rather broad and somewhat irregular in outline, the inner edge being gently outwardly bowed, and the outer edge diffuse and partly concealing a black spot in the cell. Median area largely whitish, with a distinct black spot in the fold and the usual two black discal spots more or less conjoined. Slightly more apical than these spots are small dark blotches on the costa and inner margin and a median blotch situated still more subapically; these blotches show a certain tendency to join with one another and with the discal dots. The terminal margin of the wing shows a distinct row of seven black spots. Secondaries broad, deep smoky. Expanse, 19–20 mm.

MALE GENITALIA: Uncus short, narrow, sides parallel, apex truncate. Gnathos arms placed transversely, narrow, gradually broadening towards median area, where they meet and partially coalesce, leaving a central excavation on caudal margin. Tegumen and vinculum very broad, the latter evenly rounded. Clasper of the usual blastobasid type. Basal area very finely hairy, bordered on the ventral side by a sclerotized, lunate band which is sparsely covered with small spines. Sacculus with a strong, broad, terminal hook, bent inward apically and touching the membranous costal arm. Aedeagus with the usual long cornutus extending through its entire length; the apical hood clothed with small scattered spines.

FEMALE GENITALIA: Genital plate the usual weakly sclerotized rectangle, much higher than broad. Connection of ductus bursae with genital plate could not be determined; the initial portion consists of a long, very thin, membranous tube, somewhat twisted; the spiculate distal portion is also long and twisted, expanding slightly before entering the bursa apically. Bursa oblong-ovate, feebly spiculate; signum a single small pointed spine on a broader base.

TYPE MATERIAL: Holotype, male, Pudsey Point, Cumberland County, Nova Scotia, July 9, 1955 (D. Ferguson). Allotype, female, French Mountain, Cape Breton National Park, 1390 feet in altitude, July 2, 1954 (D. Ferguson). Paratypes: One male, Jefferson Notch Road, 3000 feet in altitude, New Hampshire, June 30, 1953 (D. Ferguson); one female, St. Paul Island, Cabot Strait, Nova Scotia, July 25, 1955 (D. Ferguson); one female, Salmonier, Avalon Peninsula, Newfoundland, July 27, 1954 (D. Ferguson).

VALENTINIA WALSINGHAM

Valentinia WALSINGHAM, 1907, Proc. U. S. Natl. Mus., vol. 33, p. 200. DIETZ, 1910, Trans. Amer. Ent. Soc., vol. 36, pp. 5, 13. FORBES, 1924, Mem. Cornell Univ. Agr. Exp. Sta., no. 68, p. 310.

GENEROTYPE: *Gelechia glandulella* Riley.

The genus is well characterized by Walsingham. The main feature is in the venation of the secondaries with eight veins, vein 3 being free and veins 4 and 5 stalked. The male antennae have a large notch at the base of the stalk. Dietz's generic key (1910, p. 5) shows a typographical error, the words "free" and "stalked" in caption 3 being interchanged. Forbes corrects this error in his key.

Valentinia glandulella Riley

Figures 6, 14

Gelechia glandulella RILEY, 1871, Canadian Ent., vol. 3, p. 118.

Holcocera glandulella, RILEY, 1872, Fourth Rept. Inj. Ins. Missouri, p. 144, figs. 66a-g.

Blastobasis nubilella ZELLER, 1873, Verhandl. Zool.-Bot. Gesell. Wien, vol. 33, p. 297, pl. 4, fig. 36.

Valentinia glandulella, WALSINGHAM, 1907, Proc. U. S. Natl. Mus., vol. 33, p. 201. DIETZ, 1910, Trans. Amer. Ent. Soc., vol. 36, pp. 13, 14, pl. 1, figs. 8, 8a. FORBES, 1924, Mem. Cornell Univ. Agr. Exp. Sta., no. 68, p. 310.

The specific synonymy as established by Dietz has been followed. The same author's description of the species is adequate except for the genitalia, an omission that is herewith corrected, based on a pair of specimens from Argyle, Yarmouth County, in the collection of the Nova Scotia Museum of Science.

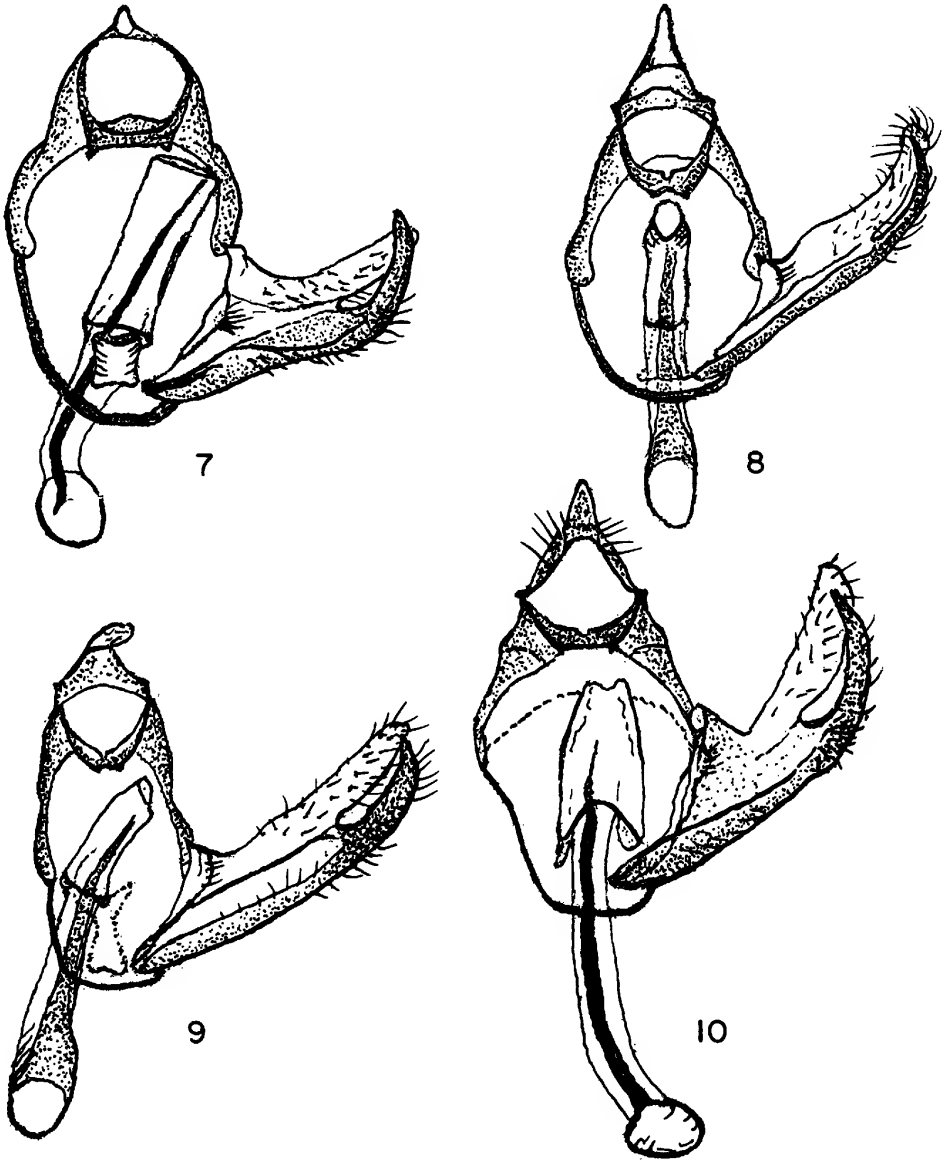
MALE GENITALIA: In general very similar to those of *Blastobasis*, especially in the structure of the gnathos and the spining on the aedeagus hood. Tegumen and vinculum very broad, the latter gently rounded. The finely haired area at the base of the clasper is present but rather indistinct, and the bordering sclerotized band is somewhat differently shaped. The whole organ is very much larger than in *Blastobasis*.

FEMALE GENITALIA: Very similar to those of *Hypatopa titanella*, the twisted distal section of the ductus bursae showing the same type of spiculation as in that species. A considerably reduced figure is given of the long extensile section of the ovipositor and the genital plate which, as already stated, are very similar throughout the whole group. The terminal section of the ductus and the bursa with the signum spine are also shown.

GROUP II

HOLCOCERA CLEMENS

Holcocera CLEMENS, 1863, Proc. Ent. Soc. Philadelphia, vol. 2, p. 121. STAINTON, 1872, Tineina of North America, p. 225. WALSINGHAM, 1907, Proc. U. S. Natl. Mus., vol. 33, p. 200 (designates generotype). DIETZ, 1910, Trans. Amer. Ent. Soc.,



FIGS. 7-10. Male genitalia. 7. *Holcocera chalcifrontella* var. *fumerella* Dietz. 8. *Holcocerina simuloides*, new species, holotype. 9. *Holcocerina confluentella* Dietz. 10. *Holcocerina immaculella* McDunnough.

vol. 36, pp. 5, 23 (*partim*). FORBES, 1924, Mem. Cornell Univ. Agr. Exp. Sta., no. 68, p. 310.

GENEROTYPE: *Holcocera chalcifrontella* Clemens.

Characterized by the presence of all eight veins on the hind wings.

Veins 3 and 4 stalked, vein 5 free, connate with the stalk of veins 3 and 4. The male antennae with a distinct but not very deep notch at the base of the shaft, the ciliations of which are quite short. The male and female genitalia not only differ from the type shown in group I but also in many details from other species at present placed in the genus on the basis of venational characters. On this account, the scope of the genus must be radically restricted, but at the present time the author is unable to state how many of the species placed here by Dietz actually belong on genitalic characters. A detailed description of the male and female organs will be found under the following specific heading.

Holcocera chalcfrontella Clemens

Figures 7, 15

Holcocera chalcfrontella CLEMENS, 1863, Proc. Ent. Soc. Philadelphia, vol. 2, p. 122. STANTON, 1872, Tineina of North America, p. 226, BUSCK, 1903, Proc. Ent. Soc. Washington, vol. 5, p. 212. DIETZ, 1910, Trans. Amer. Ent. Soc., vol. 36, pp. 25, 33, pl. 2, fig. 17. FORBES, 1924, Mem. Cornell Agr. Exp. Sta., no. 68, p. 311.

Holcocera chalcfrontella var. *fumerella* DIETZ, 1910, Trans. Amer. Ent. Soc., vol. 36, p. 35. FORBES, 1924, Mem. Cornell Agr. Exp. Sta., no. 68, p. 312.

As already stated, typical specimens of this species, bred from sumac, have been available for study through the courtesy of Mr. T. N. Freeman of Ottawa. This typical form has not as yet been recorded from Nova Scotia, but our collection contains several specimens of a darker form, presumably var. *fumerella* Dietz, which agree very closely genitally with the sumac feeders. One of these specimens, a female, was bred from a larva found in the empty cocoon of the apple-bud moth (*Spilonota ocellana*) by H. T. Stultz of the Kentville Entomological Laboratory. Whether a good species is represented is dubious.

MALE GENITALIA: Uncus arising from a broad base, short, with pointed apex. Gnathos arms directed vertically for a considerable distance, then turned inward to join in the median area as a transverse plate with convex caudal edge; the lateral edges of this plate project shortly cephalad in the form of short spines. Vinculum much narrowed, with somewhat truncate apical margin. Clasper simple, of the usual form and entirely lacking the hairy area of group I. In the median area of the extreme base is a small, sclerotized projection bearing apically a few fine hairs. The aedeagus shows the usual single, long cornutus; the distal, hood-like section is long and broad, with truncate apex, and is entirely free of any spining.

FEMALE GENITALIA: Very characteristic. The genital plate is the usual, lightly sclerotized rectangle, higher than broad; at its cephalic end it bears two lateral, rounded areas, covered with short hairs; the ostium,

situated on the cephalic margin centrally, is narrow, rounded, and feebly sclerotized for a short distance before entering the proximal end of the narrow, membranous ductus bursae. This ductus is straight for a considerable distance, then broadens, becomes lightly spiculate, and performs a series of complicated convolutions just before entering the oval bursa which is rather small and faintly shagreened. The characteristic signum consists of a semicircular, sclerotized plate on the right side of the bursa, thickly covered with small spines.

Several species, which on venational characters alone would fall into the genus *Holcocera*, show in their genitalia, especially in the female sex, considerable variation from those of the generotype, *chalcfrontella*. Such species as could be examined or are known from Heinrich's figures resemble each other very closely in the male genitalia. The main difference from *chalcfrontella* is found in the type of gnathos which in the connecting apical area consists of a much narrower plate, without any lateral projections but with a slight median excavation on the caudal margin. In the female genitalia the differences are much more marked. The genital plate lacks the lateral, rounded, hairy areas and conforms in this respect to the general type already mentioned. The signum in the bursa is quite different and consists of either a single spine or an irregular piece of chitin. The very variable, twisted condition of the ductus bursae seems to show more of a specific character than of a generic one.

In the few species of which material is before the author, the males show a deep notch at the base of the antennal shaft, distorting it to a certain extent. Forbes includes only three species in his subsection based on this character, viz., *dives*, *aphidiella*, and *confluentella*. The latter species, the only one with a figure by Dietz of the forewing maculation, is placed in a different subsection by Dietz, but he includes *estriatella*, entirely overlooked by Forbes, although the type is recorded as from Massachusetts. No figure of forewing maculation is given. The difficulty in making a correct specific determination is very great, but rightly or wrongly certain specimens before the author have been placed as *confluentella*.

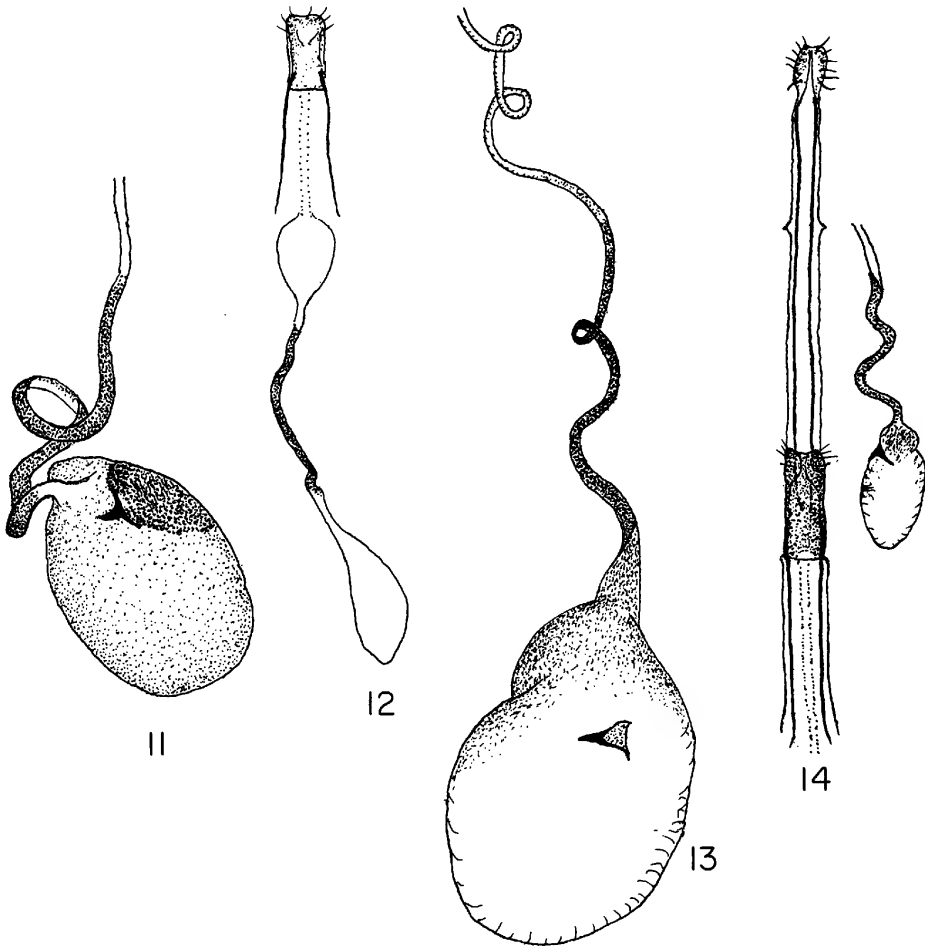
It seems advisable to propose a new generic term for species showing the genitalic characters that are mentioned above.

HOLCOCERINA, NEW GENUS

Venation as in *Holcocera*. Male antennae with a variably deep notch at base of shaft which in consequence is slightly distorted; ciliation of variable length.

Male genitalia with short uncus, either sharply pointed or broadly rounded at apex. Gnathos arms more or less vertical, bending inward to-

wards apices, conjoined in median area to form a sclerotized plate, with small median excavation on caudal margin and with cephalic margin either straight or somewhat concave, with rounded lateral edges. Vinculum narrow, more or less rounded or slightly truncate. Clasper as in *Holcocera*. Aedeagus membranous, rather long and narrow, with the usual



FIGS. 11-14. Female genitalia. 11. *Blastobasis phycidella* Zeller, generotype. 12. *Blastobasoides differtella*, new species, allotype. 13. *Hypatopa titanella*, new species, allotype. 14. *Valentinia glandulella* Riley.

long cornutus; distal hood with open, rounded apex, the lateral edges slightly sclerotized in some specimens but without spines.

Female genitalia with genital plate lightly sclerotized, nearly square, with a few scattered hairs on caudal edge. Ductus bursae narrow and

membranous, straight in its initial portion, variably twisted and convolute, as it approaches the bursa, this section in some specimens showing light spiculation. Bursa lengthily oval, faintly shagreened. Signum either a single spine on a broad, curved base or a piece of irregularly shaped chitin.

GENEROTYPE: *Holcocerina simuloides*, new species.

***Holcocerina simuloides*, new species**

Figures 8, 16

MALE: Palpi long, thin, upturned; second joint deep smoky outwardly, paler on inside, with whitish base; third joint white, shaded with smoky apically, leaving a white ring at base as well as at the extreme tip. Antennae with pecten of basal joint well developed; shaft dark with a moderate notch at base, which distorts the shaft slightly; ciliation moderate. Head whitish, somewhat shiny. Thorax largely dark, with whitish patagia. Primaries with white ground color, slightly sprinkled with smoky atoms. Basal area smoky, not sharply defined outwardly. Median band blackish, broad, sharply outlined inwardly by the white ground color and gently convex; outwardly very diffuse and extending almost to the two black discal dots which are confluent; no trace of a dot in the cell. A small dark blotch on costa above the discal dots and another below them on inner margin. Veins in terminal area outlined in black. A distinct row of seven black dots extending along costo-apical and outer margin. Expanse, 14–15 mm.

FEMALE: Antennae simple. Primaries less distinctly maculate, the smoky suffusion being more extended. Discal dots separate or partly fused. Expanse, 16–17 mm.

MALE GENITALIA: Uncus narrow, pointed apically. Gnathos arms directed obliquely inward, joining to form a moderately broad plate with a small median excision on the caudal edge; the cephalic edge concave, laterally rounded without projections. Vinculum gently rounded apically, fairly narrow. Clasper of the usual type, the apical hook of the sacculus thin, pointed, extending across the apex of the costal projection. At extreme base is a small, sclerotized plate with a few apical hairs, a characteristic found apparently in the whole group. Aedeagus membranous with the usual long cornutus. The apex of the hood-like section circular and open, the sides slightly sclerotized.

FEMALE GENITALIA: Genital plate lightly sclerotized, virtually square, with scattered hairs along the caudal margin; no definite ostium could be detected. Ductus bursae thin, entirely membranous, rather short and straight until just before reaching the bursa, where it makes two small

convolutions and enters the bursa at its apical end. Bursa large, oval, membranous, with somewhat narrowed apical section. Cephalad of the section is a large, lunate piece of chitin with pointed ends. What could be termed the signum proper is a small, lunate piece of chitin, also with pointed ends. The two terminal convolutions of the ductus bursae and the two chitinous pieces in the bursa are characteristic for the species.

TYPE MATERIAL: Holotype, male, Lake Kejimukujik, Queens County, Nova Scotia, June 11, 1958 (D. Ferguson). Allotype, female, same locality and collector, May 29, 1958. Paratypes: One female, same locality and collector, May 28, 1958; two females, Waverley, Nova Scotia, May 20, 1951, June 1, 1952.

REMARKS: A small series of male specimens taken at Argyle, Yarmouth County, Parrsboro, and North and French Mountains, Cape Breton Island, in June appears to belong here on genitalic characters, but without females to examine they are not included in the type series, as the close similarity of these organs in the male sex makes a definite determination very difficult.

Holcocerina confluentella Dietz

Figures 9, 17

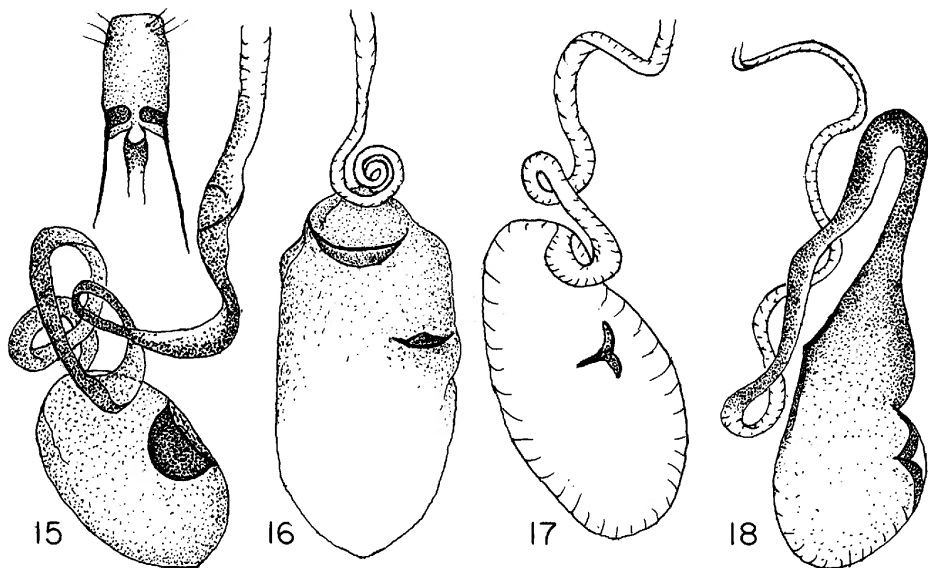
Holcocera confluentella DIETZ, 1910, Trans. Amer. Ent. Soc., vol. 36, pp. 25, 36, pl. 2, fig. 18. FORBES, 1924, Mem. Cornell Agr. Exp. Sta., no. 68, pp. 310, 311.

A small series taken in late June or early July and consisting of two males (Hammond's Plains, Halifax County, and French Mountain, Cape Breton) and four females (Hammond's Plains, Halifax, Parrsboro, and Lake Kejimukujik) have been placed tentatively under this name. The maculation of the forewing matches Dietz's figure quite well, showing the inward angle of the inner edge of the median dark band and the costal spot situated just beyond this band. These characters are especially clear in females from Parrsboro and Lake Kejimukujik. The notch in the male antenna is slightly deeper than in *simuloides*. The male genitalia are closely similar to those of *simuloides*, but the uncus is broader and the apex is rounded, not pointed; the terminal hook of the sacculus is considerably broader. In the female genitalia the ductus bursae is broader and longer, its twisted character occurring more proximad of the entrance into the bursa. The signum consists of a short spine on a wide but rather narrow base.

Holcocerina simplicis, new species

Palpi deep smoky, the third joint pointed and only slightly shorter than the second joint. Antennae dark, with moderate ciliation in the male and

a very deep notch at the base of the shaft, distorting it to a greater extent than in either *simuloides* or *confluentella*. Head dull grayish. Thorax smoky, with paler patagia. Abdomen dull smoky, banded with dark brown transverse stripes. Primaries with the whitish ground color almost obliterated by a heavy suffusion of smoky, giving a generally pale brownish appearance to the wing. Basal area deeper smoky, not well defined outwardly. The usual dark median band is represented merely by a dark brown costal patch which is extended along costa as a narrow, dark stripe,



FIGS. 15-18. Female genitalia. 15. *Holcocera chalcifrontella* var. *fumerella* Dietz. 16. *Holcocerina simuloides*, new species, paratype. 17. *Holcocerina confluentella* Dietz. 18. *Holcocerina immaculella* McDunnough.

reaching nearly to apex; a small dot in the cell is largely concealed by this patch; a more or less obsolescent dark shade occurs on the inner margin but is not connected with the costal patch. The dark discal dots are small and confluent. The usual marginal row of seven dark spots is present but quite obsolescent in the male, more distinct in the female. Secondaries light smoky, with paler fringes. The stalk of veins 3 and 4 is quite short. Expanse, 15 mm.

The male genitalia are virtually similar to those of *simuloides*; the female genitalia agree with those of *confluentella*.

TYPE MATERIAL: Holotype, male, Armdale, Halifax County, Nova Scotia, July 6, 1947 (D. Ferguson). Allotype, female, same data. Paratype, one male, same data.

REMARKS: If it were not for the difference in the depth of the notch in the male antenna, the species might be considered as a mere variety of *confluentella*. The notch is much the same as Dietz's figure of the antennal structure of *dives* (1910, pl. 2, fig. 14). However, the dull color of the forewing does not agree with Dietz's description of either *dives* or *aphidiella*, which are stated as showing considerable iridescent luster.

Holcocerina immaculella McDunnough

Figures 10, 18

Holcocera immaculella MCDUNNOUGH, "1929" (1930), Canadian Ent., vol. 61, p. 269.

Holcocera villella, FORBES (*nec* Busck), 1924, Mem. Cornell Agr. Exp. Sta., no. 68, p. 312.

It has been suggested to the writer that the name *immaculella* may prove to be a homonym of *villella* Busck (1901, Jour. New York Ent. Soc., vol. 8, p. 239). This species was originally referred to the cosmopterygid genus *Triclonella* and was based on a single female "bred by Mr. Pergande from *Xalisma (Andromeda) ligustrina*, collected at Cabin John, Md." According to Dietz (1910, p. 10) Busck "in a personal conversation informs me [Dietz] that it belongs to *Blastobasis*." He states further that "the venation of the hind wings is that of the genus" but could not satisfy himself regarding the forewing venation. He places the species, however, in *Blastobasis*. Forbes (1924, p. 312) places *villella* in *Holcocera*, but he probably had specimens of *immaculella* before him when he made this transfer. Should Dietz's placement be correct, then *immaculella* cannot be a homonym of *villella*. The matter cannot be settled until a careful study of the female type of *villella*, including genitalia, is possible. It might be noted that the food plant is rather a strange one for a blastobasid. Leaving, for the present, the status of *villella* unsolved, mention should be made of another species described by Heinrich (1921, Proc. U. S. Natl. Mus., vol. 57, p. 70) from specimens bred at Ashland, Oregon, from larvae feeding in the cones of *Pseudotsuga taxifolia*. This species was named *Holcocera augusti*, and a figure (pl. 6, fig. 33) of the male genitalia is given. There is no doubt that, both on the coloration of the forewings and the type of genitalia, *augusti* is extremely close to *immaculella*, and the present author must confess that he overlooked Heinrich's description when describing *immaculella*. This species could readily be an eastern race of *augusti*, and there is a good deal of probability that the larval food plant is a conifer species, although, as far as is known, the species has not yet been bred. The fact that Heinrich, who had every opportunity of examining the type of *villella*, described *augusti* as a new species lends

strength to the view that the name *villella*, in spite of great similarity of forewing coloration, is based on a different species.

Because material of *augusti* for study, especially of the female genitalia, is lacking, our eastern form is treated under the name *immaculella* and placed in the new genus *Holcocerina*. The male genitalia are of the same general type as those of the other species placed in this genus; the most striking difference is in the hood-like portion of the aedeagus which is much broader and less open apically. The cephalic margin of the gnathos is straight, with slight lateral projections.

Based on the female genitalia alone the species seems almost worthy of a separate generic name. The genital plate is of the usual rectangular type. The initial portion of the ductus bursae is membranous and very narrow, runs straight for a short distance, and then becomes twisted, extending downward nearly to the distal end of the bursa. The final section is broader and lightly spiculate; it runs caudad, gradually widening, and then bends cephalad to enter the long neck of the bursa. The bursa is long, narrowly oval, and spiculate in its initial portion, the distal half being broader and membranous, very faintly shagreened. The signum is a large, chitinous, spiculate plate, the narrow curving sides of which bend upward to join medially and terminate in a very short spine.

The species is not rare and occurs quite generally in Nova Scotia in late June and early July. It has been taken at light in the Halifax area as well as at Argyle, Yarmouth County, White Point Beach, Queens County, and Parrsboro, Cumberland County.