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REVISION

OF THE

NORTH AMERICAN SPECIES

OF THE GENUS

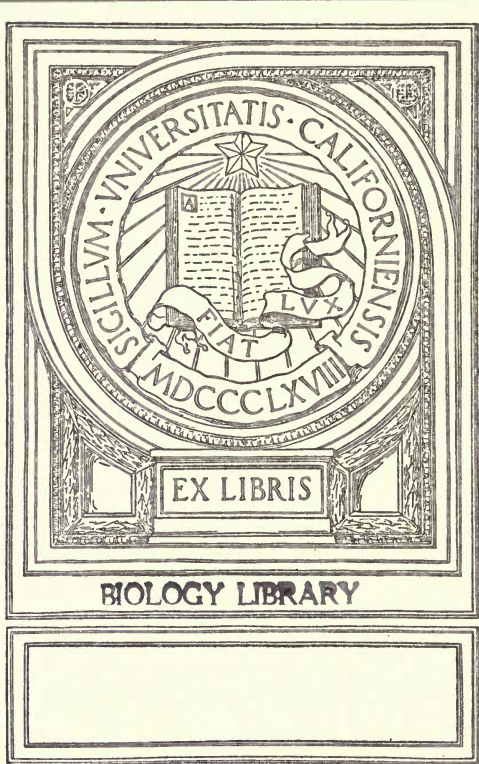
LITHOCOLLETIS
HÜBNER.

BY

ANNETTE F. BRAUN

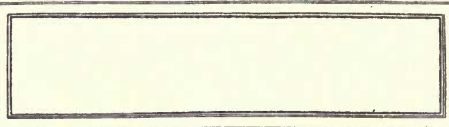
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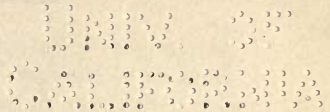
OF THE

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LITHOCOLLETIS

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PREFACE.

In the present revision, the American species of the genus *Lithocolletis** are divided into several natural and easily definable groups, based upon structural differences, not sufficient, however, to warrant the establishment of new genera.

Of necessity, this work is far from complete; the West remains practically unexplored, and it is to be expected that a large number of species are still awaiting description. It is hoped that this systematic arrangement, and the collection of scattered descriptions, rendering identification less difficult, will result in increased effort on the part of those having an opportunity for breeding and collecting in little known regions.

It was the original purpose to give illustrations of every species. The plates contain figures of all of which I was able to see specimens. The figures were in all cases sketched by the author from authentic specimens, most of them bred, and often from the types themselves. It will be noticed, however, that the figures of six species are lacking: of one of these, *L. alni* Wlsm. (= *alnivorella* Cham.), I have seen no specimens and no type is in existence; the types of the other five are in the possession of Lord Walsingham, and I regret that my efforts to secure figures of these have been unsuccessful.

In a number of cases, where the original descriptions are accurate and have proved adequate for the identification of the species and varieties, the original is reprinted. Where the species were described in German, translations following as closely as possible the original text are often given. In these cases, I have added my notes collected by breeding and by the examination of additional specimens. Where the original description might have proved misleading through peculiarities of the specimen described or through the omission of certain characteristics, new descriptions are printed. The necessity of constant reference to detached fragments, some-

* Lord Walsingham, in the "Microlepidoptera of Tenerife" (Proc. Zool. Soc. Lond., 976, 1907), has revived the name *Phyllonorycter* Hb. for this genus.

times inaccessible, has also been a reason for giving new, complete descriptions.

Three European species, formerly included in our fauna, are omitted in the present revision, viz.: *alniella* Zell., *blancardella* Fab. and *faginella* Zell. There is no authentic record of an American specimen of *alniella*; *blancardella* was included in our lists on the ground of the supposed synonymy of Clemens' *cratægella* with this species; the occurrence of *faginella* was based upon the determination by Lord Walsingham of a specimen in Dr. Riley's collection. An examination of this specimen in the National Museum discloses the fact that although a closely related species, it is very distinct from the true *faginella* of Europe.

In many cases, where species feed upon plants having a wide distribution, and are known to occur in widely separated localities, it is probable that the range of the species coincides with that of its food plant, and no specific localities have been given for such species. This is especially true where the distribution of the food plant covers the territory included in the Alleghanian, Carolinian and Austroriparian areas, the "Atlantic States" of Dyar's List.

My thanks are due to Mr. W. D. Kearfott for the loan of a large number of specimens with notes on their life history, for literature upon the genus, and for the encouragement and assistance which have made my work possible.

To Dr. Edward Meyrick of Marlborough, England, to whose consideration the proposed division of the genus was submitted, I am indebted for the expression of his opinion on the establishment of the subgenera, and also for the comparison of several American species with closely related European ones.

Through the kindness of Dr. Henry Skinner of the Academy of Natural Sciences of Philadelphia, and Prof. Samuel Henshaw of the Museum of Comparative Zoology at Cambridge, Mass., I was given every opportunity to examine and sketch the many valuable types of species of this genus.

Dr. James Fletcher has sent me a number of Canadian species for examination, for which privilege I return thanks.

I am under obligations to the U. S. National Museum for the loan of material, and to Dr. Harrison G. Dyar and Mr. August Busck for their courtesy while examining the collection at Washington.

Mr. G. R. Pilate has kindly sent me mines of a number of species from California.

I gratefully acknowledge the assistance I have received from the University of Cincinnati, and my thanks are due to Dr. M. F. Guyer for his interest and suggestions during the progress of my work.

ANNETTE F. BRAUN.

Genus LITHOCOLLETIS.

This genus was originally established for a number of European species, which conform to the conception of the genus as defined by Dr. Meyrick in his "Handbook of British Lepidoptera," p. 733. Among our species there are in addition to the typical *Lithocolletis*, two other groups, distinguished by structural differences, not great enough to warrant the establishment of new genera. In accordance with the opinion expressed by Dr. Meyrick in response to questions regarding the value of these variations in the division of the genus, the *solidaginis* group and that represented by *desmodiella* have been ranked as subgenera, but the flat larval group is treated as "a natural and definable group of the genus."

In order to include all of the American species, the definition of the genus must be somewhat broadened, and it may then be characterized as follows :

Head (Plate XX, fig. 9).—Face smooth, crown rough tufted. Labial palpi porrected or drooping, moderately long, pointed. Maxillary palpi rudimentary. Tongue moderate. Antennæ nearly attaining the wing length, simple in the male, basal joint thickened, bearing a pecten (without a pecten in subgenus *Porphyrosela*).

Forewings elongate, lanceolate, acuminate.

Hindwings about one-half the breadth of the forewings, linear lanceolate, cilia 4-5.

Venation (Plate XX, Figs. 1, 2, 3, 4, 5, 6, 7, 8).—Forewings: 1b simple, 3 absent, 4 absent, 5 absent (typical *Lithocolletis* and *Porphyrosela*), 5* and 6 stalked (subgenus *Cremastobombycia*), 7 to costa, 8 absent, 10 absent, 11 absent (subgenus *Porphyrosela*). Hindwings: 3 absent, 4 absent, transverse vein absent between 2 and 5, 6 absent (typical *Lithocolletis* and *Porphyrosela*), 5 and 6* long stalked (subgenus *Cremastobombycia*).

Posterior tibiæ with appressed hairs (except in subgenus *Porphyrosela*).

All of the species of which the life history is known are leaf miners throughout their entire larval existence, and all, with the exception of *ostensackenella*, pupate within the mine.

The three divisions may be separated by the following characters :

* Discovery of more primitive forms, with more complete venation, may necessitate a change in the interpretation of this venation.

Forewings with 5 absent; hindwings with 6 absent.

Vein 11 of the forewings absent; posterior tibiæ without hairs.

Subgenus **Porphyrosela.**

Vein 11 of the forewings present; posterior tibiæ with appressed hairs.

Lithocolletis Hb.

Forewings with 5 and 6 stalked; hindwings with 5 and 6 stalked.

Subgenus **Cremastobombycia.**

LITHOCOLLETIS Hübner.

Characters of *Lithocolletis* as given in Meyrick's "Handbook of British Lepidoptera," 1895, p. 733.

Head (Plate XX, Fig. 9).—Face smooth, crown rough tufted. Labial palpi porrected or drooping, moderately long, pointed. Maxillary palpi rudimentary. Tongue moderate. Antennæ nearly attaining the wing length, simple in male, basal joint thickened, bearing a pecten.

Forewings elongate, lanceolate, acuminate.

Hindwings about one-half the breadth of the forewings, linear lanceolate, cilia 4-5.

Venation (Plate XX, Figs. 1, 2, 3, 4, 5).—Forewings: 1*b* simple, 3-5 absent, 7 to costa, 8 absent, 10 absent. Hindwings: 3 absent, 4 absent, transverse vein absent between 2 and 5, 6 absent.

Posterior tibiæ with appressed hairs.

Our representatives fall naturally into two distinct and well defined groups, identical, however, in structural details of the imago. The first, comprising those species having a cylindrical larva, agrees closely with the European species in embryonic stages and in type of markings of the imago. The second group includes all those species having a flattened larva, and is characterized by a definite type of wing marking.

Most of the species are included in this division, which is well represented in all parts of the country. A very few of the species occur throughout the entire country; others are of comparatively wide distribution; a few appear to be confined to a very limited area.

The following characters will separate the two groups:

Larva cylindrical; white streaks and fasciæ dark margined internally...Group I.

Larva flattened; white streaks and fasciæ dark margined externally...Group II.

GROUP I.

The larva of the *first group* (Plate XX, fig. 11) is cylindrical or subcylindrical in form, and has, beside the thoracic legs, four pair of prolegs, on 7, 8, 9 and 13. It is usually of a pale greenish or yellowish color.

The mine may be placed upon either the upper or lower surface, but in either case the loosened epidermis is lined with silk, causing it to contract, thus producing a roomy, tent-like mine. The mine is at first narrow, somewhat winding, but soon spreads out into a blotch, which sometimes includes the earlier winding portion. The outline of the loosened epidermis represents the final size of the mine, no further increase taking place. The mine may be oval or circular, or in a few cases, nearly rectangular in shape, sometimes limited by two veins. Usually the larva feeds from the circumference inwardly; sometimes it begins at one end, and sometimes it feeds irregularly in spots.

With the exception of *ostensackenella*, which leaves the mine to pupate, the pupa is formed within the mine, and may or may not be enclosed in a cocoon. In the latter case, it is usually suspended in the mine by a thin meshwork of silken threads. Where a cocoon is present, several varieties may be distinguished. It may be rather small, ovoid, formed of frass and silk; large, loosely woven, semi-transparent, occupying sometimes nearly one-half the mine; or an oval ring with outlines formed of frass.

The forewings of the imagoes are usually of some shade of yellow or brown, sometimes, however, with the basal two-thirds almost pure shining white. Upon this yellowish ground color, the more or less white markings appear. The transverse markings consist of costal and dorsal streaks, usually curved and oblique, slightly curved or angulated fasciæ or combinations of these. These streaks or fasciæ are usually margined with darker scales toward the base; the internal margins of some of the streaks are sometimes lacking. In a few species some or all of the streaks or fasciæ may be more or less margined externally also, but in no case is the external margin heavier than the internal one, and in no case is an external margin present, when the internal one is absent. Longitudinal markings, when present, consist of a median streak from the base, sometimes accompanied by streaks along the costal and dorsal margins. The

apex sometimes contains a well-defined, regularly shaped black dot, formed of closely overlapping scales. In other species, these scales are more or less scattered.

In the synoptic table, and as a factor in the sequence of the species, the use of the term "apical spot" or "apical dot" has been restricted to those species in which the apical dot is circular or nearly so, and is not connected with a streak of scattered scales extending along the middle of the wing before the apex. *L. fitchella* and *L. lucidicostella* possess typical apical dots. Typically, this dot is placed at the apex of the wing membrane. In intermediate forms, such as *morrisella*, *uhlerella*, *gemmea*, the apical spot may be so increased in size as to occupy the entire apical portion of the wing.

The white costal and dorsal streaks occupy the interspaces between the veins. The veins then, within certain variable limits, determine the position of these marks. The first costal streak is placed beyond vein 12, and is the most variable in position; the second just before 11; the third between 11 and 9; the fourth between 9 and 7; rarely a fifth between 7 and the apex. In those species with but three costal streaks, the one between 9 and 7 is absent, and vein 9 reaches the costa nearer the apex, permitting the third costal streak to be shifted backward.

Of the dorsal streaks those at the tornus and beyond it are the most constant in position. Those along the dorsal margin have no defined position.

The species may be separated as follows:

- A. Ground color of the forewings pure white, marked with fuscous irrorated bands and bars **bataviella.**
- AA. Ground color of the forewings not entirely pure white.
 - B. Forewings dusted with fuscous scales.
 - C. Costal and dorsal streaks large, conspicuous and curved backward.
 - D. Size large (9-10.5 mm.); ground color reddish... **tremuloidiella.**
 - DD. Size moderate (7-8 mm.); ground color not reddish.
 - **salicifoliella.**
 - CC. Costal and dorsal streaks narrow, straight, forming angulated fasciæ.
 - **celtifoliella.**
 - BB. Forewings not dusted.
 - C. With an apical dot (indistinct in *arbutusella*, *insignis* and *obsoleta*).
 - D. Without a complete median fascia.
 - E. One white dorsal streak before the tornus.
 - F. Two white costal streaks **trinotella.**
 - FF. Three white costal streaks..... **quercialbella.**

FFF. Four white costal streaks.

G. Basal half of forewings pure white **clemensella**.

GG. A golden basal streak from base to near middle.

H. Basal streak margined with dark brown on its lower edge.

argentifimbriella.

HH. Basal streak unmargined..... **lucidicostella**.

EE. Two white dorsal streaks before the tornus.

F. With a median pale basal streak.

G. Basal streak extended across the fold to the dorsum.

H. Basal streak confluent with the upper edge of the first dorsal streak **insignis**.

HH. Basal streak not confluent with the first dorsal streak.

I. Basal streak extended to the costa..... **arbutusella**.

II. Basal streak not extended to the costa..... **hageni**.

GG. Basal streak not extended to the dorsum.

H. Basal streak confluent with the upper edge of the first dorsal streak **insignis**.

HH. Basal streak not confluent with the first dorsal streak.

I. First dorsal streak short and broad, produced to the base.

albanotella.

II. First dorsal streak extending more than half way across the wing.

J. A white costal streak from base to one-third... **rileyella**.

JJ. No such streak.

K. Basal streak dark margined toward costa.

L. First dorsal streak very long, reaching apex of second costal **obscuricostella**.

LL. Apex of first dorsal streak opposite that of first costal.

M. Head and thorax white **olivæformis**.

MM. Head and thorax reddish-saffron.

kearfottella.

KK. Basal streak unmargined.

L. Thorax and basal portion of forewings shining white.

caryæalbella.

LL. Thorax and basal portion of forewings not white.

ostryæfoliella.

FF. Without a median pale basal streak.

G. Apex of first dorsal streak opposite the apex of second costal.

H. First dorsal streak very large..... **fitchella**.

HH. First dorsal streak not larger than opposite costal streak.

robiniella.

GG. Apex of first dorsal streak opposite the apex of first costal.

H. Pale markings very indistinct..... **obsoleta**.

HH. Pale markings well defined.

I. Apex of second dorsal streak opposite the space between the second and third costal streaks; margins of opposite streaks never uniting..... **sexnotella**.

II. Apex of second dorsal streak opposite second costal; margins of opposite streaks uniting **ærifera**.

- EEE. Three large white dorsal streaks before the tornus, curving backward **leucothorax.**
- DD. With a complete median fascia.
- E. Three posterior costal streaks **martiella.**
- EE. Two posterior costal streaks.
- F. Dorsal half of the wing below the fold dark brown.
- G. A silvery basal streak in the fold **morrisella.**
- GG. No basal streak **uhlerella.**
- FF. Dorsal half of the wings not darkened **gemmea.**
- CC. Without an apical dot.
- D. Oblique costal and dorsal streaks, rarely meeting; no straight fascia, sometimes one acutely angulated fascia.
- E. Basal streak very short and indistinct **auronitens.**
- EE. Basal streak long.
- F. A median angulated fascia of equal width throughout; white marks dusted internally **celtisella.**
- FF. Fascia, if present, formed by the meeting of opposite streaks.
- G. With three long dorsal streaks before the tornus.
- H. Five costal streaks **argentinotella.**
- HH. Two costal streaks, first opposite second dorsal streak. **occitanica.**
- GG. With two dorsal streaks before the tornus.
- H. Basal streak unmarginated, or marginated toward its apex only.
- I. Markings usually very indistinct and ill-defined; sometimes a median angulated fascia **apicinigrella.**
- II. Markings well defined; never with a median fascia.
- J. Basal streak confluent with the upper edge of the first dorsal streak.
- K. Forewings pale, grayish **salicivorella.**
- KK. Forewings not grayish **deceptusella.**
- JJ. Basal streak not confluent with first dorsal streak.
- K. First pair of streaks very oblique and extended along the margins to base **basistrigella.**
- KK. First pair of streaks not extended to base.
- L. Apical third of basal streak bent toward costa.
- M. Margin of first dorsal streak bent backward on fold **scudderella.**
- MM. Margin of first dorsal streak not bent backward on fold **diaphanella.**
- LL. Basal streak straight or curved downward. **incanella.**
- HH. Basal streak dark marginated toward the costa.
- I. Costal margin white from base to near one-third. **populiella.**
- II. Costal margin not white from base.
- J. Three costal streaks **malimalifoliella.**
- JJ. Four costal streaks.

- K. Posterior tarsi whitish.
 L. Two dorsal streaks above the tornus, each uniting with its corresponding costal streak.....**ledella**.
 LL. One dorsal streak above the tornus.....**alni**.
alnicolella.
 KK. Posterior tarsi fuscous above, or tipped with black.
 L. First dorsal streak short, not attaining the fold.
minutella.
 LL. First dorsal streak very long.
 M. First dorsal streak beginning much nearer the base than first costal; expanse 8-9 mm.
propinquinella.
 MM. First dorsal streak beginning nearly opposite first costal, expanse 6.5-7 mm..... **crategella**.
 DD. Usually two complete fasciæ; if but one, median and nearly straight.
 E. A median fascia; two posterior costal streaks.
 F. Basal portion of the wing shining white.....**lucetiella**.
 FF. Basal portion of the wing golden.....**symphoricarpella**.
 EE. Two complete fasciæ.
 F. Head and thorax pure white.....**tiliacella**.
 FF. Head and thorax not white.
 G. Two posterior costal streaks.
 H. Head and base of wings dark brown..**ostensackenella**.
 HH. Head and base of wings not dark brown.
 I. Fasciæ nearly straight.
 J. Apex of wing dusted.....**tritæniæna**.
 JJ. Apex of wing not dusted.....**affinis**.
 II. Fasciæ distinctly bent outward near the middle.
mariaella.
 GG. Three posterior costal streaks.
 H. Costal arm of each fascia broadly dusted internally.
fragilella.
 HH. Fasciæ not dusted internally.....**oregonensis**.

Lithocolletis fitchella Clemens.

(Plate XXI, Fig. 1.)

Lithocolletis fitchella Clem., Proc. Acad. Nat. Sci. Phil., 207, 1860.—Tin. No. Am., 139, 1872.—Chambers, Can. Ent., iii, 183, 1871.—Cin. Quart. Jn. Sci., i, 201, 1874.—Packard, Guide Stud. Ins., 353, 1869.—Chambers, Bull. Geol. Surv. Terr., iii, 139, 1877.—Can. Ent., xi, 90, 1879.—Frey and Boll, Stett. ent. Zeit., xxxix, 260, 1878.—Busck, Proc. Ent. Soc. Wash., v, 204, 1903.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6253.

Syn. *quercifoliella* Fitch, Fifth Rept. Ins. N. Y., 327, 1859.—*quercitorum* Frey and Boll, Stett. ent. Zeit., xxxiv, 207, 1873.—Zeller, Verh. zool.-bot. Ges. Wien., xxv, 346, 1875.—Chambers, Cin. Quart. Jn. Sci., i, 201, 1874; ii, 229, 1875.—Bull. Geol. Surv. Terr., iii, 139, 141, 1877.

"Head, face and thorax silvery white. Labial palpi tipped with pale ochreous. Antennæ pale saffron; basal joint silvery white. Forewings pale reddish-saffron; with a slight brassy hue. Along the costa are five silvery-white costal

streaks, all black-margined internally except the first, which is very oblique and continued along the costa to the base of the wing. All the costal streaks are short except the first. On the inner margin are two conspicuous silvery dorsal streaks, dark-margined internally, the first very large, and placed near the middle of the inner margin, the second opposite the third costal streak. At the tip is a small round black spot, placed above the middle of the wing. Cilia silvery gray tinted with saffron. Hindwings grayish fuscous; cilia paler."

The above is a reprint of Clemens' description. Although Clemens makes no mention of it in his description, there is a very distinct black hook in the cilia above the apical spot. Alar expanse 7.5-8 mm.

The larva mines the underside of oak leaves, forming a tentiform mine, of which the loosened epidermis is slightly wrinkled at maturity. The pupa is suspended in a slight web of silk.

Lithocolletis leucothorax Walsingham.

Plate XXI, Fig. 2.

Lithocolletis leucothorax Walsingham, Proc. U. S. Nat. Mus., xxxiii, 223, 1907.

"Antennæ pale saffron. Palpi white. Head pale saffron; face white.

"Forewings pale saffron, the extreme costa whitish from the base, with two very oblique, shining whitish costal streaks tending outward, the first at the middle, the second beyond it, and two much shorter streaks in the costal cilia pointing inward—all anteriorly dark margined; on the dorsum are three very conspicuous, broad, white streaks, tending obliquely outward, the first and second before the middle, the third beyond it—these are all also anteriorly margined with ferruginous, the ferruginous shades bent outward about the middle of the wing giving them an angulated appearance; cilia shining, saffron, a small blackish apical dot and a dark line running from it through the cilia toward the tornus. Alar expanse 8.5 mm.

"Hindwings whitish gray; cilia grayish. Abdomen tinged with saffron; anal tuft grayish. Hind tibiæ yellowish white, very faintly spotted."

Described by Lord Walsingham from a specimen collected by Mr. A. Koebele, in the Santa Cruz Mountains, California. Mr. W. D. Kearfott has this species from Colfax, Placer County, California, May 1-10th (A. H. Vachell, collector).

Lithocolletis bataviella sp. nov.

Plate XXI, Fig. 3.

Antennæ whitish, banded above with dark gray. Face and palpi white. Tuft white and gray intermixed.

Thorax white, dusted with gray scales. Forewings white; the markings consisting of darker angulated fasciæ formed by gray-tipped whitish scales, with a faint golden brown lustre at their bases. At the base of the costa, is a patch of these scales. Within the basal fourth is an angulated fascia, sometimes consisting only of the line of black scales which forms its outer border, and sometimes

interrupted beneath the angle; sometimes the gray scales extend to the base of the wing. Just before the middle is a second angulated fascia, with its dorsal arm more nearly perpendicular than that of the first fascia, also dark margined on its outer side. Beyond this is a somewhat Y-shaped mark, with its arms resting on the costa and enclosing between them a small inwardly dark margined white costal streak. The outer margin of this mark is angulated or interrupted, emitting at the angle a streak of gray scales. This streak unites with an outwardly concave fascia near the apex. The apical part of the wing is dusted with gray scales, with a few black scales at the apex. A marginal row of gray-tipped scales passes around the apex to the tornus. Cilia pale gray. Expanse 7-7.5 mm.

Hindwings and cilia gray. Abdomen gray above, with paler anal tuft, whitish beneath. Legs pale grayish, tarsi tipped with black.

Described from eight specimens, Cincinnati, Ohio, April 13-29th.

Not closely related to any described American species, but approaching the European *sybilla* more closely than any other species.

Lithocolletis trinotella Braun.

Plate XXI, Fig. 4.

Lithocolletis trinotella Braun, Ent. News, xix, 99, 1908.

Palpi, face, tuft and antennæ glistening snowy white; antennæ faintly annulate above with ocherous.

Thorax and basal two-thirds of the forewings glistening white, below the fold somewhat suffused with yellow; apical third of the wings pale golden. A pale golden basal streak begins on the costa, extends nearly parallel to the costa for one-fourth the wing length, then is bent downward and passes parallel to the fold into the golden apical portion of the wing. In the apical portion there are two costal white wedge-shaped streaks and a similar dorsal one just before the tornus, opposite the first costal streak; all are internally margined with pale fuscous. A black apical spot. A pale fuscous marginal line in the cilia. Cilia whitish, faintly tinged with yellow. Alar expanse 5 mm.

Hindwings and cilia whitish. Abdomen pale grayish ocherous above, whitish beneath. Legs whitish.

The unique type, a male, was taken in Essex County Park, New Jersey, by Mr. W. D. Kearfott, April 26th.

Lithocolletis quercialbella Fitch.

Plate XXI, Fig. 5.

Argyromiges quercialbella Fitch, Rept. Ins. N. Y., v, 328, 1859.

Lithocolletis quercialbella Chambers, Can. Ent., iii, 57, 1871.—Walsingham, Ins. Life, ii, 25, 1889; iii, 325, 1891.—Dyar, Bull., 52, U. S. Nat. Mus., 1902, No. 6259.

Syn. *quercibella* Chambers, Cin. Quart. Jn. Sci., ii, 102, 1875.—Walsingham, Ins. Life, ii, 77, 1889.—*quercipulchella* Chambers, Bull. Geol. Surv. Terr., iv, 120, 1878.—Packard, Bull. Ent. Comm., vii, 53, 1881.—Walsingham, Ins. Life, ii, 77, 1889.—*quercipulchrella* Riley, Smith's List Lep. Bor. Am., 109, 1891.

Face, palpi, tuft and antennæ white, extreme tips of antennæ dark brown. Thorax and basal two-thirds of the forewings shining white; apical third suffused with golden. A rather broad golden basal streak begins at the base on the costa and extends parallel to the fold, to the middle of the wing. In the apical golden portion of the wing, there are three costal white streaks, all dark margined internally, and nearly perpendicular to the margin. Opposite the first costal streak a dorsal white streak, dark margined internally; opposite the second costal streak is a second indistinct dorsal streak. A black apical spot. Cilia whitish, tipped with fuscous around the apex. Marginal line in the cilia dark brown. Expanse 7 mm.

Hindwings and cilia pale grayish ochereous. Abdomen grayish ochereous above, whitish beneath. Legs whitish ochereous.

Eastern United States.

The larvæ make tentiform mines on the underside of the leaves of various species of oak.

Fitch in his description says "three or four costal streaks," making the description applicable to two species, *argentifimbriella* Clem. and *quercialbella* Fitch. Lord Walsingham (Ins. Life, iii, 326, 1891) distinguishes *quercialbella* from *argentifimbriella* by its having three instead of four costal streaks. In order to avoid needless confusion, the name *quercialbella* should be retained for the species having three costal streaks, although Fitch's supposed type of *quercialbella* in the U. S. Nat. Mus. collection is a specimen of *argentifimbriella*.

Lithocolletis clemensella Chambers.

(Plate XXI, Fig. 6.)

Lithocolletis clemensella Chambers, Can. Ent., iii, 57, 85, 1871; xi, 91, 1879.—Walsingham, Ins. Life, ii, 25, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6256.

"Silvery or glistening white. Antennæ annulate above with brownish. Apical half of the anterior wings pale golden, with four silvery white costal and two dorsal streaks all dark margined internally. The dark margin of the first costal streak distinct, oblique, and produced along the costa towards the base. The first dorsal streak opposite to the second costal, oblique pointing to the third costal. No basal streak. Apical spot black, nearly circular. Hinder marginal line at the base of the dorsal cilia brownish, broad, continuous with the hind margin of the second dorsal streak, and reaching to but not passing around the apical spot; cilia silvery-tinged with pale golden. Alar expanse one-fourth inch. Kentucky—common."

The above is Chambers' description of the species. It is common at Cincinnati, Ohio, and may be bred from tentiform mines on the underside of leaves of sugar maple. The pupa is suspended in the mine by a few silken threads. The expanse of the imago is 6–6.5 mm.

Lithocolletis argentifimbriella Clemens.

Plate XXI, Fig. 7.

Lithocolletis argentifimbriella Clemens, Proc. Acad. Nat. Sci. Phil., 318, 321, 1859.—Tin. No. Am., 39, 64, 70, 1872.—Chambers, Can. Ent., iii, 57, 85, 1871.—Cin. Quart. Jn. Sci., i, 201, 1874; ii, 229, 1875.—Frey and Boll, Stett. ent. Zeit., xxxiv, 209, 1873.—Walsingham, Ins. Life, iii, 325, 1891.—Busck, Proc. Ent. Soc. Wash., v, 188, 1903.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6258.

Syn. *longistriata* Frey and Boll, Stett. ent. Zeit., xxxiv, 209, 1873.—Chambers, Cin. Quart. Jn. Sci., ii, 229, 1875.—Walsingham, Ins. Life, ii, 325, 1891. *longirostrata* Dyar, Bull. 52, U. S. Nat. Mus., 550, 1902.—*fuscocostella* Chambers, Cin. Quart. Jn. Sci., ii, 102, 1875.—Walsingham, Ins. Life, ii, 25, 1889.

"Antennæ silvery, annulated with darkish brown. Head, front and thorax silvery-white. Anterior wings silvery, pale golden from nearly the middle to the tip, with a long basal dark brown streak margined above with golden, extending nearly to the first costal streak. There are four silvery costal streaks, all dark margined, the first very oblique, the second convex toward the base of the wing. The first costal dark margin is decided and extended on the costa toward the base. Two silvery dark margined dorsal streaks, the first opposite the second costal streak. The apical spot black, hinder marginal line dark brown, cilia silver-gray. Hindwings silver-gray, cilia the same."

The above is Clemens' description.

The larva makes a tentiform mine on the underside of leaves of oaks. The pupa is suspended in the mine in a thin web.

The imago may easily be distinguished from *L. lucidicostella*, which it most closely resembles, by having a less portion of the wing golden; and by differences in the basal streak, which in *L. argentifimbriella* is longer, narrower and dark brown, margined above by a narrow golden line. In *L. lucidicostella* the basal streak is entirely golden. Expanse 6.5–7 mm.

The type of *longistriata* F. & B. at the Museum of Comparative Zoology, Cambridge, Mass., is identical with *argentifimbriella* Clem.

Lithocolletis lucidicostella Clemens.

Plate XXI, Fig. 8.

Lithocolletis lucidicostella Clemens, Proc. Acad. Nat. Sci. Phil., 318, 1859.—Tin. No. Am., 39, 64, 66, 1872.—Chambers, Cin. Quart. Jn. Sci., ii, 102, 1875.—Can. Ent., iii, 57, 1871.—Busck, Proc. Ent. Soc. Wash., v, 187, 1903.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6257.

Syn. *ludicostella* Riley, Smith's List Lep. Bor. Am., 109, 1891.

"Antennæ white. Head and tuft silvery white. Forewings, basal portion silvery white to the middle, with a discal pale golden streak from the base, retreating from the costa before reaching the middle of the wing and somewhat

suffused with golden beneath the fold. From the middle to the tip pale golden, with four costal silvery streaks, dark margined internally and two dorsal silvery streaks, the first opposite the second costal streak and both dark margined internally; *the first costal streak not decidedly dark margined*. Apical spot black. Hinder marginal line in the cilia dark brown; cilia pale gray. Hindwings shining bluish gray; cilia gray.

"The larva mines the under side of the maple leaf, *Acer saccharinum*, in July, September and October. The head is pale brown; body pale green, colored darker by the ingesta. "Frass" collected into a ball within the mine. The pupa is suspended in a web of silk within the mine."

The above is Clemens' description. As noticed by Stainton, the statement, "the first costal streak not decidedly dark margined," is an error. This streak is decidedly dark margined, as is also the first dorsal. The extent of the wing suffused with golden also varies; in some specimens being merely a golden line extending from the golden apical half of the wing along the fold toward the base; in others the entire basal half of the wing below the fold is golden. Expanse 6.5 mm.

Lithocolletis albanotella Chambers.

Plate XXI, Fig. 9.

Lithocolletis albanotella Chambers, Cin. Quart. Jn. Sci., ii, 101, 1875.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6263.

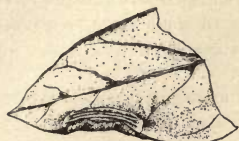
Syn. *subaureola* Frey and Boll, Stett. ent. Zeit., xxxix, 262, 1878.—Walsingham, Ins. Life, ii, 25, 1889; iii, 325, 1891.—Dyar, Bull. 52, U. S. Nat. Mus., No. 6260.

Antennæ white, dark brown at the apex. Face and palpi shining snow-white. Tuft white, mixed with pale yellowish brown scales.

Thorax shining white. Forewings pale golden brown. There is a broad white basal streak ending in a point at about two-fifths of the wing length and black margined toward the costa. At the basal third is a very oblique costal streak, with its internal black margin produced along the costa to the base. Opposite to its apex is the apex of the larger first dorsal streak, which is continued as a broad band along the dorsal margin to the base. Near the base it is confluent with the basal streak, leaving only a narrow streak of the ground color between its apex and the basal streak. The black margin at the apex of the first dorsal streak extends along its upper edge toward the base for a greater or less distance. In the apical half of the wing are three costal and one or two dorsal streaks. Second costal and dorsal streaks opposite each other, sometimes meeting, and their oblique dark internal margins often uniting in the middle of the wing. Third and fourth costal streaks nearly perpendicular, the fourth sometimes un-margined, the third opposite the third dorsal streak, which is often small or indicated by its dark margin only. A black apical spot with a few silvery scales before it. A dark marginal line in the cilia, which are pale golden around the apex, with a gray streak below the fourth costal streak, shading to grayish white toward the tornus. Expanse 6-7.5 mm.

Hindwings and cilia pale grayish ochereous in the male, more ochereous in the female. Abdomen above, gray in the male, ochereous in the female, whitish beneath. Legs and tarsi whitish gray, except the first pair, which are fuscous on their anterior edges.

Ohio, Kentucky (Chambers), Texas (Boll). Chambers records it on *Quercus nigra* L.; Boll bred it from *Quercus macrocarpa* Michx. in Texas. I have bred it at Cincinnati on *Quercus macrocarpa* and *Quercus platanoides*. The rather small tentiform mine may be placed either at the edge of the leaf or between two veins, the loosened epidermis being thrown into numerous longitudinal wrinkles. The pupa is enclosed in a rather large semi-transparent ovoid silken cocoon.



Mine of *L. albanotella*.

The type of Chambers' *albanotella* at Cambridge consists of abdomen and hind wings only, which are pale grayish ochereous. His description of the species was made from a rubbed specimen, but agrees with that of *subaureola* in all details, with the exception of "basal fourth of the costa white." As Chambers' type was a female, and in the female the costal portion of the wings toward the base is much paler, this error in the description was probably due to the condition of his specimen.

Lithocolletis insignis Walsingham.

Plate XXI, Fig. 10.

Lithocolletis insignis Walsingham, Ins. Life, ii, 117, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6255.

"Antennæ yellowish, unspotted. Palpi white. Face white, frontal tuft white, with a few saffron scales. Thorax white.

"Forewings pale saffron, with a rather golden tinge; a broad white basal streak on the upper half of the wing, running parallel to the costal margin for one-third the wing length, thence deflexed and confluent with the middle of the upper edge of the first very broad white dorsal streak. The basal streak is sometimes extended at the base across the fold reaching to the dorsal margin, thus leaving between itself and the first dorsal streak a small curved oblique saffron streak; sometimes it is not thus projected across the fold, but upon the dorsal margin beneath it is found a separate short dorso-basal white dash. Above and slightly beyond the point at which the broad basal streak is deflexed there is a very oblique costal streak, somewhat triangular, with its apex reaching nearly to the apex of the much larger first dorsal streak below it; beyond this the second streak, situated just beyond the middle of the costal margin, is of about the same size, also triangular, a little less oblique, and corresponding with a wider and more conspicuous white dorsal patch opposite to it. The third and fourth

costal streaks, of which the former points slightly outwards. The latter is perpendicular, reaching nearly (or in some specimens quite) to a white patch on the dorsal margin before the apex, which seems to consist of two confluent white dorsal streaks. At the extreme apex is a minute black apical spot, surrounded by a semi-circular dark line at the base of the apical cilia, which are tinged with golden saffron at the extreme apex. Beneath the apex the cilia are white, blending into saffron-gray about and before the anal angle; all the white markings are distinctly dark margined on all sides. The white streaks on the forewings of this species are so large and conspicuous as in some cases to almost obliterate the pale saffron ground color, and different specimens vary much in the proportionate space occupied by one and the other.

"Hindwings and cilia pale gray. Abdomen and anal tuft grayish white. Hind tarsi whitish, spotted above with gray. Expanse alar, 9 mm."

This species was described as above by Lord Walsingham from specimens collected in California in 1871, in Lake and Mendocino Counties in June, and on Mt. Shasta, Siskiyou County, in August. In Mr. Kearfott's collection, there is a specimen of this species from Carmel, California, taken in June (A. H. Vachell, collector).

Lithocolletis hageni Frey and Boll.

Plate XXI, Fig. 11.

Lithocolletis hageni Frey and Boll, Stett. ent. Zeit., xxxiv, 208, 1873.—Chambers, Cin. Quart. Jn. Sci., i, 201, 1874.—Bull. Geol. Surv. Terr., iv, 100, 1878.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6252.

Syn. *necospinusella* Chambers, Bull. Geol. Surv. Terr., iv, 100, 1878.—Can. Ent., xi, 144, 1879.

Face, head and thorax white. Palpi white. Scales of the tuft mixed with gray. Antennæ remarkably dark gray, with the basal joint white. Upper side of the abdomen dark gray. Anal tuft somewhat lighter, tinged with yellow. The underside of the abdomen is brownish white; as are likewise the legs, the tarsi on the outside being obscurely dark spotted. The ground color of the forewings is a deep saffron brown. The white spots are greatly developed on the dorsal margin, but, on the contrary, only slightly on the costa. Here, beginning just before the middle of the costal margin, are four white streaks dark margined on both sides. The first is placed very obliquely, the second less so, the two last are placed transversely on the wing, are bent, and their apices point toward the tornus. At the base of the dorsal margin there is a very large white spot. It forms an irregular quadrilateral, which approaches the costa, extends parallel to it, and is prolonged to a point on the fold. An obliquely placed transverse band of the saffron brown ground color, very much darkened, borders this spot behind. Then follows a second white mark, in the shape of an irregular triangular, whose broad base rests upon the dorsal margin. There follows a second, also very much darkened shorter transverse band. It ends at one-half the wing length. Behind this at the tornus, we see finally the last white triangle. At the apex of the wing there is a black dot. A well defined black streak extends from this dot into the whitish cilia. A peculiar glistening blue line extends along the base of the cilia. This line becomes very noticeably slightly concave before the tornus.

The hindwings moderately dark gray, their cilia somewhat lighter. Underside brownish dark gray. The second white dorsal spot usually shows through as a lighter shade.

The larvæ have almost the same habits as those of *quercitorum* on the underside of leaves of *Quercus Prinus* L. and *Quercus Castanea* Willd. However, the mine is more wrinkled, and hence the leaf is more strongly drawn together and is somewhat gray.

The imagoes emerge in April and May.

The above is a translation of Frey's original description (Stett. ent. Zeit., xxxiv, 208, 1873).

The tuft is saffron brown at the sides. Thorax white, except a narrow brown stripe across the anterior edge of the patagia. The position of a fourth dorsal streak above the tornus is indicated by its dark margin. On large specimens a fifth small white costal streak is sometimes present. The apex of the large white basal dorsal streak is above the fold, not on the fold. Alar expanse 7.5-10 mm.

I have bred this species from mines on the underside of *Quercus platanoides* (Lam.) Sudw. The pupa is suspended in a few silken threads.

Lithocolletis arbutusella sp. nov.

Plate XXI, Fig. 12.

Male.—Antennæ whitish, annulate with gray. Face and palpi yellowish white. Tuft brown, mixed with ochreous and white scales.

Thorax whitish, with the anterior portion darkened with grayish brown scales. Forewings pale reddish ochreous. At the basal fourth of the dorsum, there is a curved oblique line of brown scales, uniting at a very acute angle with a shorter curved costal line, thus enclosing a white basal patch, suffused with pale ochreous toward the base and costa and darkened along the costa with grayish brown scales. There is a small patch of similar dark scales on the dorsum near the base. Just before the middle of the wing is an oblique white costal streak dark margined on both sides. Nearly opposite it is a large oblique curved dorsal streak also dark margined on both sides, the dark margin being continued from the apex along the middle of the wing to the apex of the second dorsal streak. The anterior margin of the second very broad dorsal streak is formed by a line of brown scales beginning on the dorsum a little anterior to the apex of the first dorsal streak, bent backward along the fold, then directed upward. The nearly perpendicular external margin of this streak is formed of a few scattered scales. Second costal streak very long, narrow and oblique, margined internally only, and ending just above the apex of the second dorsal streak. From here to near the apex, the middle of the wing is dusted with whitish scales. Third costal streak triangular and inwardly oblique. Fourth costal streak small. A small patch of brown scales in the apical portion of the wing, from which an indistinct line of brown scales extends to the tornus. A brown line in the cilia passes around the apex from the fourth costal streak to the tornus. Cilia pale grayish. Alar expanse 8 mm.

Hindwings, cilia and upper side of abdomen gray. Hind tibiæ reddish gray, their tarsi white, with broad black annulations.

Female.—The female shows the following differences: face and palpi white, antennæ white, grayish toward the apex. Tuft white, with a few brown scales. Thorax and basal portion of the wings almost pure white. The apical portion of the wings is also more suffused with white. Hindwings and cilia almost pure white. Abdomen silvery gray. Legs white, tarsi with black annulations.

Type.—No. 12002, U. S. Nat. Mus.

San Mateo Co., California. Two specimens bred from *Arbutus menziesii* in September, and bearing the record number 243.

Lithocolletis obscuricostella Clemens.

Plate XXI, Fig. 13.

Lithocolletis obscuricostella Clemens, Proc. Acad. Nat. Sci. Phil., 321, 1859.—Tin. No. Am., 64, 71, 1872.—Chambers, Can. Ent., iii, 85, 1871; xi, 92, 1879.—Busck, Proc. Ent. Soc. Wash., v, 188, 1903.

Syn. *virginiella* Chambers, Can. Ent., iii, 84, 1871.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6280.

“Head and frontal tuft silvery. Thorax very pale golden. Forewings pale golden with a silvery median stripe from the base, black margined toward the costa, extending to the middle of the wing; with four silvery costal streaks, the first very oblique and rather long, and all except the last black margined internally, the margin of the first being long and the continuation of a black streak from the base along the extreme costa. Three silvery dorsal streaks, the first quite long, obliquely curved and opposite the first costal streak, and the first two black margined internally; the second dorsal obliquely opposite the third costal streak. Apical spot black; hinder marginal line black, cilia grayish. Hind wings bluish gray, cilia the same. Abdomen black, tipped freely with yellow.”

The above is Clemens' description.

The small tentiform mines of this species may be found on the underside of the leaves of *Ostrya Virginiana* (Mill.) Willd. They are usually between two veins and are less wrinkled than those of the other species, mining the same leaves, viz.: *L. ostryæfoliella*. The pupa is formed inside of a thin silken web which occupies an entire half of the mine. Expanse of the imago 6–6.5 mm.

I have some specimens in which the entire abdomen is pale grayish yellow, but which otherwise agree with Clemens' description.

Lithocolletis ostryæfoliella Clemens.

Plate XXI, Fig. 14.

Lithocolletis ostryæfoliella Clemens, Proc. Acad. Nat. Sci. Phil., 322, 1859.—Tin. No. Am., 64, 71, 1872.—Chambers, Can. Ent., iii, 85, 1871.—Cin. Quart. Jn. Sci., i, 202, 1874.—Can. Ent., xi, 91, 1879.—Walsingham, Ins. Life, ii, 53, 1889.—Busck, Proc. Ent. Soc. Wash., v, 188, 1903.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6275.

Syn. *mirifica* Frey and Boll, Stett. ent. Zeit., xxxiv, 212, 1873.

"Antennæ silvery. Front silvery, tuft fuscous and silvery mixed. Thorax silvery, with the basal part of the tegulæ pale golden. Forewings pale golden, with an unmargined, median, silvery basal stripe, and a silvery streak along the basal portion of the inner margin. Forewings pale golden, with four silvery costal streaks, all except the last black margined internally; with two dorsal streaks of the same hue, black margined internally. The first costal and first dorsal streaks opposite, quite oblique, and broad at their bases, the second dorsal opposite the second costal streak. The basal streak is moderately broad, and extends quite to the middle of the wing. Apical spot black; hinder marginal line blackish; cilia fulvous gray. Hindwings gray, cilia fulvous gray. Abdomen pale fulvous."

Clemens' description is given above.

The mines are formed on the underside of leaves of *Ostrya Virginiana* (Mill.) Willd., usually near the margin, and are much wrinkled when mature. The larvæ, which are of the cylindrical type and pale yellow, spin ovoid cocoons of frass and silk. Expanse of the imago 6-6.5 mm.

Lithocolletis rileyella Chambers.

Plate XXI, Fig. 15.

Lithocolletis rileyella Chambers, Cin. Quart. Jn. Sci., ii, 236, 1875.—Walsingham, Ins. Life, ii, 25, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6254. Syn. *tenuistrigata* Frey and Boll, Stett. ent. Zeit., xxxvii, 225, 1876; xxxix, 260, 1878.

Antennæ ochereous-white, grayish toward the tips; face and palpi white, tuft ochereous.

Thorax and forewings golden yellow, the thorax with a white line across the patagia, continuous with a median white unmargined basal streak attaining one-third of the wing length. There are five costal and three or four dorsal white streaks, all dark margined internally. The first costal at the basal third is very oblique and produced along the costa to the base. The apex of the second oblique costal streak is opposite the apex of the large curved first dorsal streak. Third costal streak is nearly perpendicular, curved and opposite the large triangular second dorsal streak, placed just before the tornus. Fourth costal streak curved, with its apex meeting that of the smaller third dorsal streak. Fifth costal streak inwardly oblique and opposite the minute fourth dorsal streak, which is sometimes wanting. A small circular apical spot. A brownish marginal line in the cilia, which are pale whitish ochereous. Expanse 7-8 mm.

Hindwings and cilia pale whitish ochereous. Abdomen pale ochereous. Legs whitish ochereous.

Missouri and Texas.

This species makes a tentiform mine on the underside of several species of oak.

Lithocolletis kearfottella Braun.

Plate XXI, Fig. 16.

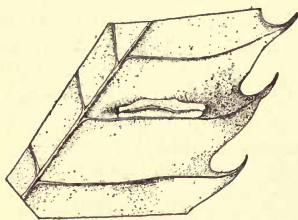
Lithocolletis kearfottella Braun, Ent. News, xix, 100, 1908.

Antennæ grayish, darker toward the tips. Palpi shining white, with a slight golden tinge. Face shining white, with a slight golden tinge; tuft reddish saffron, scales darker toward the tips.

Thorax and forewings shining reddish saffron. A white band extends across the anterior margin of the thorax, passes over the patagia and is continuous with a basal white streak. The basal streak extends for one-third the wing length, nearly parallel to the costa and is dark margined above. Four costal and three dorsal shining white streaks, all dark margined internally. The first costal streak at the basal third is placed very obliquely, and is produced along the costa to the basal fourth. The first dorsal streak at the basal fourth is very large and very oblique. Near the costa its apex sometimes unites with that of the first costal streak, forming a very acute angle. The remaining three costal streaks are placed at equal distances from each other and from the first costal streak. The second costal streak is almost perpendicular to the costa and wedge-shaped. Opposite to it on the dorsum, before the tornus, is the larger almost perpendicularly placed wedge-shaped second dorsal streak. The third costal streak is inwardly oblique, curved, its apex pointing toward the apex of the third dorsal streak, which is small, wedge-shaped and placed beyond the tornus. The fourth costal streak is very oblique and curved. A large black apical dot. A brown line in the cilia extending from the fourth costal streak around the apex to the third dorsal streak. Cilia grayish. Just below the fourth costal streak there is a darker brownish streak in the cilia, giving the appearance of a hook, as in *L. fitchella* Clem., but not as distinct. Alar expanse 7 mm.

Hindwings pale grayish, with a slight ochereous tinge. Cilia whitish gray, tinged with ochereous. Abdomen dark gray above, silvery white beneath. Anal tuft grayish ochereous. Legs silvery white slightly shaded with ochereous, tibiae and tarsi of the first pair very dark brown.

Three specimens, Montclair, N. J., bred by Mr. W. D. Kearfott, from mines on chestnut collected in October, 1901. The imagoes appeared in the following spring.

Mine of *L. kearfottella*.

I have specimens from Powell Co., Kentucky, on chestnut; and there are a number of specimens in the Nat. Mus. collection bred by Mr. August Busck on chestnut at Washington, D. C.

The rather small elongate mine of this species is found upon the lower side of the leaf, where it is placed between two veins. The pupa is enclosed in a loose, semi-transparent silken cocoon.

Lithocolletis caryæalbella Chambers.

Plate XXI, Fig. 17.

Lithocolletis caryæalbella Chambers, Can. Ent., iii, 58, 85, 182, 206, 1871.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6261.Syn. *caryæalbella* Walsingham, Ins. Life, iii, 328, 1891.

“Head, palpi, tuft, antennæ and thorax silvery white; basal portion of the wing (within the costal and dorsal streaks) silvery white, with a wide pale golden basal streak along the costal margin from the base to the first costal streak. The basal white portion in some lights suffused with pale golded. Apical two-thirds or more of the wings pale golden, with four silvery costal and two dorsal silvery streaks, all dark margined internally. The first dorsal large, oblique, opposite the first costal, which is smaller; their dark margins uniting at an acute angle on the fold, the streaks themselves being scarcely confluent. Second dorsal opposite to and larger than the second costal; its dark margin wide. Third and fourth costal streaks small. Apical spot small, black; hinder marginal line at the base of the cilia brown. Cilia pale, fulvous. Alar expanse one-fourth inch. Larva unknown. Mines the under surface of the leaves of hickory trees (*Carya alba*). Mine ovoid, tent-like. The parenchyma is eaten off of the upper cuticle in a ring, leaving a green spot in the centre, which is then eaten off. The pupa is contained in an oval cocoon made of frass. Imago in July—rare.”

The above, which is Chambers' description, is accurate in all details, except that, as shown by Chambers' types, the dark margins of the first pair of streaks do not unite, but are narrowly separated by the pale golden ground color of the wing. Kentucky and Wisconsin (Chambers).

Lithocolletis olivæformis sp. nov.

Plate XXI, Fig. 18.

Antennæ white, grayish toward the tips. Face, palpi, tuft and thorax pure snow-white.

Forewings pale brownish ochereous, with a median white basal streak dark margined toward the costa, and four costal and two dorsal white streaks, all dark margined internally. The dorsal margin is also whitish toward the base. The first dorsal streak placed somewhat nearer the base than the first costal, has its dark margin bent backward on the fold for a short distance, then continued obliquely upward. The second dorsal streak rather large and triangular, has its apex directed toward the space between the second and third costal streaks. A small black apical spot. A brown marginal line in the cilia, which are whitish ochereous. Alar expanse 6.5 mm.

Hindwings, cilia and abdomen pale grayish ochereous. Legs whitish ochereous, tarsi unspotted.

Type.—Female, No. 12008, U. S. N. M.

This species, bred from *Carya olivæformis* Nutt., is very distinct from *caryæalbella* Cham. The type at the National Museum bears the following labels: 811, *Carya oliv.* Pupa 6–VI.

This species may be distinguished by the irregular anterior margin of the first dorsal streak.

Lithocolletis martiella sp. nov.

Plate XXI, Fig. 19.

Antennæ brownish gray. Face and palpi yellowish white. Scales of the tuft pale brownish ochereous, darker toward the tips.

Thorax and forewings deep reddish saffron. A rather broad median white basal streak, ending at one-third the wing length, is faintly dark margined above and at its apex. Just before the middle of the wing is a curved white fascia margined on the inner side with brown scales and shading into the ground color on the outer side. Beyond this are three costal and two dorsal white streaks, margined internally with brown scales, the last costal and dorsal streaks but faintly so. The first dorsal streak, which begins opposite the wedge-shaped, perpendicular first costal streak, is oblique, its apex directed toward the apex of the second costal streak. Second dorsal streak above the tornus, points toward the second costal streak. In the apical portion of the wing, just below the third costal streak, is a conspicuous black apical dot. A dark brown marginal line in the cilia, which are pale grayish brown at the apex, becoming darker toward the tornus. Alar expanse 6.8 mm.

Hindwings and cilia brownish gray. Abdomen dark brownish gray. Legs pale brownish gray, tarsi unspotted.

Type.—Male, No. 12003, U. S. Nat. Mus.

A single specimen of this very distinct species was bred by Dr. Harrison G. Dyar at Kaslo, B. C. Record number 21563, the food plant being given with some doubt as birch, which is, however, probably correct, as the species bears a close relationship to the European birch feeding species, *ulmifoliella* Hb.

Lithocolletis gemmea Frey and Boll.

Plate XXI, Fig. 20.

Lithocolletis gemmea Frey and Boll, Stett. ent. Zeit., xxxiv, 218, 1873.—Chambers, Cin. Quart. Jn. Sci., i, 206, 1874; ii, 227, 1875.—Can. Ent., xi, 144, 1879.—Walsingham, Ins. Life, ii, 53, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6266.

Antennæ dark gray, whitish at the apices. Face and palpi pale golden. Tuft dark brown mixed with white scales.

Thorax and forewings deep shining reddish saffron. A very narrow line across the patagia is continuous with a broader basal streak, which is white with a golden lustre. The basal streak, ending at one-third the wing length, is dark margined above and indistinctly so beneath. On the dorsal margin, just before the apex of the basal streak is a small broad white spot. Just before the middle of the wing, is a nearly straight fascia, distinctly margined on its inner side with black, and with a few scales on the outer side. Beyond the fascia are two pair of streaks, of which the two costal and the first dorsal are black margined internally. The first pair of streaks are large, triangular and placed nearly perpendicular, the dorsal just before the tornus with its apex between the first and second costal streaks. The second dorsal streak above the tornus is small and opposite the second costal streak. Beyond them, the apical portion of the wing is

densely dusted with brown scales, forming a large apical spot. Marginal line in the cilia brown. Cilia pale brownish gray. Expanse 7-7.5 mm.

Hindwings and cilia pale reddish brown. Abdomen and legs dark brown. Hind tarsi whitish, except the first two joints, which are brown tipped with white.

Massachusetts.

According to Frey and Boll, the food plant of this species is *Robinia Pseudacacia* L., the mine being on the upper side of the leaf.

Lithocolletis morrisella Fitch.

(Plate XXI, Fig. 21.)

Argyromiges morrisella Fitch, Rept. Ins. N. Y., v, 336, 1859.

Lithocolletis morrisella Chambers, Can. Ent., iii, 183, 1871.—Walsingham, Ins. Life, ii, 52, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6269.

Syn. *texanella* Zeller, Verh. Zool.-bot. Ges. Wien, xxv, 349, 1875.—Frey and Boll, Stett. ent. Zeit., xxxix, 275, 1878.—*amphicarpælla* Chambers, Bull. Geol. Surv. Terr., iii, 137, 1877.

Face and palpi whitish gray. Antennæ gray, annulate with dark brown. Tuft dark brown mixed with a few whitish scales.

Thorax and inner margin of the forewings beneath the fold dark brown, sometimes more golden beyond the fascia. Remainder of the wing golden brown, markings bright shining silvery. In the fold is a silvery basal streak, uniting with the upper side of a nearly perpendicular white dorsal streak at one-third. A little beyond this on the costal margin is a somewhat oblique streak dark margined on both sides. About the middle of the wing, is a slightly convex or obtusely angled fascia dark margined internally and, on its costal half, externally. Beyond this are two perpendicular costal streaks dark margined internally and the former also externally. Opposite to the first of these costal streaks is a dorsal streak whose apex sometimes meets that of the costal. In the fold between this streak and the fascia is a velvety black streak. Opposite the last costal streak, there is sometimes a small silvery dorsal streak. Apical spot black, varying in size, sometimes occupying the entire apex of the wing. Cilia gray, becoming darker toward the tornus; marginal line blackish. Expanse 6-7 mm.

Hindwings and cilia gray. Abdomen brownish gray above, somewhat metallic. Legs and tarsi gray, banded with white.

Eastern U. S., west to Colorado and Texas.

This species may be bred from whitish mines on the under side of *Falcata comosa* (L.) Kuntze (= *Amphicarpa monoica* L.).

The white basal streak, confluent with the first dorsal streak separates this species from both *robiniella* and *uhlerella*.

Lithocolletis uhlerella Fitch.

Plate XXI, Fig. 22.

Argyromigea uhlerella Fitch, Rept. Ins. N. Y., v, 337, 1859.

Lithocolletis uhlerella Chambers, Can. Ent., iii, 183, 1871.—Walsingham, Ins. Life, ii, 53, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6268.

Syn. *amorphælla* Chambers, Bull. Geol. Surv. Terr., iii, 132, 137, 1877.—*amorphæ* Frey and Boll, Stett. ent. Zeit., xxxix, 275, 1878.

Face and palpi whitish gray. Antennæ gray, annulate with dark brown, Tuft brownish.

Thorax and inner margin of the forewings beneath the fold dark brown, more golden behind. Ground color of the remainder of the wing golden brown. The first costal streak at the basal third is somewhat oblique and dark margined on both sides. A little nearer the base is the more perpendicularly placed first dorsal streak. About the middle of the wing is a curved or obtusely angulated white fascia, dark margined internally and toward the costa externally. Beyond this are two nearly perpendicular white costal streaks, dark margined internally, of which the former is opposite a white dorsal streak, just before the tornus. In the fold, between the fascia and this dorsal streak, is a black streak. A black apical spot sometimes elongate. Cilia grayish, with a blackish marginal line. Expanse 6-6.5 mm.

Hindwings and cilia brownish gray. Abdomen dark brownish gray. Legs gray, hind tarsi whitish toward their bases.

Eastern U. S., west to Colorado and Texas.

The whitish rather flat mine of this species occurs on the under side of leaves of *Amorpha fruticosa* L.

Uhlerella may be distinguished from *robiniella* by the presence of the first white dorsal streak, the complete median fascia, and the less oblique position of the streaks. It differs from *morrisella* by the absence of a white basal streak.

Lithocolletis robiniella Clemens.

Plate XXI, Fig. 23.

Lithocolletis robiniella Clemens, Proc. Acad. Nat. Sci. Phil., 318, 1859; 209, 1860.—Tin. No. Am., 66, 1872.—Chambers, Can. Ent., iii, 54, 87, 163, 183, 185, 1871; iv, 9, 107, 1872.—Cin. Quart. Jn. Sci., ii, 228, 1875.—Bull. Geol. Surv. Terr., iii, 137, 1877.—Jn. Cin. Soc. Nat. Hist., ii, 91, 1879.—Zeller, Verh. zool.-bot. Ges. Wien., xxv, 348, 1875.—Frey and Boll, Stett. ent. Zeit., xxxix, 275, 1878.—Buseck, Proc. Ent. Soc. Wash., v, 189, 1903.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6267.

Syn. *pseudacaciella* Fitch, Rept. Ins. N. Y., v, 335, 1859.

Face and palpi silvery; antennæ and tuft dark brown, the latter mixed with gray. Thorax dark brown.

Forewings golden above the fold, dark gray dusted with black below the fold, this dark shade extended to the costa at the base, becoming more golden toward the tornus. Four rather large silvery costal streaks, the first two oblique. Opposite to the first of these, which is placed before the middle, and is dark margined on both sides, the position of a first dorsal streak is indicated by a somewhat lighter shade. The second at about the middle, also dark margined on both sides, nearly unites at an angle with an opposite white dorsal streak, dark margined internally. A white costal streak at three-quarters, margined internally with a curved black line, nearly unites with an opposite internally mar-

gined dorsal streak. A fourth white costal streak, just before the apex is also internally dark margined. Between the first and second dorsal streaks is a black streak in the fold. A third streak beyond the tornus is indicated by two or three white scales. Black apical spot round or wedge-shaped. Marginal line at the base of the cilia blackish. Cilia silvery at the apex, tipped with gray. Expanse 6-6.5 mm.

Hindwings and cilia dark gray. Abdomen dark gray. Legs gray.

The larvæ, which belong to the cylindrical group, form whitish mines upon either the upper or the underside of leaves of locust, *Robinia pseudacacia* L. A white silken cocoon is spun within the mine. This species occurs throughout the Atlantic States.

Lithocolletis auronitens Frey and Boll.

Plate XXI, Fig. 24.

Lithocolletis auronitens Frey and Boll, Stett. ent. Zeit., xxxiv, 216, 1873.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6302.

Head saffron brown, face lighter, antennæ light brown, annulate with darker, the apex whitish.

Thorax and forewings shining saffron, rather light, legs yellowish gray, unspotted; abdomen dark gray. The marks of the forewings have a strong metallic lustre, which is between the color of gold and silver. There are four pair of streaks. The first costal streak is at the basal fourth of the wing length and is obliquely placed. The first dorsal streak is shorter, and nearer the base than the costal streak. Almost in the middle of the wing, there follow, placed one directly above the other, two more marks, which are tall narrow triangles, somewhat dark margined internally, whose apices touch each other. The third pair of markings at three-fourths of the wing length, are very similar to the preceding pair, except that the dorsal triangle lies nearer to the base than the costal triangle. The fourth pair of markings, just before the apex of the wing, consists of a small costal streak, which has inwardly a few dark scales, and a small dorsal streak, which is placed so far back that it is beyond the hind angle. In the apex is a black dot, toward the base overlaid with metallic scales. Cilia light; a dark curved line extends through them at the apex.

Hindwings and cilia gray.

On the underside the forewings are dark brownish gray; the marks reappear brownish white.

The larvæ live in fall toward the end of October on the underside of the leaves of *Alnus serrulata* Willd. The mine is roundish, the loosened epidermis is much wrinkled, resulting in the leaf being rather arched at this place. The imagoes appear in May and June.

The above is a translation of the original description.

The type specimens were bred by Boll in Massachusetts. In the U. S. Nat. Mus. is a specimen bred on alder, with no locality given.

There is a very indistinct short basal streak on the wings. The first costal streak is very long, oblique and curved, and dark mar-

gined on both sides; the corresponding dorsal streak is more properly called a spot, and is scarcely dark margined. The expanse is 6.5-8.2 mm.

Lithocolletis diaphanella Frey and Boll.

Plate XXII, Fig. 1.

Lithocolletis diaphanella Frey and Boll, Stett. ent. Zeit., xxxix, 265, 1878.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6277.

Head, face, palpi and tuft snow white. Antennæ white, faintly annulate with ochre-yellow; basal joint ochre-yellow. Tegulæ snow white, thorax pale golden yellow. Abdomen whitish gray; legs whitish, tarsi annulate with brown.

Forewings pale golden brown, marks white. There is a broad basal streak without any dark margining extending for more than two-fifths of the wing length. It begins rather broad, and ends in a long point directed toward the costa. Behind the middle of the wing there is a small, bent, very oblique costal streak, faintly blackish margined toward the base. There is a similarly bent but broader dorsal streak beginning nearer the base and pointing toward the first costal streak. On the costa follow very small, faintly inwardly dark margined streaks. A fourth one is indicated by a few white scales. At the hind angle is an inwardly blackish margined white dorsal triangle. Its apex extends between the second and third costal streaks. From this, a line of blackish scales extends toward the termen. Cilia whitish, with a blackish basal line. The latter only extends around the apical part of the wing. [Expanse 6 mm.]

Hindwings light, yellowish gray, cilia whitish.

This species, the habitat of which is given as Texas, is an under-side miner on scrub oak. A peculiar characteristic of the mine, as noted by Frey and Boll, is its transparent appearance, when mature, allowing the pupa to be plainly visible through the epidermis.

The description is a translation of the original.

There is a specimen of this species from Texas in the U. S. Nat. Mus.

Lithocolletis minutella Frey and Boll.

Lithocolletis minutella Frey and Boll, Stett. ent. Zeit., xxxix, 263, 1878.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6276.

Head and tuft pale golden brown, the latter mixed with white. Face and palpi whitish; antennæ whitish, obscurely annulate with brown.

Thorax pale golden brown, tegulæ bordered with whitish, abdomen gray, with a yellowish white tuft. Legs whitish, all the tarsi spotted with black.

The pale golden brown (approaching the color of *L. faginella*) faintly shining forewings have peculiar white markings. There is a short narrow basal streak dark margined toward the costa, ending just before the two-fifths of the wing length. The first costal streak beginning at two-fifths is placed very obliquely, is dark margined toward the base, sharply bent at an angle in the fold, and is then prolonged as a very short spur toward the dorsum and base. Beginning under the apex of the basal streak, and extending toward the costal streak, is a

rather small and bent dorsal streak, also placed very obliquely. It does not attain the fold, and ends at some distance from the short spur of the costal streak. In the apical half of the wing there are three more small costal streaks, dark margined toward the base. On the dorsum there is a considerable sized streak of the shape of an equilateral triangle, whose apex, covered with black scales, projects between the second and third costal streaks. There are a few white scales in the apical portion of the wing. The cilia at the apex of the wing are shining and of the wing color, with a blackish basal line. Toward the hind angle they become yellowish gray.

Hindwings light gray. Cilia lighter. The underside of the forewings is brownish gray.

The mines, which produced the specimens, from which Frey and Boll described the species, were found by Boll in eastern Texas on the underside of leaves of *Quercus rubra* L. They are roundish, small and slightly wrinkled.

No exact expanse is given, but the statement is made that the species is small.

Lithocolletis scudderella Frey and Boll.

Plate XXII, Fig. 2.

Lithocolletis scudderella Frey and Boll, Stett. ent. Zeit., xxxiv, 212, 1873.—Chambers, Cin. Quart. Jn. Sci., ii, 230, 1875.—Bull. Geol. Surv. Terr., iv, 156, 1878.—Can. Ent., xi, 72, 1879; vii, 126, 1875.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6278.

Of medium size; however, several specimens are considerably smaller; rather broad-winged. The ground color of the head, thorax and forewings is a peculiar light yellowish brown. This color is similar to that of a flown specimen of *L. connexella* Z. The forewings are finely scaled. Head and palpi brownish white. Antennæ brownish white, annulate with darker. The legs are brownish white, the tibiæ of the first pair are striped with black. Thorax concolorous with the wings, with a median whitish line. Patagia whitish. Abdomen gray, lighter at the tip.

The markings of the forewings are somewhat indistinct, but are characteristic because of the great accumulation of black scales in the region of the fold. They are as follows: there is a rather straight basal streak ending at one-third the wing length, where it is slightly dilated. It is margined with blackish around the apex. The first pair of streaks are placed very obliquely. Of these, the costal is the smaller and is triangular. The dorsal is of very peculiar form, in that it is strongly constricted on the fold. Both are black margined internally. Usually the extent of the black scales on the inner edge of the dorsal streak is so greatly increased as to form a considerable sized black spot, which extends to the apex of the basal streak. (Less frequently these black scales are almost lacking). The next pair of streaks are at the middle of the wing length, and are also inwardly black margined. (These black scales are also increased so as to form a spot.) The costal streak is narrow, almost perpendicular; the dorsal forms a broader triangle, placed just before the tornus. Toward the apex are

two very narrow, slightly curved streaks. At the apex is a black dot or a streak, bordered with white scales toward the base. Cilia light, darker toward the tornus, with a blackish marginal line around the apex.

Hindwings dark gray. Cilia somewhat lighter.

The last three light costal streaks are visible on the dark brownish underside of the forewings.

The larvæ are abundant in October and November on several species of *Salix*. The mine is on the underside between the veins. It is elongate-oval and somewhat wrinkled. The imagoes emerged in April and May.

The above is a translation of Frey's description of *L. scudderella*. The second costal streak is placed rather beyond the middle than at the middle. In some specimens, there is also a third dorsal streak above the tornus. The apical black marking, when a streak, is often margined not only before with white scales, but also above for its whole length. Alar expanse 7.5–9 mm.

I have flown specimens taken at Cincinnati, Ohio, which are of a lighter and more grayish color than specimens bred by Mr. W. D. Kearfott on willow, Essex County Park, N. J.

Lithocolletis ledella Walsingham.

Plate XXII, Fig. 3.

Lithocolletis ledella Walsingham, Insect Life, ii, 79, 1889,—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6292.

"Antennæ whitish, faintly barred above with brown. Palpi white. Face white, frontal tuft saffron, mixed with whitish. Thorax golden saffron, with a few white scales.

"Forewings golden saffron with a white medio-basal streak, somewhat expanding outwards on the fold and reaching to one-third the length of the wing above it, this is dark margined on its upper edge; beyond it are four costal and four dorsal silvery white streaks; the first dorsal commences beneath the point of the basal streak and extends obliquely outward to the middle of the wing, it is dark margined internally and around its apex; the costal streak above it is short, rather square, and also internally dark margined; the second costal streak scarcely longer than the first, is a little oblique and also inwardly dark margined; beyond this are two more narrow costal streaks, the first curved outwards, and dark margined internally, the second pointing inwards from above the apex, with a few black scales at the extremity; the second dorsal streak is triangular, dark margined internally and around the apex, commencing somewhat further from the base than the second costal streak, its point lies between the second and third; the last two of the four dorsal streaks are very slender, and pointing inward, with a few black scales at their ends, where they reach the points of the costal streaks above them; a black elongate spot lies at the apex, separated from the dark apical line which lies at the base of the golden gray apical cilia.

"Hindwings and cilia gray, with a faint golden sheen. Abdomen gray, and tuft paler. Hind tarsi whitish gray, unspotted. Alar expanse, 9–10 mm."

"Six specimens, bred from somewhat folded mines, occupying the whole upperside of leaves of *Ledum glandulosum*, found in June in Mendocino County, Cal., and bred the same month. I met with this species also on the wing at the same time and place. It appears to be nearly allied to *salicicolella* Sircom, among the European species."

The above is Lord Walsingham's description.

Lithocolletis salicivorella Braun.

Plate XXII, Fig. 4.

Lithocolletis salicivorella Braun, Ent. News, xix, 101, 1908.

Antennæ pale grayish ocherous, faintly annulate with darker, somewhat darker at the tip. Palpi shining white. Face white. Tuft pale gray, with an ocherous tinge.

Thorax and basal third of the forewings ocherous gray. Wings becoming more ocherous towards the apex. A white band across the anterior margin of the thorax extends across the patagia and is continuous with a median basal white streak on the forewings. There is a short dorso-basal white streak somewhat dilated posteriorly. The median basal streak is curved downward and extends for two-fifths of the wing length where it is confluent with the first dorsal streak, its upper edge uniting with the apex of the first dorsal streak. A few dark brown scales extend around the apex of the angle thus formed. There are four costal and three dorsal white streaks. The first dorsal streak at the basal fourth is very large, oblique and curved. Internally it is dark margined just before it unites with the basal streak, the dark margin being continued around the angle and for a short distance along the lower side of the basal streak. The extreme edge of the costa is dark brown for about one-third of the wing length, where the dark line is deflexed and continues as the dark margining of the first costal streak, which is narrow, very oblique, its apex extending to a point just beyond the apex of the first dorsal. The second costal streak is large, nearly perpendicular, its apex opposite to that of the second dorsal streak, which is also very large, and placed slightly nearer the base than the corresponding costal streak, and is somewhat oblique. The next pair of streaks, of which the dorsal is placed just above the tornus, are nearly opposite to each other, slightly oblique toward the base and curved; their apices nearly meet. These two pair of streaks are margined internally with brown scales. Fourth costal streak oblique, curved and unmarginated. A narrow line of black scales extends from below the apex of the last costal streak to near the apex of the wing, and is margined above by a line of white scales. Marginal line in the cilia dark brown, extending around the apex from the fourth costal streak to the third dorsal. Cilia grayish ocherous. Alar expanse 7 mm.

Hindwings grayish. Cilia gray, with a fulvous tinge.

Abdomen dark gray above, whitish beneath. Anal tuft grayish ocherous. Legs whitish, banded and striped with gray.

The unique type, a male, of this species was bred by Mr. W. D.

Kearfott from a much wrinkled mine on the underside of a willow leaf, collected in Essex County Park, New Jersey, July 6, 1902. The imago appeared July 19th.

Lithocolletis deceptusella Chambers.

Plate XXII, Fig. 5.

Lithocolletis deceptusella Chambers, Can. Ent., xi, 73, 1879.—Walsingham, Ins. Life, iii, 328, 1891.—Busck, Proc. Ent. Soc. Wash., v, 190, 1903.

Face, palpi and antennæ white; antennæ faintly annulate with brownish. Tuft pale brownish ochereous, mixed with white.

Thorax and forewings pale golden brown. Three longitudinal white streaks on the thorax, the median one continuous with a short narrow dorso-basal white streak, the other two uniting with the unmarginated median basal streak, which curves downwards and unites with the upper edge of the slightly oblique nearly square first dorsal streak, which is faintly margined internally by a darker shade. The first costal streak, a little beyond it, is triangular, somewhat oblique, and dark margined on both sides. Second costal streak nearly perpendicular and opposite the larger triangular second dorsal streak, both faintly dark margined before. Last two costal streaks small, oblique and faintly internally margined. A third dorsal streak above the tornus is indicated by its dark margin. Beginning under the apex of the third costal streak is a dark brown streak of scales, extending to the apex. A brown marginal line extends around the apex, at the base of the cilia, which are pale whitish ochereous. Expanse 6 mm.

Hindwings and cilia pale grayish, slightly fulvous. Forelegs pale, tibiæ and first tarsal joint reddish.

Kentucky (Chambers).

This species has been made a synonym of *blancardella* (Walsingham, Trans. Am. Ent. Soc., x, 202, 1882). An examination of Chambers' type shows it to be a distinct species, not closely related to *cratægella* or the other apple feeding species. It differs from *cratægella* in the less oblique first costal streak; in the confluence of the unmarginated basal streak with the first dorsal streak, which is entirely different from the first dorsal streak of *cratægella*; and in the absence of any very distinct dark margining of the streaks.

Lithocolletis alnicolella Walsingham.

Plate XXII, Fig. 6.

Lithocolletis alnicolella Walsingham, Ins. Life, ii, 80, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6273.

"Antennæ whitish, very faintly spotted above. Palpi white. Face white, frontal tuft grayish saffron. Thorax pale grayish saffron, touched with white at the sides.

"Forewings pale grayish saffron with three dorsal and four costal silvery white streaks, all dark margined on their inner sides and at their points; a somewhat broad but very indistinct white medio-basal streak extends above the fold

to one-third the wing length, and a shorter streak of the same color follows the dorsal margin from the base to half the length of the one above it; the first dorsal streak is broad, outwardly oblique, and reaching nearly to the smaller triangular costal streak above it; in some specimens it actually attains to it, forming an angulated fascia; the point of the second dorsal, also somewhat triangular, is directed a little beyond the point of the second costal streak above it; these are both nearly perpendicular; the third dorsal very small; arising opposite the space between the third and fourth costal streaks; it reaches to the apex of the former; the end of the wing is enclosed by a dark semi-circular line at the base of the cilia, within which is an elongate blackish spot; cilia are grayish, with a faint saffron tinge.

"Hindwings and cilia pale grayish. Abdomen gray above, anal tuft scarcely paler. Posterior tibiæ, whitish, unspotted. Expanse 6 mm."

"Two specimens were bred from larvæ found mining the upper sides of leaves of *Alnus incana* on Mount Shasta, Siskiyou County, Cal., in August, 1871, in which month the perfect insects emerged. Three other specimens were met with on the wing, also in the neighborhood of Mount Shasta."

The above is Lord Walsingham's description.

Lithocolletis alni Walsingham.

Lithocolletis alni Walsingham, Ins. Life, iii, 326, 1891.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6274.

Syn. *alnivorella* Chambers (not Ragonot), Cin. Quart. Jn. Sci., ii, 302, 1875.—Bull. Geol. Surv. Terr., iii, 139, 1877.

"Palpi and antennæ rather short for this genus, and tuft on the vertex also small; face, palpi, under surface of the thorax and abdomen and the legs silvery, the palpi a little darker on the outer surface; antennæ and tuft silvery fuscous, or perhaps as correctly ash-brown; upper surface of thorax and forewings egg-yellow, varying to golden with change of light. There is a short basal, silvery white streak along the dorsal margin of the forewings, and a longer median basal streak of the same color, and dark margined toward the costa. A silvery white fascia immediately before the middle, posteriorly obtusely angulated about the middle of the wing, and dark margined before, the dark margin becoming more diffuse along the dorsal margin, where it is produced forwards until it meets the basal dorsal white streak; the point of the angle of the fascia is sometimes margined behind by a small dark brown spot, and the fascia is widest on the dorsal margin; just behind the middle is a costal silvery white streak, and opposite to it is a dorsal one, both strongly dark margined before, and both pointing a little obliquely backwards, this dorsal streak is placed immediately before the cilia, and a little further back is a small triangular dorsal silvery spot, dark margined before; opposite to the space between these two is a straight silvery costal streak, also dark margined before, which sometimes bends backwards and unites with the second of the dorsal streaks referred to above; whilst its dark margin bends forwards and unites with the dark margin of the first one; further back is a third costal streak, which is small, straight and dark margined before.

Apical spot triangular and dark brown; cilia silvery fuscous; hindwings and cilia a little darker than the cilia of the forewings. Abdomen shining bluish black on its upper surface. Alar expanse less than one-third inch. Spanish Bar. The larva is cylindrical, and makes a large tentiform mine on the under surface of the leaves of an *Alnus*."

The above is Chambers' description. This species is apparently close to *alnicolella* Wlsm., the principal difference being in the larval habits, as noted by Lord Walsingham, under his description of *alnicolella*. I have seen no specimen and no type is in existence.

Lithocolletis malimalifoliella Braun.

Plate XXII, Fig. 7.

Lithocolletis malimalifoliella Braun, Ent. News, xix, 101, 1908.

Antennæ gray. Palpi silvery white. Face silvery white. Tuft golden brown, tipped with dark brown.

Thorax and forewings golden brown. There are three longitudinal stripes on the thorax, one median, the other two passing over the patagia and continuous with a median white basal streak, ending at one-third the wing length and dark margined above and around the tip behind. The dorsal margin is also white for a short distance. There are three costal and two dorsal white streaks of which the dorsal are the larger, all dark margined before, and the first pair dark margined at the tip behind. The first costal at the basal third is small, oblique. The first dorsal at the basal fourth is very large, oblique and curved, ending just before the apex of the first costal. The second costal streak is small, nearly perpendicular, and opposite the second dorsal, which is triangular, and placed just before the tornus. The third costal streak, at the same distance from the second as the latter is from the first, is somewhat oblique, pointing forward. A third dorsal streak is indicated by the dark margin. An elongate black apical spot, with a few scattered brown scales before it. Marginal line in the cilia blackish with a distinct blue lustre around the apex. Cilia gray, brownish around the apex. Alar expanse 5.5-6 mm.

Hindwings dark gray. Cilia gray. Abdomen very dark gray above, silvery white beneath. Legs gray, hind tarsi blackish, grayish at their bases.

I have bred this species from small tentiform mines on the under-side of leaves of apple, *Malus Malus* (L.) Britton. The appearance of the mine is entirely different from that of *L. crataegella* Clem. The mine is much wrinkled, and the leaf is strongly folded. The parenchyma is eaten in spots, giving the leaf a speckled appearance on the upperside. The pupa is suspended in a few silken threads. I also have flown specimens from Montclair, N. J., which are identical with the bred specimens.

There are two specimens of this species in the Museum of Comparative Zoology at Cambridge, Mass., bred by Chambers on quince, in Kentucky.

The mine also occurs on *Cratægus mollis* Scheele, and then the parenchyma is almost completely consumed.

Occasionally, specimens of *cratægella* occur in which the fourth costal streak is wanting, but *malimalifoliella* may be distinguished from these by the relative position of the third costal streak, which is placed farther back, almost equally dividing the space between the second costal and the apex.

Lithocolletis cratægella Clemens.

Plate XXII, Fig. 8.

Lithocolletis cratægella Clemens, Proc. Acad. Nat. Sci. Phil., 324, 1859; 208, 1860.—Tin. No. Am., 76, 141, 1872.—Chambers, Can. Ent., iii, 55, 108, 1871; v, 50, 1873; xi, 73, 1879.—Bull. Geol. Surv. Terr., iv, 100, 1878.—Walsingham, Trans. Am. Ent. Soc., x, 202, 1882.—Busck, Proc. Ent. Soc. Wash., v, 190, 1903.

Antennæ dark silvery gray. Face and palpi silvery. Tuft dark brown, mixed with whitish scales.

Thorax and forewings brownish golden, with a silvery basal streak continuous with a white line on each side of the thorax and extending for two-fifths of the wing length, black margined toward the costa and around its pointed apex. Dorsal margin narrowly white toward the base. Four costal and two or three white dorsal streaks, of which the first costal and the first two dorsal streaks are dark margined on both sides, the others internally only. The first costal streak, beginning at two-fifths, is oblique and rounded beneath, its internal margin produced along the costa to the base. The other three costal streaks are nearly perpendicular. The first dorsal streak, somewhat nearer the base than the first costal streak, also oblique, its apex a little beyond that of the first costal streak, which it also touches. Second dorsal streak triangular, just before the tornus and opposite the second costal streak. From the space between the second pair of streaks, a streak of dark scales extends to the apex. Marginal line in cilia blackish, with a decided bluish lustre. Cilia grayish ocherous. Expanse 6.5-7 mm.

Hindwings and cilia gray. Abdomen dark gray above, silvery beneath, with more ocherous anal tuft. Legs grayish, hind tarsi spotted with fuscous above.

An underside miner on several related plants, viz.: *Cratægus* sp., apple, and wild cherry, *Prunus serotina* Ehrh. The mine is rather small, usually lying between two veins. A common species in the eastern United States.

This species is distinct from any of the apple feeding species of Europe. It has been made a synonym of *L. blancardella* Fab., from which it differs in the much smaller size, more pointed basal streak, and less oblique first pair of streaks.

Lithocolletis propinquinella sp. nov.

Plate XXII, Fig. 9.

Antennæ dark gray. Face and palpi silvery. Tuft dark brown mixed with whitish scales.

Thorax brownish golden, with a white line across the anterior margin, passing over the patagia and continuous with the basal streak on the forewings. Forewings brownish golden in the male and darkened with brownish scales along the middle and in the dorsal half; more golden in the female. The rather broad basal streak, pointed at the apex, ends at about two-fifths of the wing length and is black margined above and around its apex. Dorsal margin narrowly white toward the base. Four costal and three dorsal white streaks. First costal just before the middle, very oblique, and dark margined internally and around its tip behind. The other three costal streaks nearly perpendicular and dark margined internally only. First dorsal streak commencing much nearer the base than the first costal, long and oblique, its apex reaching beyond that of the first costal, sometimes almost to the space between the second costal and dorsal streaks. It is dark margined on both sides. In the male its internal dark margin is indented on the fold, in the female it is almost regularly inwardly convex. An accumulation of blackish brown scales, densest in the male, between the second pair of streaks extends backward along the middle of the wing to the apex. Marginal line in the cilia blackish, with a bluish metallic luster. Cilia grayish ocherous, less gray in the female. Expanse 8-9 mm.

Hindwings and cilia grayish, with a fulvous tinge. Abdomen dark gray above, silvery beneath. Anal tuft grayish in the male, ocherous in the female. Legs grayish ocherous, tarsi gray above.

A common underside miner on wild cherry, *Prunus serotina* Ehrh.

A much more common species than *L. cratægella* Clemens, and more closely related to the European *blancardella*, from which, however, it is distinct. It differs from *cratægella* in the much larger size and the more oblique first dorsal streak, which is also relatively much nearer the base of the wing than in *cratægella*.

Lithocolletis incanella Walsingham.

Plate XXII, Fig. 10.

Lithocolletis incanella Walsingham, Ins. Life, ii, 81, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6272.

“Antennæ whitish, faintly spotted above. Palpi shining white. Face shining white, frontal tuft white, with a few saffron scales at the sides. Thorax bright reddish saffron, with a thin whitish line running around its anterior margin and communicating with the basal streak on the forewing.

“Forewings bright brownish saffron, with a long slender medio-basal white streak without dark margins, four costal and three dorsal streaks of the same color, sometimes with a slight metallic sheen; the first costal streak is a little before the middle of the wing, oblique and pointed, with a scarcely perceptible dark dusting along its inner margin; the first dorsal streak commences a little nearer to the base; it is dark margined internally, and is somewhat wider than

and reaches a little beyond the costal streak beyond it; the second costal streak is small and points slightly outwards; the third is nearly perpendicular; the fourth points slightly inwards from a little before the apex; these three are all dark margined on their inner edge; opposite to these are the second and third dorsal streaks; the second is triangular, wider at the base and dark margined internally, its black dusting communicating with a patch of similar blackish scales at its apex, extending to the second costal streak above it; the third dorsal streak is short, pointing inwards and dark margined on both sides, its outer margin being continuous with a dark line at the base of the cilia, which encircles the tip of the wing, reaching to the exterior costal streak; within this line, but separate from it, is an elongate apical spot of somewhat disconnected blackish scales, the cilia pale grayish.

"Hindwings and cilia pale grayish. Abdomen dark gray above, anal tuft somewhat paler. Hind tarsi white, tipped with grayish and two grayish saffron spots above. Expanse 9 mm."

"The larva feeds in mines on the underside of *Alnus incana* toward the end of June in Colusia County, Cal., the perfect insects emerged in July, 1871. Seven specimens were bred, and the species was also met with on the wing at Burney Creek (near Pit River), Shasta County, Cal."

The above is Lord Walsingham's description.

The mines also occur upon the upperside of the leaf. I have bred a large series of specimens on a species of *Alnus* from Alameda County, Cal., where the mines are very common on the upperside of the leaf, but appear very rarely on the lower side. Some specimens have the basal streak faintly margined above, especially toward the apex.

Lithocolletis populiella Chambers.

Plate XXII, Fig. 11.

Lithocolletis populiella Chambers, Bull. Geol. Surv. Terr., iv, 101, 1878.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6331.

"Palpi, head, tuft, antennæ, under surface of the thorax, legs, and abdomen pure snowy white; upper surface of abdomen and forewings pale golden; there are three white longitudinal streaks on the thorax (one median, and continuous with a dorso-basal white streak on the wings, the other two passing over the tegulæ, and continuous with a median basal white streak on the wings); there is also a costo-basal white streak on the forewings, and these three basal white streaks are of about equal length, and less than one-fourth of the length of the wings. Immediately behind the dorso-basal streak, and scarcely distinct from it (probably sometimes confluent with it), is the first dorsal streak, which approaches a square form, and is dark margined before and above. Almost opposite to this dorsal streak, but a little behind it, is the first costal streak; it is oblique, not pointed, and is dark margined before. The second costal and second

dorsal are opposite each other, the costal one being the largest of the two, triangular and dark margined before. The third costal and third dorsal are nearly opposite, the costal being perhaps a little farther back, and being larger than the dorsal, and larger also than the second costal; both are dark margined before. These are the only three dorsal streaks. The fourth costal is just before the apex, points a little obliquely forward, and is margined behind by a small apical patch of brown dusting. Cilia white, with a brownish hinder marginal line at their base. Alar expansion one-fourth of an inch. Ohio and Kentucky."

The above is Chambers' original description. The second and third costal streaks can scarcely be said to be larger than their corresponding dorsal streaks; usually they are about the same size. There is also some variation in the amount of apical brown dusting; sometimes it only consists of two or three scales. The expanse is 6-7 mm.

I have bred this species from tentiform mines on the underside of the leaves of the silver leaf poplar, *Populus alba* L., the same food plant from which Chambers bred this species. The mines are exceedingly small, oval, 9-10 mm. long, and 4-5 mm. broad; an indistinct fold extends through the long axis. They are scarcely visible on the lower side, owing to the peculiar tomentose texture of the leaf, and on the upperside may be distinguished by the speckled appearance of the leaf, caused by the larva eating the parenchyma in spots. The pupa is not enclosed in a cocoon, but its anal end is attached to a small button of silk toward one end of the roof of the mine.

Lithocolletis sexnotella Chambers.

Plate XXII, Fig. 12.

Lithocolletis sexnotella Chambers, Jn. Cin. Soc. Nat. Hist., ii, 189, 1879.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6282.

Face and palpi white; antennæ whitish, darker at the tips; tuft very pale golden.

Thorax and forewings very pale golden. Four costal and three dorsal white streaks (the third dorsal obscure and sometimes wanting); of these the first two pair are dark margined internally, the first dorsal also faintly around the tip. First costal very oblique, small and opposite the large curved first dorsal. Second dorsal opposite the space between the second and third costal streaks. A small dark brown apical spot. Marginal line at the base of the cilia brownish, with a pale blue metallic luster. Cilia whitish, slightly tinged with golden. Alar expanse 7-7.5 mm.

Hindwings and cilia pale yellowish. Abdomen above ocherous in the female, gray in the male, beneath whitish. Legs yellowish white, tarsi unspotted.

This species was described by Chambers from a Kentucky specimen, and the type is deposited in the Museum of Comparative

Zoology, Cambridge, Mass. A number of specimens collected by Mr. W. D. Kearfott, in Pike County, Penna., are identical with the type.

While very closely allied to *æriferella* Clem., *sexnotella* may be distinguished by its paler color, the pure white dorsal and costal streaks, and by having its second dorsal streak opposite the space between the second and third costal streaks. The internal margins of the corresponding costal and dorsal streaks never unite in the middle of the wing.

Lithocolletis æriferella Clemens.

Plate XXII, Fig. 13.

Lithocolletis æriferella Clemens, Proc. Acad. Nat. Sci. Phil., 320, 1859.—Tin. No. Am., 64, 68, 1872.—Chambers, Can. Ent., iii, 183, 1871.—Cin. Quart. Jn. Sci., ii, 104, 1875.—Busck, Proc. Ent. Soc. Wash., v, 187, 1903.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6281.

“Antennæ dark brown above, white beneath. Front silvery white; tuft dark brown. Forewings pale reddish saffron, with a golden hue, especially from the middle to the base, with four silvery costal streaks, the first on the middle of the costa, and all, except the last, black margined toward the base, the third but faintly, and the costa black from the base to the first costal streak. Three silvery dorsal streaks on the inner margin, the first two large and the third small, the first black margined internally and around the tip behind, the second by a line curved above. Apical spot small and black, with the scales behind it having a bluish splendid lustre; hinder marginal line blackish; cilia dark grayish, with a fulvous hue. Hindwings dark gray, cilia fulvous.

“The larva may be found in the leaves of oaks in September and early in October. It makes a small mine on the under surface, and the leaf is thrown into a fold previously to pupation and the cuticles folded and corrugated. The pupa is contained in an ovoid cocoon, within the mine, composed of “frass” and silk. The imago appears in May. The body of the larva is cylindrical. The head is pale brown; the body yellow, with a broad, vascular, reddish brown band.”

The above is Clemens' description.

The white color of the costal and dorsal streaks, especially the first pair, is often suffused with pale golden. The margins of the second and the third costal streaks, in the middle of the wing, where they are of a dull leaden color, unite with the margins of their opposite dorsal streaks. In some of my specimens bred at Cincinnati from mines on *Quercus imbricaria* Michx., the dark margin of the second dorsal streak is very heavy and conspicuous.

Expanse 7-8.5 mm. •

Lithocolletis obsoleta Frey and Boll.

Plate XXII, Fig. 14.

Lithocolletis obsoleta Frey and Boll, Stett. ent Zeit., xxxiv, 211, 1873.—Chambers, Cin. Quart. Jn. Sci., i, 202, 1874.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6279.

Syn. *obsoletella* Chambers, Bull. Geol. Surv. Terr., iv, 155, 1878.

Antennæ whitish ochereous. Face and palpi white. Tuft whitish in the center, brownish toward the sides.

Thorax and forewings ochereous. There are four costal and two dorsal streaks, faintly indicated by a lighter shade. In some of the type specimens these streaks are almost obsolete, the wing then being nearly unicolorous. The first pair of streaks just before the middle are very oblique, the dorsal being the larger. The triangular second dorsal streak is opposite the space between the second and third costal streaks. In the apical part of the wing is an indistinct brownish spot, sometimes wanting. An indistinct brownish line in the cilia has a faint bluish lustre around the apex. Cilia whitish ochereous, darker toward the tornus. Expanse 8 mm.

Hindwings grayish ochereous, with slightly paler cilia. Abdomen in male grayish, in female pale ochreous. Legs whitish ochereous, tarsi not at all or but faintly spotted.

Hab.—Massachusetts, the locality from which the type specimens were obtained. Easily distinguished from all other species by the absence of any clearly defined markings.

Lithocolletis argentinetella Clemens.

Plate XXII, Fig. 15.

Lithocolletis argentinetella Clemens, Proc. Acad. Nat. Sci. Phil., 321, 1859.—Tin. No. Am. 66, 78, 1872.—Chambers, Can. Ent., iii, 148, 1871; xi, 89, 1879.—Frey and Boll, Stett. ent. Zeit., xxxiv, 213, 1873.—Chambers, Cin. Quart. Jn. Sci., i, 202, 1874; ii, 101, 1875.—Busck, Proc. Ent. Soc. Wash., v, 190, 1903.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6283.

“Antennæ silvery. Front and tuft silvery. Thorax pale reddish saffron, with a rather short, unmarginated, silvery basal streak, with five costal and four dorsal streaks of the same hue. The first costal and dorsal streaks unmarginated, the first dorsal being near the inner angle of the base, tapering to a point in the middle of the wing from a very broad base; the first costal streak rather slender, and only one-half as long as the first dorsal; the second costal and second dorsal connected about the middle of the wing, and dark marginated toward the base by a line much curved in the middle; the third costal and third dorsal opposite, and each dark marginated internally; the fourth dorsal about midway between the fourth and fifth costal streaks; sometimes the fourth costal and dorsal streaks with a few dark internal scales, sometimes unmarginated. At the apex is a small patch of scattered black scales; the hinder marginal line rather indistinct; cilia saffron, paler on inner margin. Hindwings shining silver-gray, cilia rather darker.”

The above is Clemens' description.

A white transverse band across the anterior margin of the thorax, crossing the patagia, continuous with the basal streak, is not mentioned in the description. The tuft is golden at the apex. Abdomen yellowish fuscous above; anal tuft yellow. Legs whitish, spotted with brown. Alar expanse 6.5–8 mm.

Bred from underside mines on elm, *Ulmus fulva* Michx. and *Ulmus Americana* L. The pupa is formed within a transparent silken web, occupying half the mine.

Lithocolletis occitanica Frey and Boll.

Lithocolletis occitanica Frey and Boll, Stett. ent. Zeit., xxxvii, 224, 1876; xxxix, 270, 1878.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6284.

Face and palpi white; tuft white, with a few brownish scales; antennæ whitish, faintly annulate with yellowish; legs whitish, spotted with brown. Abdomen gray.

The thorax (with a white line across the patagia) and the forewings are deep saffron. They are lustreless, and their markings are pure white. At the base of the wings in the fold there is a very short white streak. At the basal fifth there begins on the dorsal margin a broad, backwardly bent, oblique cross streak, whose pointed apex does not reach the costal margin. At the middle of the wing length there is a narrow, slightly horse-shoe shaped complete fascia, inwardly narrowly dark margined. A third similarly formed fascia appears at three-quarters of the wing length. Each of these is darkened or interrupted in its costal half, as in the middle by a group of brown scales. In the apical part of the wing there are some more scattered brownish scales. The cilia around the apex are saffron gray, around the hind angle entirely light yellowish gray.

The hindwings and cilia are whitish.

According to Frey and Boll, whose description is given above, this species may be bred from an underside rather arched mine on *Ulmus fulva* Michx.

Hab.—Texas.

I have had no opportunity of examining specimens of this species. Further study and breeding of a large series may show that it is not specifically distinct from *argentinotella* Clem.

Lithocolletis apicinigrella sp. nov.

Plate XXII, Fig. 16; Plate XXIV, Fig. 23.

Antennæ pale grayish ocherous. Face and palpi whitish. Tuft grayish ocherous, mixed with brown and white scales.

Thorax and forewings pale grayish ocherous. Markings ocherous white and usually very indistinct and ill-defined. When distinct, they consist of a pale unmargined basal streak extending for one-fourth the wing length in the fold, then bent upward toward the costa; a dorso-basal streak continuous with a median line on the thorax and uniting with the first dorsal streak; just before the

middle an oblique costal and a dorsal streak, faintly or not at all dark margined internally, which sometimes unite to form an angulated fascia; three more nearly perpendicular costal streaks; a dorsal streak before the tornus, oblique and pointing toward the third costal streak; sometimes two more dorsal streaks above the tornus, which unite with the third and fourth costal streaks respectively, thus enclosing the apex, which then contains a small patch of blackish scales. Usually, the last two dorsal streaks are wanting, and the black scales are so increased as to occupy the entire apex, a line of them extending to the tornus. Often all of the marks are very ill-defined and the entire thorax and dorsal portion of the wing below the fold is of the pale color, and the black area at the apex is very pronounced. Alar expanse 6.5-7.5 mm.

Hindwings and cilia pale grayish ocherous. Abdomen pale gray, with silvery anal tuft. Legs pale silvery ocherous.

Described from a series of specimens bred from mines on the underside of leaves of a species of *Salix*, received from Mr. G. R. Pilate, Mills College, Alameda Co., Cal., and from two captured specimens in the U. S. Nat. Mus., from Seattle, Wash. (Prof. T. Kincaid, collector).

***Lithocolletis basistrigella* Clemens.**

Plate XXII, Fig. 17.

Lithocolletis basistrigella Clemens, Proc. Acad. Nat. Sci. Phil., 321, 1859.—Tin. No. Am., 39, 65, 69, 1872.—Chambers, Can. Ent., iii, 148, 166, 182, 1871.—Cin. Quart. Jn. Sci., i, 205, 1874.—Walsingham, Insect Life, ii, 25, 1889.—Busck, Proc. Ent. Soc. Wash., v, 188, 1903.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6301.

Syn. *intermedia* Frey and Boll, Stett. ent. Zeit., xxxiv, 210, 1873.—Chambers, Cin. Quart. Jn. Sci., ii, 230, 1875.

"Antennæ silvery. Front silvery, tuft fulvous, mixed with silvery. Thorax pale, reddish golden, with a white streak on each side, and one in the middle. Forewings shining ocherous saffron, with a slender unmarginated white basal streak in the fold, a white basal streak along the costa, narrowly dark margined on the extreme costa, extended to the first costal streak, which is silvery white, very oblique and unmarginated; behind this are three small costal streaks of the same hue, the two central dark margined internally. Opposite the first costal streak is a long, very oblique, silvery white dorsal streak, extending along the inner margin to the base, with dark brown scales between their hinder ends, or exterior to the tip of the dorsal streak, but sometimes absent. Nearly opposite the third costal streak is a dorsal silvery streak dark margined internally. No apical spot, sometimes with dispersed brown scales beneath the last costal spot. The hinder marginal line blackish; cilia pale fulvous. Posterior wings gray; cilia gray, with a fulvous hue."

The alar expanse, omitted in the original description, is 8 mm.

The mines of this species are very common on the underside of leaves of oaks. The mine lies between two veins and is nearly rectangular in shape and unwrinkled. At the time of pupation, the

frass, which has been deposited along the edges of the mine, is collected and made into an oval ring-like wall of the cocoon, leaving the cuticle transparent, through which the pupa is plainly visible. It ranges throughout the entire United States. Specimens collected by Lord Walsingham in California and Oregon (of which there is a specimen in the U. S. Nat. Mus.) are identical with the eastern specimens, but somewhat larger and the white streaks are a little broader and more distinct.

Lithocolletis celtisella Chambers.

Plate XXII, Fig. 18.

Lithocolletis celtisella Chambers, Can. Ent., iii, 129, 1871.—Cin. Quart. Jn. Sci., i, 201, 1874.—Bull. Geol. Surv. Terr., iv, 117, 1878.—Frey and Boll, Stett. ent. Zeit., xxxix, 274, 1878.—Chambers, Jn. Cin. Soc. Nat. Hist., ii, 190, 1879.—Walsingham, Ins. Life, ii, 52, 1889.

Syn. *nonfasciella* Chambers, Can. Ent., iii, 108, 1871.—Cin. Quart. Jn. Sci., i, 201, 1874.—*pusillifoliella* Frey and Boll, Stett. ent. Zeit., xxxvii, 226, 1876.—Stett. ent. Zeit., xxxix, 274, 1878.

"Face, palpi and under surface silvery white, the under surface and legs tinged with yellowish; antennæ silvery, annulate above with dark brown. Tuft, thorax and anterior wings saffron yellow, with a white patch in the center of the tuft and the usual white line across the anterior margin and sides of the thorax, which, however, as in other species, is sometimes wanting. When present it is confluent with the rather long narrow median basal white streak, which is faintly dark margined towards the dorsal margin. Just before the middle is a white fascia, angulated near the costa and produced backwards at the angle, and strongly dark margined internally. Near the base of the cilia is another straight white fascia not definitely bounded, anteriorly margined with dark brown and with many dark brown scales interspersed in the white, and sometimes divided into two or three rather indefinite spots. The apex of the thorax is white, and from it a narrow white line passes along the posterior margin of the wing to the first fascia, and sometimes is faintly indicated to the base of the cilia and is margined with dark brown. Apex dusted with dark brown on a white ground, the dusting margined by an oblique white line internally. Sometimes the dusting is not thick, and the whole apical half of the wings is sparsely flecked with dark brown scales. The markings of the apical half of the wing are all indefinite, the colors not being separated by distinct well-marked lines, but to some extent running into each other. Alar expanse less than one-fourth inch. Kentucky. Very abundant. There is some variation in the intensity of the color, some species being much paler than others, and one specimen in my possession has the thorax entirely white."

In the original description, which is reprinted above, Chambers says that the basal streak is "faintly dark margined toward the dorsal margin." In all my specimens (bred), the streak is margined toward the costa and not at all on the dorsal side. The first

fascia in *celtisella* occupies nearly the same position as the second in *celtifoliella*.

This species has been made a synonym of *celtifoliella*, but an examination of specimens of each and a comparison of the early stages shows that *celtisella* and *celtifoliella* are specifically distinct.

Food plant, *Celtis occidentalis* L.

The larva, of the cylindrical type in the later stages, enters the leaf on the lower surface, and makes a narrow linear mine, then cuts through the parenchyma to the upper side, where the mine broadens into an elongate blotch, made tent-like by a longitudinal ridge in each epidermis. The larvæ eat the entire parenchyma, leaving merely the dark discolored cuticles of the leaf.



Mine of *L. celtisella*.

The mines and imagoes of this species are very abundant. Its range is wide, and probably coincides with that of its food plant.

Lithocolletis lucetiella Clemens.

Plate XXII, Fig. 19.

Lithocolletis lucetiella Clemens, Proc. Acad. Nat. Sci. Phil., 319, 322, 1859.—Tin. No. Am., 65, 73, 1872.—Chambers, Can. Ent., iii, 56, 1871.—Walsingham, Ins. Life, ii, 52, 1889.—Busck, Proc. Ent. Soc. Wash., 188, 1903.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6262.

Syn. *ænimatella* Frey and Boll, Stett. ent. Zeit., xxxiv, 219, 1873.—Chambers, Cin. Quart. Jn. Sci., i, 210, 1874.

Antennæ, palpi, face and tuft shining white. Thorax and basal half of the forewings shining white. Apical part of the forewings suffused with golden. A golden costal streak from the base, not extending to the middle. At about the middle is a silvery white fascia, broadly margined with golden on its inner side, and with a black spot on the costa internally. This fascia is also sometimes margined internally towards the dorsal margin with a few black scales. In the apical portion of the wing are two white costal streaks; the first margined internally by a black spot; the second near the tip and unmargined. Nearly opposite the first costal streak is a large dorsal streak dark margined internally by an oblique black line. Cilia golden around the apex, becoming silvery white toward the tornus. Expanse 6-7 mm.

The hindwings and cilia are silvery gray. Legs white, first pair shaded with gray. Abdomen dark gray in the male, silvery in the female; anal tuft silvery.

The mines of this very distinct species are common in the Atlantic States on the underside of leaves of *Tilia Americana* L. The

larva is pale greenish yellow, with a darker head. The mine is rectangular, often nearly square, and placed between two veins and unwrinkled. When complete, the mine is transparent, and the pupa, which is contained in an oval cocoon, is plainly visible.

Lithocolletis symphoricarpella Chambers.

Plate XXII, Fig. 20.

Lithocolletis symphoricarpella Chambers, Cin. Quart. Jn. Sci., ii, 98, 1875.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6311.

Syn. *symphoricarpella* Frey and Boll, Stett. ent. Zeit., xxxix, 271, 1878.—*bolliella* Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6312.

Antennæ grayish, broadly annulate with dark brown. Face and palpi shining yellowish white. Tuft reddish golden.

Thorax and forewings shining brownish golden. Pale markings shining with a faint golden lustre. There is a short indistinct median basal streak. Just before the middle is a slightly curved fascia, inwardly margined with blackish scales and outwardly shading into the ground color of the wing. At the beginning of the cilia is a second fascia, sometimes divided into a costal and an opposite dorsal streak by a line of dark scales. Just preceding the dusted apex is a rather indistinct costal streak. Cilia around the apex, of the wing color, becoming gray at the tornus. Alar expanse 5.5–6 mm.

Hindwings and cilia gray. Abdomen gray. Legs shining gray, tarsi spotted with whitish.

The form described by Frey and Boll is that in which the pair of streaks at the beginning of the cilia do not unite to form a fascia.

While only reported from Ohio, Kentucky and Texas, its range is probably co-extensive with that of its food plant.

The larvæ form very small tent mines on the underside of leaves of *Symphoricarpos* *Symphoricarpos* (L.) Mac M. The mine is placed between two veins, and when mature is much wrinkled. Just before pupation, one half of the mine is lined with silk, and partitioned off, thus forming an ovoid silken chamber in which the pupa is formed. When the imago emerges the pupa case is thrust through the upper epidermis.

Lithocolletis ostensackenella Fitch.

Plate XXII, Fig. 21.

Argyromiges ostensackenella Fitch, Rept. Ins. N. Y., v, 338, 1859.

Lithocolletis ostensackenella Chambers, Can. Ent., iii, 183, 1871.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6265.

Syn. *ornatella* Chambers, Can. Ent., iii, 161, 1871; iv, 107, 1872; xi, 91, 1879.—Zeller, Verh. Zool.-bot. Ges. Wien, xxv, 347, 1875.—Frey and Boll, Stett. ent. Zeit., xxxiv, 217, 1873.—Walsingham, Ins. Life, ii, 53, 1889

Antennæ dark brown. Face and palpi silvery white, with a purplish and golden iridescent lustre. Tuft small, dark brown. Ground color of the thorax and forewings brilliant golden brown; that of the thorax a shade darker. Two silvery fasciæ, margined internally with dark brown; and beyond them two pair of opposite streaks, also internally dark margined, of which the first pair sometimes unite to form an interrupted fascia. The basal fourth of the wing is dark brown, more golden below the fold toward the base. The first fascia is at the basal fourth, and shades gradually into the ground color of the wing. It is followed at about the middle by a second similar fascia. At the beginning of the costal cilia is a silvery spot, and opposite it a larger dorsal spot. At the apical fifth is a similar costal spot, and opposite it a small dorsal one. Marginal scales at the base of the apical cilia dark brown. Cilia silvery gray. Expanse 5.5-6 mm.

Hindwings and cilia gray. Abdomen dark gray, with a purplish golden lustre. Legs gray.

The mine is a yellow blotch, occurring upon either the upper or lower surface of leaves of *Robinia pseudacacia* L. and *Robinia hispida* L. The leaf is but slightly contracted and the larva is somewhat more flattened than is usual in the cylindrical group. The larva leaves the mine to pupate, spinning a flat, oval, yellowish brown, silken cocoon.

The species is abundant wherever its food plant occurs.

Lithocolletis tritæniarella Chambers.

Plate XXII, Fig. 22.

Lithocolletis tritæniarella Chambers, Can. Ent., iii, 110, 184, 1871; v, 48, 1873; xi, 89, 1879.—Walsingham, Ins. Life, ii, 53, 1889.—*tritæniella* Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6316.

Syn. *consimilella* Frey and Boll, Stett. ent. Zeit., xxxiv, 214, 1873.—Chambers, Cin. Quart. Jn. Sci., i, 202, 1874; ii, 230, 1875.—Walsingham, Ins. Life, ii, 51, 1889.

Face and palpi white; antennæ white, annulate with fuscous above; tuft saffron, mixed with a few brownish scales.

Thorax and forewings pale reddish saffron. Three white fasciæ, each narrowly margined internally with dark brown scales; the first at about the basal fourth, the second near the middle. The third midway between the second and the apex, is the narrowest and is slightly angulated in the middle. An indistinct oblique whitish costal streak near the apex. Apex slightly dusted with brown mixed with a few white scales. Cilia slightly paler than the ground color. Expanse 7-8 mm.

Hindwings and cilia gray. Abdomen reddish brown. Legs and tarsi whitish; tarsi slightly tipped with black.

The larvæ form rather large tent mines on the upper side of *Ostrya Virginiana* (Mill.) Willd. At first the mine is a flat blotch, and the loosened epidermis is white, sparsely speckled with brown. Later, by contraction of the epidermis, the mine becomes roomy

and tentiform; and the leaf is completely folded over. The larva is green and of the cylindrical type, and spins a thin ovoid silken cocoon, fastened to the leaf above and below. Mr. Chambers (Can. Ent., iii, 84, 1871) described the larvæ and mine of this species under the mistaken impression that they belonged to his *L. virginiella*.

Lithocolletis affinis Frey and Boll.

Lithocolletis affinis Frey and Boll, Stett. ent. Zeit., xxxvii, 222, 1876; xxxix, 270, 1878.—Walsingham, Ins. Life, ii, 51, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6314.

The head, thorax and forewings are of a uniformly dark reddish saffron. Face and palpi shining white, legs whitish gray. The tarsi of the first pair have distinct blackish bands. The second pair are spotted with blackish, the last pair are lighter, marked with brownish black. The dorsal side of the abdomen is dark gray, the ventral side whitish.

The feebly shining forewings have three fasciæ, at the basal third, at the middle, and at three-quarters of the wing length respectively. All the fasciæ are faintly dark margined toward the base, the first straight, the second slightly concave, the third feebly angulated. Before the apex there is a white costal streak, without any dark margining. The cilia are of the ground color.

Hindwings rather dark gray, their cilia lighter brownish.

Frey and Boll have thus described the species.

Found in Texas, where the larvæ make underside mines on a species of *Lonicera*, and on a species of *Symphoricarpos*.

The absence of any dark dusting in the apex of the wing distinguishes the imago of this species from that of *tritaniella* Cham.

Lithocolletis mariæella Chambers.

Plate XXII, Fig. 23.

Lithocolletis mariæella Chambers, Cin. Quart. Jn. Sci., ii, 99, 1875.—Can. Ent., xi, 92, 1879.—Walsingham, Trans. Am. Ent. Soc., x, 201, 1882.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6315.

Syn. *mariella* Riley, Smith's List Lep. Bor. Am., 190, 1891.

Face and palpi whitish; last joints of the palpi darkened externally. Antennæ grayish white, annulate with brown. Tuft reddish orange.

Thorax and forewings golden brown. Two white fasciæ, one at the basal fourth, and the other at the middle of the wing length, both bent outward near the median line, and margined with dark brown internally. At the beginning of the costal cilia is a white streak nearly meeting an opposite dorsal streak, both dark margined internally. A curved white streak, margined before by a darker shade, encloses the apex, and sometimes extends through the cilia on the dorsal margin. The apex of the wing is sometimes darkened by a few brown scales. Cilia a shade paler than the wings. Expanse 8-8.5 mm.

Hindwings gray, with reddish cilia. Abdomen brownish gray. Hind legs brownish red; the other two pair whitish, banded with black.

Missouri.

The tentiform mine of this species occurs on the lower surface of leaves of *Symphoricarpos vulgaris* Michx. Pupation takes place within an ovoid white silken cocoon. Mr. Chambers (Cin. Quart. Jn. Sci., ii, 99, 1875) quotes Miss Murtfeldt's description of the early stages of this species.

Lithocolletis tiliacella Chambers.

Plate XXII, Fig. 24.

Lithocolletis tiliacella Chambers, Can. Ent., iii, 56, 1871.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6310.

Syn. *tiliælla* Chambers, Cin. Quart. Jn. Sci., i, 203, 1874.—*tiliella* Walsingham, Ins. Life, iii, 328, 1891.

"Glistening, snowy white; middle portion of the anterior wings from near their base to the base of the cilia pale golden, which is produced along the costa to the base—three broad silvery white fasciæ dark margined internally; the dark margin of the third fascia widely interrupted in the middle, and the pale golden very indistinct, sometimes not visible, behind it; the second fascia is about the middle of the wing. Alar expanse one-fourth inch."

Chambers has sufficiently characterized this species by the short description above.

The larvæ belong to the cylindrical group and form almost circular tent mines on the upper side of *Tilia Americana* L. The mine is white, densely speckled with dark brown. The pupa of the summer brood is suspended in a very slight silken web; in the brood remaining through the winter in the pupal state, a denser cocoon is spun, which is attached above and below.

The species is common throughout the Atlantic States.

Lithocolletis oregonensis Walsingham.

Lithocolletis oregonensis Walsingham, Ins. Life, ii, 117, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6309.

"Antennæ closely annulate with white and brown. Palpi whitish, dusted with gray externally. Haustellum yellow. Face grayish, frontal tuft grayish fuscous. Thorax golden saffron.

"Forewings golden saffron, with four rather shining white fasciæ, and a semi-circular white apical streak inclosing a black apical spot and reaching through the cilia on the costal and dorsal margins; the first fascia is situated within one-fourth the wing length, the dorsal portion of it commencing nearer to the base than the costal portion and proceeding obliquely outward to a little above the fold, the shorter costal portion only being conspicuously dark margined internally; the second fascia, just before the middle, is distinctly curved, almost angulated outwards, and has a conspicuous margin of black scales on its inner side; the third fascia, commencing before the costal cilia, is less curved than the

second, but its black inner margin interrupts it in the middle by a short line of black scales; the fourth fascia, at the apical fifth of the wing, is also internally black margined, but the black scaling is almost interrupted, becoming very slender at the middle of the wings; the apical spot is black, encircled by white as already described; the cilia are grayish, tinged with fuscous about the anal angle, and with a short golden saffron dash from the black apical spot; there is no line along their base.

Hindwings and cilia pale grayish. Abdomen gray. Hind tarsi whitish, thickly spotted with fuscous above. Expanse 7 mm."

Described by Lord Walsingham from two specimens taken on the wing near Fort The Dalles, on the Columbia River, in Northern Oregon, in April, 1872.

Lithocolletis fragilella Frey and Boll.

Plate XXIII, Fig. 1.

Lithocolletis fragilella Frey and Boll, Stett. ent. Zeit., xxxix, 270, 1878.—Walsingham, Ins. Life, ii, 51, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6313.

Syn. *trifasciella* Frey and Boll (not Haworth), Stett. ent. Zeit., xxxiv, 215, 1873.—Chambers, Cin. Quart. Ju. Sci., i, 205, 1874.—Walsingham, Ins. Life, iii, 326, 1891.

Antennæ dark brown, narrowly annulate with pale gray. Face and palpi pale golden. Tuft on the vertex reddish orange, with a few brown scales intermixed.

Thorax and forewings deep reddish saffron. On the forewings are three faintly indicated narrow whitish fasciæ situated at the basal fifth, two fifths, and three-fifths of the wing length, respectively.

The two former are bent outward above the middle, the third is nearly straight. These fasciæ are sparsely dusted internally on the dorsal half with blackish scales, densely so on the costal half, where the margin broadens into a triangular area, that of the first fascia sometimes being produced along the costa to the base. The internal margin of the third fascia interrupts it in the middle with a tooth-like projection. At three-fourths of the wing length on the costa is a patch of dark dusting forming the internal margin of a pale costal streak, opposite to which on the dorsal margin above the tornus is a smaller patch of dusting. Just before the apex is a second whitish costal streak, dusted internally with a few dark scales. Apex sparsely dusted with black scales. Cilia of the wing color becoming gray toward the tornus. Alar expanse 8.5-9 mm.

Hindwings and cilia gray, with a fulvous tinge. Abdomen dark brownish gray, anal tuft with an ochreous tinge. Legs brownish, tarsal joints blackish, tipped with white.

Massachusetts to Texas. This species is identical with that erroneously identified by Frey and Boll as *trifasciella* Haw. from a specimen bred from *Lonicera sempervirens* Ait. at Cambridge, Mass. (Stett. ent. Zeit., xxxiv, 215, 1873). The food plant of the Texan

specimens was given as *Lonicera* "*albida*" (such a plant has never been catalogued). The mine is placed on the underside of the leaf. A large series bred by Mr. August Busck on *Lonicera sempervirens* Ait. is in the U. S. Nat. Mus.

***Lithocolletis salicifoliella* Clem.**

Plate XXIII, Figs. 2, 3; XXIV, Fig. 24.

Lithocolletis salicifoliella Clemens, Proc. Ent. Soc. Phil., i, 81, 1861.—Tin. No. Am., 169, 1872.—Packard, Guide Stud. Ins., 353, 1869.—Chambers, Can. Ent., iii, 163, 185, 1871.—Cin. Quart. Jn. Sci., ii, 302, 1875.—Can. Ent., vii, 126, 1875.—Bull. Geol. Surv. Terr., iii, 139, 1877.—Walsingham, Ins. Life, ii, 54, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6333. Syn. *atomariella* Zeller, Verh. zool.-bot. Ges. Wien, xxv, 350, 1875.—Walsingham, Ins. Life, ii, 54, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6332.

Antennæ white, more or less distinctly annulate with brown. Face and palpi white; tuft white, sometimes thickly interspersed with brown scales.

The following is Chambers' description of the forewings in Can. Ent., vii, 126, 1875:

"Thorax and primaries bright golden or saffron yellow, according to the light, or even sometimes dull brownish yellow, the thorax and basal portion of the dorsal margin of the forewings being largely intermixed with white, and dusted more or less with black. Sometimes the inner angle is of the general ground hue, scarcely dusted or marked with either white or dark brown, and then there is a median white basal streak which meets at an acute angle with a dorsal white streak about the basal fourth of the wing length. Both of these white streaks, and all other white markings on the wings are more or less dusted with dark gray-brown, sometimes so much as to obscure the white. Before the middle of the costa is a long white streak, which attains the middle of the wing, curving backwards; a little behind this, on the dorsal margin, is a large dorsal white streak, wide on the margin, but shorter than the first costal streak, like which it curves backwards along the middle of the wing, being usually confluent, or very nearly so with the first costal streak; a little further back, about the middle of the costal margin, is another white costal streak shorter than the first, but like it curving back along the middle of the wing, and usually confluent with the first costal and first dorsal streaks. Then follows another narrower and somewhat oblique costal white streak, opposite to which is a triangular white dorsal spot separated from it by some brown scales; just before the cilia is a curved white fascia concave towards the apex and sometimes interrupted in the middle, and just before the apex is another similar fascia, which, however, sometimes does not attain the dorsal margin, and behind it in the apex is a short brown streak. All these white streaks and fasciæ are decidedly dark margined before, and more or less dusted with grayish brown. There is a brown hinder marginal line at the base of the cilia, which latter are stramineous."

Expanse 7-8 mm.

The hindwings are gray, with ochereous tinged cilia; pale ochereous.

ous in the summer form. Abdomen gray, with ochereous apex. Legs varying from pale whitish ochereous to gray, their tarsi whitish at the bases, grayish brown toward the apices.

This species is probably found over the whole of the United States. In the U. S. Nat. Mus. is a series bred by Dr. Dyar at Denver, Colorado, on cottonwood in July, 1901, and a specimen from California on *Salix* (collection C. V. Riley).

The food plants are various species of *Salix* and *Populus*, the mine being placed on the lower side of the leaf. The imagoes of the fall brood, which appear in October, hibernate.

This is an exceedingly variable species, so variable in fact, that specimens of the different broods may easily be mistaken for distinct species. The differences are due to a variation in the extent of the white markings, and in the black dusting, some specimens lacking entirely the black dusting typical of the species.

I have bred series of this species in successive broods from tentiform mines on the underside of leaves of *Populus balsamifera* L. In the imagoes which appear in August, the black dusting is almost or entirely lacking. One of these is represented on Plate XXIII, Fig. 3. Such specimens are identical with those bred by Dr. Dyar in Colorado. In this form the tuft and thorax are often pure white, and very often the first dorsal streak is widely separated from the first costal streak, with which it is usually confluent in the dusted specimens.

Zeller, in his description of *atomariella*, and Chambers, in his earlier description (Can. Ent., iii, 163, 1871), regarded white as the ground color of the wings. Zeller's two types at Cambridge are identical with Chambers' specimens, which represent the dusted form of the species (Plate XXIII, Fig. 2). The Zeller type at the U. S. Nat. Mus. (Plate XXIV, Fig. 24) has a greater extent of the wing occupied by the white markings.

Lithocolletis tremuloidiella Braun.

Plate XXIII, Fig. 4.

Lithocolletis tremuloidiella Braun, Ent. News, xix, 102, 1908.

Antennæ dark gray, the joints becoming lighter toward their bases. Palpi grayish white. Face grayish white. Tuft gray, mixed with white.

Forewings pale reddish brown near the base, becoming more ochereous beyond the middle. There is a short median basal white streak, and a dorso-basal white streak, both thickly dusted with blackish scales, and uniting with the first dor-

sal streak. There are five costal and five dorsal white streaks, all dark margined internally and more or less dusted with blackish scales, the last two pair, however, not dusted. These streaks are situated as follows: a large oblique white costal streak at the basal fifth, attaining the middle of the wing and prolonged backward; nearer the base an oblique dorsal streak, almost meeting the first costal before the middle; the second costal streak also oblique; the second dorsal streak nearer the base than the second costal, large, oblique, strongly constricted just below the fold, and uniting with the apices of the first and second costal streaks; third costal and dorsal streaks nearly opposite, less oblique, their apices separated by a narrow prolongation of the blackish internal margins. The fourth costal and dorsal streaks, of which the costal is at the apical fourth, the dorsal at the tornus, form an inwardly convex white fascia. Fifth costal and dorsal streaks also form a curved white fascia. An irregular blackish apical spot. Marginal line in the cilia blackish, with a bluish lustre. Cilia gray. Alar expanse 9-10.5 mm.

Hindwings gray. Cilia gray, with a reddish tinge. Abdomen dark gray above, grayish white beneath. Anal tuft grayish ochreous. Legs dark gray, tips of the tarsi lighter.

Described from specimens bred by Mr. W. D. Kearfott from tentiform mines on the underside of leaves of *Populus tremuloides* Michx., received from Mr. J. W. Cockle, Kaslo, B. C., August 26, 1907. The imagoes appeared during the same month. The mine is large (for an underside *Lithocolletis* mine), oval, and with a fine fold through its long axis. It closely resembles the mine of *L. salicifoliella* on poplar, but is very much larger.

There is considerable variation in the extent of the white markings; sometimes the fascia formed by the fourth pair of streaks is interrupted, and the fascia just before the apex does not reach the inner margin.

This species is very close to *L. salicifoliella* in the character and arrangement of markings; but may be distinguished from it by the much greater expanse, the slightly shining and more reddish ground color of the forewings, the slightly less oblique position of the white streaks, and by the noticeable bluish lustre of the marginal line in the cilia. The specimens which appear in August are densely dusted, in this respect differing from the corresponding brood of *L. salicifoliella*.

By some mistake, this species has been referred to as *Lithocolletis populiella* Chambers by Mr. Busck in his paper, "Tineid Moths from British Columbia" (Proc. U. S. Nat. Mus., xxvii, 770, 1904), and by Dr. Harrison G. Dyar in "Lepidoptera of the Kootenai District" (Proc. U. S. Nat. Mus., xxvii, 937, 1904).

Lithocolletis celtifoliella Chambers.

Plate XXIII, Fig. 5.

Lithocolletis celtifoliella Chambers, Can. Ent., iii, 128, 1871.—Bull. Geol. Surv. Terr., iv, 118, 1878.—Walsingham, Ins. Life, ii, 52, 1889.—Dyar, Bull. 52, U. S. Nat. Mns., 1902, No. 6286.

“Face and palpi silvery white, the palpi on their outer surface saffron, flecked with brown. Antennæ brown, annulate with white, and flecked with blackish scales. Tuft reddish saffron, with white scales intermixed. Thorax reddish saffron anteriorly, passing into brown toward the apex, sparsely flecked with white, and with the usual white line (sometimes absent), across the anterior margin produced backwards over the tegulæ and on to the wings, where it is confluent with a narrow median white basal streak which is strongly dark margined dorsally, the dark margin being produced beyond it nearly to the middle of the wing. Anterior wings reddish saffron, the dorsal margin nearly to the cilia, thickly dusted with dark brown on a white ground, and with a streak of dark brown extending to the basal streak not far from the base. Three fasciæ, rather indefinitely bounded, of dark brown upon a white ground; all strongly angulated posteriorly about the middle, the third one slightly interrupted near the costa and passing gradually into a costo-apical patch of dark brown on a white ground. The first fascia is just before the middle; the second is about the middle, and each sends a white streak from its angle nearly to the next fascia. There is a dorso-apical patch of dense dark brown dusting on a white ground, larger than the costo-apical one above mentioned. Cilia pale reddish saffron, with a dark brown hinder marginal line in the cilia. Sometimes almost the entire thorax and dorsal margins of the wings are densely dusted with dark brown on a white ground, whilst the first and second fasciæ blend with each other near the dorsal margin, and the third fascia blends with the dorso-apical dusting. It varies in the extent and intensity of the dusting. Under surface silvery white, with a patch of dark brown dusting on each side of of each abdominal segment. Legs silvery white, with the anterior tibiæ and tarsi reddish saffron, dusted thickly with dark brown, and the intermediate and posterior tibiæ and tarsi spotted and annulate with dark brown. Alar expanse one-fourth inch. Kentucky. Not common. The larva is cylindrical, yellowish, and makes a tent mine on the under surface of the leaves of the hackberry (*Celtis occidentalis* L.)”

The above extract from the Can. Ent., iii, 128, 1871, is Chambers' original description of the species with his note upon the larval stage.

There is great variation in the density of the dark dusting; in one specimen the white fasciæ are distinctly present as narrow white lines, beyond what would in this case be considered their internal dusting (the three dark brown fasciæ of which Chambers speaks). The first of these fasciæ reaches the costa at about the basal third. Often the basal streak is overlaid with black dusting, which then occupies the basal portion of the wing below the fold. This species is much less common than *L. celtisella* Chambers, which mines the upper surface of *Celtis*.

Chambers records this rare species from Kentucky. I have taken it at Cincinnati, Ohio, and Mr. W. D. Kearfott has collected the mines in the early part of September in Jefferson County, West Virginia.

The mine, which is of the usual underside type, lies between two veins, and is somewhat variable in shape. The pupa is suspended in a few silken threads. The imagoes appear during the latter part of September.

Lithocolletis lysimachixella Chambers.

Lithocolletis lysimachixella Chambers, Cin. Quart. Jn. Sci., ii, 100, 1875.—Walsingham, Ins. Life, ii, 77, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6336.

This is a name given to a species in the larval state, whose tentiform mines were found on the underside of *Lysimachia lanceolata* Walt. (*Steironema lanceolatum* (Walt) A. Gray). No imago was ever bred. I have never seen a mine of a *Lithocolletis* on this plant.

GROUP II.

The larva of the *flat group* (Plate XX, Fig. 10) is very much depressed, almost flat, with the sides of the segments projecting, thus giving the entire larva a beaded appearance. The head is flat, somewhat triangular in shape, usually of a shining reddish brown color, with the mouth parts projecting in front. The first three segments of the body are broader than the others; the body tapers toward the posterior end. While the legs are of the same number and occupy the same position as in the cylindrical larva, all are very rudimentary, appearing as small tubercular projections. Upon the upper and lower side of most and sometimes all of the body segments are distinctly outlined, shining, darker spots—the maculæ. These vary in shape on the different segments, being elliptical or trapezoidal, but are constant for a given species in each stage. After the seventh or last moult, the larva assumes a more cylindrical shape, the legs are better developed, and the dark maculæ gradually disappear.

All of the species are miners on the upper side of leaves, where they make a flat, sometimes irregularly shaped blotch, or a rather broad, linear tract. The larva feeds from the centre outwardly, thus gradually increasing the extent of the mined portion of the leaf. This mode of feeding is a necessary accompaniment of the

flattened head, the larva being able to consume but a few layers of parenchyma cells directly in front of it.

The mine retains its flat blotch-like character until after the seventh moult. The larva then lines the loosened epidermis with silk and by contraction produces from one to three narrow folds or ridges. Beneath this folded portion the floor of the mine is thinly covered with silk. Then the larva, lying on its back, spins a flat semi-transparent sheet of silk, oval or nearly circular in shape, attached around its edges to the floor of the mine (Plate XX, Fig. 12). Beneath this, along its long axis, the pupa is formed. The pupa, which is protruded from the mine in emergence, is thrust through a transverse slit near one end of the flat cocoon. Such a cocoon is formed in all but a few of the species of which the life history is known.

In almost all of the species, however, this cocoon is only made in the brood of which the imagoes are to appear in the same summer. In a later brood, the hibernating period, with one or two exceptions, is passed in the larval state. In a number of species, hibernation takes place beneath the folded epidermis. In most cases, however, an especially prepared silken-lined chamber is formed. After the floor of the mine is loosely covered with silk, the upper epidermis is fastened down in a circular or oval outline, and the whole cavity is then lined with silk. Ample space is provided by a characteristic oval or hemispherical projection upon the underside of the leaf. The change to pupa occurs in the spring.

The moths of this group may easily be recognized by the fact that the white markings of the forewings are always externally dark margined, often densely dusted with black scales behind. In some cases there is, in addition, a slight internal margin consisting of a few dark scales near the costa. The markings consist of white costal and dorsal streaks, usually oblique. Opposite streaks may unite to form a fascia, either outwardly angulated or straight. Where the fasciæ are straight, they are nearer the base on the dorsal margin. The apex of the wing is often densely dusted with black atoms, this effect being produced by the black tips to whitish scales. Sometimes these black tips form a distinct marginal line, which passes around the apex and usually extends to the tornus. This line is always present, but where the apex is not dusted, is not

noticeable. Beyond this, a second line runs through the middle of the cilia. This line is formed by the tips of a row of scales of equal length.

The following table will separate the species:

- A. Oblique costal and dorsal streaks; fasciæ, if present, distinctly angulated; never two straight fasciæ.
- B. Ground color of the forewings white.....**hamadryadella.**
- BB. Ground color of the forewings not white.
- C. An oblique white streak or patch at the base of the dorsal margin, rarely indistinct (*lentella*, *caryæfoliella*), or indicated by its dark margin only (*agrifoliella*); usually two angulated fasciæ.
- D. First pair of costal and dorsal streaks nearly perpendicular; second pair very oblique.
- E. A white costal patch near the base.....**umbellulariæ.**
- EE. White costal patch indicated by dark margin only.
agrifoliella.
- DD. First pair of streaks parallel to the second pair.
- E. No costal streak before the middle; a median fasciæ.
saccharella.
- EE. A fasciæ at one-fourth and one-half.
- F. White streak at base of dorsum indistinct or indicated by external dark scales only.
- G. Third costal streak long and usually uniting with the third dorsal.....**caryæfoliella.**
- GG. Third costal streak merely a spot.....**lentella.**
- FF. White streak at base of dorsum large and distinct.
- G. A tuft of brown scales in the apical cilia...**macrocarpella.**
- GG. No such scales.....**cineinnatiella.**
- CC. No such pale streak at base of dorsum.
- D. Dorsal margin white from base to beyond middle.
- E. Dorso-basal streak extending to oblique streak above the cilia.
- F. Antennæ annulate with brown for their whole length.
conglomeratella.
- FF. Basal third of antennæ pure white.....**ulmella.**
- EE. Dorso-basal streak extending but little beyond the middle of the dorsal margin.
- F. An oblique dorsal streak at end of basal streak.
mediodorsella.
- FF. No such streak.....**quercivorella.**
- DD. Dorsal margin not white.
- E. Costal and dorsal spots large; but little oblique, first pair meeting or almost meeting.
- F. Apex enclosed in a conspicuous semi-circular white streak.
gaultheriella.
- FF. Last costal streak not extended across the wing....**nemoris.**
- EE. Not as above; first pair of streaks widely separated.

- F. Dorsal streak beyond fascia oblique.....**australisella**.
- FF. Dorsal streak beyond fascia perpendicular or absent.
- G. With two costal streaks or spots before the white streak or spot forming the anterior edge of the apical dusting.
- H. Costal streaks unmarginated.....**chambersella**.
- HH. Costal streaks margined.
- I. Ground color of wings pale, with a coppery lustre toward the apex; marks very indistinct.....**cervina**.
- II. Ground color saffron, marks white....**platanoidiella**.
- GG. With at most one costal streak before the white streak or spot forming the anterior edge of the apical dusting.
- H. Median fascia but slightly angulated; other white marks small or absent.
- I. Costal and dorsal streaks absent.....**fasciella**.
- II. Costal and dorsal streaks present.....**castaneocella**.
- HH. Median fascia sharply angulated; white marks conspicuous.
- I. First dorsal streak long, oblique, curved...**fletcherella**.
- II. First dorsal streak perpendicular.
- J. Marks dull white, faintly margined.....**betulivora**.
- JJ. Marks shining white, strongly margined.
- K. External dusting at angle of fascia produced backward; apex densely dusted.....**bethunella**.
- KK. Externally margin of fascia not produced.
- L. Size large (10 mm.); first dorsal streak very large.
arcuella.
- LL. Size small; first dorsal streak short.
eppelsheimii.
- AA. Two straight or nearly straight fasciæ, nearer the base on the dorsal margin.
- B. No costal or dorsal streaks beyond fasciæ... ..**tubiferella**.
- BB. A costal and a dorsal streak at three-fourths.
- C. Without a paler streak at the base of the dorsal margin.
- D. Apical dusting black on a whitish ground and extended to the tornus.
guttifinitella.
- DD. Apex velvety black, dusting not extended to tornus.
obstrictella.
- CC. With a white streak or paler shade from inner angle to fold.
- D. First fascia and its dark margin broken near the costa.
æsculisella.
- DD. First fascia complete.
- E. Color deep reddish; not ochereous.....**hamameliella**.
- EE. Color more ochereous.
- F. Scales of the apical third tipped with brown, marginal line in the cilia distinct.....**ostryarella**.
- FF. Apical third not dusted, marginal line indistinct.
- G. Apex of dorsal streak above cilia directed toward opposite costal streak.....**corylisella**.
- GG. Dorsal streak above cilia curved and directed toward apex.
aceriella.

Lithocolletis gaultheriella Walsingham.

Plate XXIII, Fig. 6.

Lithocolletis gaultheriella Walsingham, Ins. Life, ii, 79, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1903, No. 6291.

“Antennæ closely annulated with white and brown, the brown annulations somewhat wider apart toward the apex.

“Palpi silvery white, with a small spot on the outer side. Head, face silvery white; frontal tuft saffron, mixed with white. Thorax golden saffron, posteriorly whitish.

“Forewings golden saffron, shading to golden brown, no basal streak, three costal and three dorsal snow-white spots, the first two pairs internally dark margined; the first costal spot is situated at about one-third the length of the wing, its internal dark margin passing around its apex; the corresponding dorsal spot commences nearer the base of the wing and sometimes reaches obliquely to, or near, the point of the costal spot; the second costal spot at half the wing length is somewhat oblique, square ended, and as in the case of the first is placed somewhat beyond its smaller corresponding dorsal spot, which is pointed and has some dark fuscous scales running outwardly from its apex and merging in the darkened lower margin of the costal spot above it; the third costal spot at one-fourth from the apex is somewhat triangular and lies also farther from the base than the corresponding smaller spot on the dorsal margin; before the anal angle between these spots, lies a cloud of fuscous scaling serving to throw up and make more conspicuous these white markings on the golden brown ground color of the wing; inclosing the apex of the wing is a narrow, outwardly concave white streak, not reaching through the cilia on the apical but only on the costal margin; beyond it are a few darkened scales and sometimes one or two whitish ones with them; cilia pale, golden saffron, tending to golden; gray about the anal angle. The only conspicuous markings on the under side are two pale spots in the costal fringes, corresponding with the last two markings on the upper side.

“Hindwings grayish, with golden gray cilia. Abdomen gray, anal tuft slightly paler. Hind tarsi grayish white, with one or two darker bands above. Expanse 10–11 mm.”

The above is Lord Walsingham's description.

Western United States and British Columbia (Rev. George W. Taylor). The mine, on the upper side of *Gaultheria shallon*, is a large, somewhat irregular blotch, occupying about half the leaf. When mature, the leaf is slightly folded and the epidermis lies in two fine ridges across one end of the mine.

Lithocolletis nemoris Walsingham.

Plate XXIII, Fig. 7.

Lithocolletis nemoris Walsingham, Ins. Life, ii, 116, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6293.

“Antennæ white, spotted above with fawn brown. Palpi white, face white, frontal tuft whitish, much mixed with saffron brown, especially at the sides. Thorax saffron.

"Forewings rather shining saffron, with snow-white markings consisting of two transverse fascia, slightly oblique, and angulated beneath the costal margin, beyond which are one dorsal and two costal streaks; there is no basal streak; the first fascia at one-fourth the wing length is but slightly angulated, margined with scattered blackish scales, widely on its outer and very indistinctly on its inner side. The second fascia at the middle of the wing is rather more strongly angulated than the first; this is also slenderly dark margined internally and more widely so externally; the black dusting on its outer side being produced backwards at the angle in the direction of the first costal streak; this is at the commencement of the costal cilia, rather further from the base than the first dorsal streak, which is oblique, its point terminating below the point of the first costal streak; from the points of these two streaks a cloud of black scales proceeds outwards along the middle of the wing, forming a dark patch below, and beyond the second costal streak which is situated just before the apex; the cilia are saffron shading to pale grayish saffron beyond their faintly darker median line.

"Hindwings and cilia pale grayish, with a very faint saffron tinge. Abdomen pale gray, anal tuft saffron yellow. Hind tarsi white, with two grayish fuscous bars above. Expanse 8 mm.

"The puckered mines of this species were found in some abundance in June, 1871, in Mendocino County, California, on the upper sides of leaves of *Vaccinium ovata*, the mine occupying the whole surface of each leaf, and causing the margins to approach each other."

The above is Lord Walsingham's description.

Lithocolletis caryæfoliella Clemens.

Plate XXIII, Fig. 8.

- Lithocolletis caryæfoliella* Clemens, Proc. Acad. Nat. Sci. Phil., 323, 1859.—Tin. No. Am., 65, 74, 1872.—Chambers, Can. Ent., iii, 109, 165, 1871.—Frey and Boll. Stett. ent. Zeit., xxxix, 273, 1878.—Busck, Proc. Ent. Soc. Wash., v, 189, 1903.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6288.
Syn. *juglandiella* Clemens, Proc. Ent. Soc. Phil., i, 81, 1861.—Tin. No. Am., 170, 1872.—Chambers, Can. Ent., iii, 165, 1871; xi, 91, 1879.—Packard, Guide Stud. Ins., 353, 1869.

"Antennæ silvery, annulated with blackish. Front silvery. Tuft and thorax reddish orange. Forewings reddish orange, with three silvery bands, black margined externally, the second about the middle of the wing, angulated, with the black margin broad and produced posteriorly on a whitish ground, nearly to the third, which is somewhat interrupted in the middle; the first midway between the second and the base of the wing and also angulated near the costa. The apical portion of the wing white, covered with dispersed black scales, with a few black scales on a whitish ground, on the costa, between the last silvery band and the dusted apical portion; with two hinder marginal lines, one the margin of the apical scales, the other a dark brownish line in the cilia. Hindwings pale brownish gray; cilia gray, with a fulvous hue."

This species, of which the above is Clemens' description, is the common miner on the upper side of hickory in the eastern United States. The mines are irregular blotches; often two or more mines are confluent. The pupa is formed under an oval silken flat cocoon. The mine occasionally occurs on leaves of walnut and butternut.

Imagoes vary greatly in the distinctness of the fasciæ and the dark dusting; often the first fascia does not extend to the costa. There is a faintly indicated pale basal streak from the inner angle to the fold.

Alar expanse 6-7 mm.

Lithocolletis lentella sp. nov.

Plate XXIII, Fig. 9.

Antennæ grayish, broadly annulate with dark brown. Face and palpi whitish, sometimes with a golden tinge. Tuft reddish saffron, mixed with whitish scales behind.

Thorax and forewings deep reddish saffron. A narrow white line on each side of the thorax is continuous with an indistinct curved whitish basal streak at the inner angle. This streak is sometimes absent, its position being indicated by the few black scales which form its external margin. There are two angulated white fasciæ, the first at about the basal third, the second at the middle of wing length, both strongly margined externally, and on the costa internally with black scales. The first of these fasciæ sometimes consists only of a costal and a dorsal streak, not connected, but of which the black dusting is continuous. At the apical third is a white costal spot, margined on both sides, and beneath with black scales. Beginning a little farther from the base is a long oblique dorsal streak, strongly margined behind with black scales. Opposite its apex is a small white costal spot overlaid with black scales. Apex of the wing densely dusted with black on a whitish ground. A dark brown line runs through the middle of the cilia, which are grayish ocherous, becoming gray toward the torus. Alar expanse 6.5-7 mm.

Hindwings gray. Cilia gray, with an ocherous tinge. Abdomen dark gray above, pale reddish beneath. Anal tuft reddish. Hind tibiæ reddish toward their apices, tarsi white, annulate with black.

Described from eleven specimens; five bred from a blotch mine on the upperside of black birch, *Betula lenta* L., from Caldwell, N. J., in July, 1902, by Mr. W. D. Kearfott; two bred from a much wrinkled blotch mine on the upperside of *Ostrya Virginiana*, Hamilton County, Ohio, in



Mine of *L. lentella*.

June, 1908; one flown specimen, Caldwell, N. J., May 17th, Mr.

W. D. Kearfott, and three in the National Museum, collected by Mr. August Busck, Washington, D. C., July, 1903.

The mine on *Ostrya* is very characteristic and easily distinguished from that of any other species of the flat group by the numerous longitudinal folds in the loosened epidermis at maturity, causing the opposite halves of the leaf to approach one another.

Lithocolletis saccharella Braun.

Plate XXIII, Fig. 10.

Lithocolletis saccharella Braun, Ent. News, xix, 104, 1908.

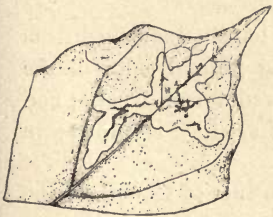
Antennæ pale ocherous, beyond the basal third annulate with dark; several joints toward the tip dark. Palpi shining white. Face shining white. Tuft whitish, golden toward the sides.

Thorax and forewings ocherous. A white stripe on each side of the middle of the thorax is continuous with a very oblique curved white streak at the inner angle of the forewing. This streak, which is sometimes dark margined behind, extends to the fold and is usually prolonged along the fold to unite with the first dorsal streak. The first dorsal streak begins at the basal fifth, is oblique and curved, and extends slightly more than halfway across the wing. The second dorsal streak, at about the middle of the dorsal margin, is also oblique and curved, and near the costa its apex meets that of the first costal streak, which is short, oblique and placed slightly beyond the middle, thus forming an acutely angled, interrupted fascia. The second costal streak at the apical fourth is sometimes almost overlaid with black scales. Above the dorsal cilia is a long oblique white streak. All the streaks are dark margined externally. Apical portion white, dusted with black. There is considerable variation in the extent of the black dusting, which sometimes extends to the tornus. Marginal line in the cilia brownish ocherous. Cilia pale ocherous. Alar expanse 5-7 mm.

Hindwings pale grayish ocherous. Cilia pale ocherous. Abdomen gray above, pale ocherous below. Anal tuft ocherous. Legs whitish. Hind tarsi faintly tipped with black.

Described from specimens bred at Cincinnati, Ohio. I also have specimens taken in Essex Co. Park, N. J., by Mr. W. D. Kearfott.

The mines of this species are very common on sugar maples, *Acer saccharum* Marsh. and *Acer nigrum* Michx., as many as 25 or 30 mines sometimes occurring on one leaf. The mine is a small irregular blotch on the upper side. The pupa is not enclosed in a cocoon. The imagoes appear from May to June and again in August.



Mine of *L. saccharella*.

Mr. Chambers (Can. Ent., iii, 130, 1871) confused this species with *L. aceriella* Clem., which it in no way resembles.

Lithocolletis macrocarpella Frey and Boll.

(Plate XXIII, Fig. 11.)

Lithocolletis macrocarpella Frey and Boll, Stett. ent. Zeit., xxxix, 261, 1878.—
Walsingham, Ins. Life, ii, 78, 1889.—Dyar, Bull. 52, U. S. Nat. Mus.,
1902, No. 6289.

Face, palpi and underside of the antennæ white, antennæ above annulate with brown; tuft white, mixed with brown and saffron scales.

Thorax brownish saffron, with its apex and two longitudinal stripes white. Sometimes almost the entire thorax is white. Forewings brownish saffron, very feebly shining. A broad curved basal streak from the inner margin to the fold is densely dusted behind with blackish scales. Two white fasciæ angulated near the costa, one at the basal third, the other at the middle of the wing length; the dorsal arm of each slightly curved. Each fascia is internally margined by a few black scales near the costal and the dorsal margins. On the outer side the costal arm of each has a few black scales near the costa; the dorsal arm is densely dusted with blackish scales, which are produced backward at the angle. A white costal streak at two-thirds is dusted with blackish scales. Opposite it is an oblique curved dorsal streak, dusted behind with blackish scales, running into the dusted apical portion. Before the apex is a white costal streak with a few black scales before it on the costa. Apical part of the wing dusted with black on a white ground. Hinder marginal line in the cilia brownish, with a few blackish scales intermixed. Cilia around the apex of the wing color, grayish toward the tornus. In the cilia, extending outwards from the apex, is a small pencil of dark brown scales. Expanse 8.5-9 mm.

Hindwings brownish gray, with somewhat lighter cilia. Abdomen in the male dark gray, in the female lighter, somewhat ocherous. Anal tuft ocherous brown. Legs and tarsi whitish, spotted with dark brown.

This species was originally described by Frey and Boll from specimens from mines on the upperside of leaves of *Quercus macrocarpa* Michx. in Texas. I have a series of specimens bred by Mr. W. D. Kearfott from blotch mines on the upperside of leaves of chestnut, Montclair, N. J. The density of the black dusting varies somewhat, and in one specimen the basal streak is confluent with the dorsal arm of the first fascia.

Very close to *L. cincinnatiella* Chambers, but distinguished from it by the larger size, darker and less shining ground color of the forewings; the more oblique and slightly curved dorsal streaks; and the tuft of dark brown scales in the apical cilia, which is wanting in *cincinnatiella*.

The mine of *macrocarpella* also differs from that of *cincinnatiella*, being of the usual upperside blotch type and containing but a single larva.

Lithocolletis cincinnatiella Chambers.

Plate XXIII, Fig. 12.

Lithocolletis cincinnatiella Chambers, Can. Ent., iii, 146, 149, 1871.—Cin. Quart. Jn. Sci., i, 203, 1874.—Bull. Geol. Surv. Terr., iii, 141, 1877.—Walsingham, Ins. Life, ii, 78, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6287.

“Face, palpi, under surface and legs silvery white, the legs marked on their anterior surface with golden and brownish spots and bands: tuft white, golden at the sides; antennæ silvery white beneath, above golden brown, faintly annulate with whitish; thorax and anterior wings bright golden; upon the wings is a short snow-white median basal streak strongly dark margined behind and within. (Sometimes the anterior margin and sides of the thorax are also white.) Two snow-white fasciæ, one at about the basal one-fourth, the other about the middle, both strongly dark margined behind, and sometimes slightly so interiorly; and both strongly angulated posteriorly near the costa; with the first sometimes slightly interrupted at the angle, and the dark margin of the second posteriorly produced. A long oblique snow-white dorsal streak at the base of the dorsal cilia posteriorly dark margined, and a smaller costal one a little behind it at the base of the costal cilia, similarly dark margined. This dorsal streak is sometimes posteriorly produced, and confluent with a straight dorso-apical streak, which is faintly dark margined behind, but is sometimes entirely wanting. When present it forms the interior border to the apical dusting. Sometimes the costal streak is produced so as to be confluent with it also, and opposite to it there is sometimes a costo-apical white spot which is separated from it by the apical dusting, which extends thence to the apex and is black upon a white ground. Hinder marginal line in the cilia dark brown. Cilia golden. Alar expanse one-fourth to one-third inch.”

The species, of which the above is the original description, is common in the eastern United States.

The larvæ form large blotch mines on the upper surface of leaves of white oak, *Quercus alba* L. One mine will often contain from several to a dozen larvæ. The loosened epidermis is brownish yellow, somewhat puckered, and often covering nearly the entire leaf.

Lithocolletis hamadryadella Clemens.

Plate XXIII, Fig. 13.

Lithocolletis hamadryadella Clemens, Proc. Acad. Nat. Sci. Phil., 324, 1859.—Tin. No. Am., 65, 77, 1872.—Chambers, Can. Ent., iii, 55, 164, 182, 1871.—Cin. Quart. Jn. Sci., i, 201, 1875; ii, 104, 1875.—Frey and Boll, Stett. ent. Zeit., xxxix, 262, 1878.—Buseck, Proc. Ent. Soc. Wash., v, 190, 1903.—*hamadryella* Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6334.

Syn. *alternatella* Zeller, Verh. zool.-bot. Ges. Wien., xxv, 351, 1875.—*alternata* Chambers, Bull. Geol. Surv. Terr., iv, 153, 1878.

Antennæ white, with dark annulations; face and tuft white, the latter mixed with gray. Thorax white, sometimes sparsely sprinkled with gray. Forewings white, with two angulated, shining, ochreous fasciæ; the first just before the

basal third and margined internally with dispersed blackish scales, sometimes interrupting it in the middle; the second just behind the middle and margined internally with dispersed scales which are produced in the middle, dividing it into two parts. In the space between the fasciæ are a few scattered ocherous scales and an irregular line of blackish scales through the middle. Near the apex is a costal and a dorsal ocherous patch, sometimes meeting, with the space between them and the second fascia more or less marked with a line of irregular dusting, and separated from each other by a more or less dense cloud of dusting, sometimes connected with the produced margining of the second fascia. Apical portion white, mixed with ocherous, and densely dusted with black scales connected with the line separating the costal and dorsal ocherous patches. Basal third of the wing more or less dusted with black and marked with ocherous; a small patch of black scales on the costa near the base, followed by a black dusting sometimes arranged into two irregular bands upon an ocherous ground, of which the more basal one is the broader. Hinder marginal line of blackish scales. Cilia tinged with saffron. Expanse 6.5-8.5 mm., the usual size about 8 mm.

Hindwings and cilia gray, the latter tinged with fulvous. Abdomen gray, with ocherous anal tuft. Legs white, tibiæ and tarsi spotted with black.

Very common throughout the Atlantic States. The larva, which is of the flat type, forms an irregular whitish blotch mine on the upper side of oak, most commonly upon *Quercus alba* L. While the species is usually confined to oak as the food plant, I have specimens bred from *Magnolia* (District of Columbia) and *Ostrya Virginiana* (Cincinnati), which cannot be separated from those on oak.

***Lithocolletis umbellulariæ* Walsingham.**

Plate XXIII, Fig. 14.

Lithocolletis umbellulariæ Walsingham, Ins. Life, ii, 78, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6290.

"Antennæ white, evenly dotted with brown along their upper sides, the five brown spots towards the apex being larger and more widely separated than the others. Palpi shining white. Face shining white, frontal tuft yellowish in the middle, saffron brown at the sides. Thorax golden saffron, whitish behind.

"Forewings golden saffron, somewhat shining, a short white patch at the base of the dorsal margin reaches to the fold and is exteriorly dark margined, the dark margin of a somewhat similar white spot on the costal portion of the wing, also reaches to the opposite side of the fold a little beyond it; at one-fourth the wing length is a waved white fascia running nearly straight from the dorsal margin to the fold, and bulging outwards beneath the costa; this is distinctly dark margined externally throughout and briefly so internally; immediately adjoining the costal margin at half the wing length is a broad, very oblique, white costal streak dark margined on both sides and freely dusted with blackish scales around the apex; the black dusting is continued along the outer side of an opposite less oblique dorsal streak, the apex of which reaches as far as the edge of the costal streak above it; at three-fourths the wing length is a white costal spot slightly margined with blackish atoms, and opposite to this is another

white dorsal streak, very oblique, externally margined at the apex with dusky atoms, which are continued so as to form a large patch of blackish dusting, at the apex of the wing, on the upper side of which patch lies a sickle-shaped white costal streak, concave towards the costal margin; cilia pale saffron, with a brown line running through the middle and reaching around the apex nearly to the anal angle, where they become paler, inclining to grayish.

"Hindwings and cilia pale grayish. Abdomen dark gray above, grayish white beneath; anal tuft yellowish. Hind tibiæ white, with two broadish black bars across their upper sides, and a small black terminal spot. Expanse 9 mm.

"Mendocino County, Cal., found and bred in the month of June, 1871. Three specimens, from large diffused blister-like mines on the upperside of leaves of *Umbellularia californica* Nuttal; the pupa being inclosed in a semi-transparent flat oval silken web, within the mine, like that of *cincinnatiella* Chamb., to which species it is somewhat allied. Its nearest ally in America is probably *macrocarpella* Frey and Boll, but it differs in the possession of a dark margined costa basal spot and in the comparatively straight first fascia." These characters also serve to separate it from *cincinnatiella* Chamb."

The above is Lord Walsingham's description.

Lithocolletis agrifoliella Braun.

Plate XXIII, Fig. 15.

Lithocolletis agrifoliella Braun, Ent. News, xix, 105, 1908.

Antennæ pale ochereous, spotted with brown above, the last five spots more widely separated. Palpi yellowish white, dark brown externally. Face yellowish white. Tuft yellowish in the middle, brown at the sides. Thorax reddish ochereous, with a few dark scales on the patagia.

Forewings reddish ochereous, somewhat shining. At the basal fourth is a perpendicular white dorsal streak dark margined externally, and reaching to the fold. A little farther back is a nearly perpendicularly placed white costal streak, convex outwardly beneath the costa and also attaining the fold slightly beyond the dorsal streak; it is strongly dark margined externally; its short internal straight dark margin is opposite the external dark margin of the first dorsal streak. Near the base the costal portion of the wing is of a smoky hue. Placed diagonally across the wing toward the base on a line with the internal edging of the first costal streak are two black transverse spots, the first just above the fold, and the second nearer the base just below the fold; sometimes with a few whitish scales internally. At about the middle of the wing length is a broad oblique costal streak, internally dark margined near the costa, and its external dark dusting continued as the external dusting of a much narrower dorsal streak, whose apex just meets that of the costal. At the angle the dusting is very dense on a white ground and is continued backward as a broad band, nearly one-half the breadth of the wing, to a point between the third costal and dorsal streaks. The third costal streak, which is sometimes a spot, not touching the costa, is inwardly oblique, and externally dark margined. Opposite it is a long oblique

dorsal streak, whose external dark margin is continued into the dusted apex, and which usually unites with a sickle-shaped costal streak lying above the dusted apex, and concave toward the costa. The dark margin of the third costal streak is sometimes continued along the costa to this last streak. Cilia ocherous, with a dark brown hinder marginal line through their middle. Alar expanse 7.5-9 mm.

Hindwings gray, with a bluish metallic lustre. Cilia fulvous. Abdomen dark bluish metallic above in the male, pale yellowish beneath, with a median line and diagonal marks on each segment dark. In the female with the last two or three segments and tuft ocherous, pale ocherous beneath and marked as in the male. Legs whitish, the first two pair annulate with black; hind tibiæ shaded with ocherous and black scales, tarsi tipped with black.

Mills College, Alameda County, California.

Described from specimens bred from leaves of *Quercus agrifolia* Nee. received from Mr. G. R. Pilate. The mine is a whitish, somewhat irregular blotch on the upperside of the leaf. The pupa is formed under a flat nearly circular semi-transparent web, the upper epidermis, as is usual, being thrown into a longitudinal fold.

This species is very near to *umbellulariæ* Wlsm. The most marked difference is the absence of the costal and dorsal basal white patches characteristic of that species.

Lithocolletis conglomeratella Zeller.

Plate XXIII, Fig. 16.

Lithocolletis conglomeratella Zeller, Verh. zool.-bot. Ges. Wien., xxv, 346, 1875.—Walsingham, Ins. Life, ii, 24, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6295.

Syn. *bicolorella* Chambers, Bull. Geol. Surv. Terr., iv, 103, 1878.—*obtusilobæ* Frey and Boll, Stett. ent. Zeit., xxxix, 265, 1878.

Thorax saffron yellow; head lighter, with whitish face and palpi. Antennæ closely annulate with brown, annulations obsolete toward the base. Fore and middle tarsi white, spotted with black; hind tarsi pure white. Of the size of an average *quercifoliella*. Forewings dull saffron yellow. On the costa there are two very short oblique streaks and a dot, at one-third, one-half and two-thirds the wing length, all three of a lustreless white color. The two former are externally blackish margined, the second being the longer and dusted around its apex with black scales. A narrow white line extends along the dorsal margin, becoming less distinct opposite the first costal streak, beyond which it is almost obsolete, until it reaches a place between the second costal streak and the costal spot, where it is broadened and deflexed, and extends as the inner margin of the black apical dusting, nearly to the apex of the wing in an outwardly convex line becoming narrower. Such is the case in but one specimen; in the second it stops entirely after the broadening, which makes a short streak, and as an indication of its continuation, there is an indistinct dot above the dusting, somewhat behind the costal streak. Toward the dorsal cilia and partly on them is a broad trans-

verse streak, made up of a cloud of black dusting, narrowly separated from the dusting of the second costal streak. Cilia yellowish gray, yellowish around the dusted portion, and without lustre.

Hindwings gray, their cilia lighter. None of the markings reappear upon the underside of the forewings.

In addition to the above description, Zeller has noted another form of this variable species, in which the dusting, especially that in the apical portion, is much less dense.

Very widely distributed, occurring from New Jersey to Ohio, southward and westward to Texas and California.

The larvæ form blotch mines on the upper side of leaves of various species of oak. The pupa is formed under a flat, nearly circular silken cocoon. I have a series bred from live oak, *Quercus Virginiana* Mill. from Fortress Monroe, Va., showing all intergrades between specimens having the deflexed dorso-basal streak extending unbroken nearly to the costa, and those in which it is nearly overlaid with black dusting. The figure represents a specimen of the former variety. There is a median white streak on the thorax not mentioned in the description. The character "hind tarsi pure white" is by no means constant or reliable, as several specimens have the first tarsal joint very distinctly tipped with black.

A series in the National Museum, bred by Mr. Busck on live oak from Willis, Texas, is darker, more densely dusted, and has the antennal joints very distinctly annulate all the way to the base.

Alar expanse 7.5-9 mm.

Lithocolletis ulmella Chambers.

Plate XXIII, Fig. 17.

Lithocolletis ulmella Chambers, Can. Ent., iii, 148, 1871.—Cin. Quart. Jn. Sci., i, 202, 1874; ii, 101, 1875.—Frey and Boll, Stett. ent. Zeit., xxxiv, 214, 1873.—Walsingham, Ins. Life, ii, 24, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6294.

Syn. *modesta* Frey and Boll, Stett. ent. Zeit., xxxvii, 224, 1876; xxxix, 274, 1878.

"Face and palpi silvery white, tuft white, intermixed with golden. Antennæ silvery white, the apical two-thirds annulate with brownish. Legs and under surface silvery white. Anterior wings bright golden, inclining to orange, with a white streak along the dorsal margin from the base to the cilia, where it is deflexed and passes on to the dusted portion of the apex which is near the posterior margin, and is dark brown on a white ground. There are three small costal silvery streaks, the first and second being near the middle of the costal margin, and the second one the largest, while the third is small and near the apex. There is some variation in the size of the third costal streak and in the extent of

the apical dusting, and sometimes the costal streaks are faintly dark margined. The abdomen and legs are very pale golden varied with white. Alar expanse one-fourth to nearly one-third inch."

The larvæ form irregular blotch mines on the upper side of leaves of elms, *Ulmus fulva* Michx. and *Ulmus Americana* L. The pupa of the summer brood is formed under a flat silken cocoon. A later hibernating brood changes from the usual green color to a pale yellow color, and passes the winter in silk lined chambers.

The expanse of the imago does not vary as greatly as would appear from Mr. Chambers' measurements, being 6.5-7 mm. The original description, printed above, is accurate in all other details, except that the second costal streak is often more than "faintly dark margined" behind.

Although resembling *L. conglomeratella* Zell. very closely, it may be distinguished from it by the uniformly smaller size, paler ground color of the wings, slightly more oblique position of the costal streaks, the absence of the tuft of scales in the apical cilia and especially by the antennæ. In *ulmella* the apical two-thirds only are annulate with brown, while in *conglomeratella* the annulations are always present for the whole length, although sometimes indistinct toward the base.

Lithocolletis quercivorella Chambers.

Plate XXIII, Fig. 18.

Lithocolletis quercivorella Chambers, Can. Ent., xi, 145, 1879.—Walsingham, Ins. Life, ii, 24, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6296.

Face, palpi, tuft and antennæ silvery white; sides of the tuft reddish orange; each joint of the antennæ spotted above with dark brown, the spots becoming small and indistinct toward the base. Thorax and forewings golden; a median white streak on the thorax is continuous with a dorso-basal white streak on the forewing, which extends slightly beyond the middle of the dorsal margin. Its end is usually bordered with two or three fuscous scales. There are three costal white streaks, of which the first two are oblique. The first at one-third is dark margined behind and sometimes on the costa before; the second at the middle of the wing length is dark margined behind and around the tip, and the dark scales are produced backward for a short distance. The third is a spot before the cilia dark margined on both sides. Opposite this is an oblique dorsal streak densely margined with blackish scales behind, the dark margin passing into the dusted apical part of the wing. Cilia silvery ocherous; hinder marginal line dark brown. Expanse 6.5-7 mm.

Hindwings silvery ocherous, cilia concolorous. Abdomen pale yellow. Legs whitish, shaded with ocherous. In the original description Mr. Chambers says "tarsi annulate with black." The fore and middle tarsi are always annulate with black, but more often the hind tarsi are silvery white.

The species occurs probably throughout the entire eastern half of the United States upon various species of oak. The mine is a flat blotch upon the upperside of the leaf, similar to that of *L. conglomeratella* Zell.

Quercivorella is closely related to *ulmella* and *conglomeratella* but may be distinguished from both by the fact that the dorso-basal white streak extends only a short distance beyond the middle. The dorsal margin is of the ground color from here to the oblique streak, which occupies the same position as the deflexed portion of the dorso-basal streak in *conglomeratella* and *ulmella*.

Lithocolletis mediodorsella sp. nov.

Plate XXIII, Fig. 19.

Antennæ whitish, spotted above with brown. Face and palpi white. Tuft whitish, ocherous toward the sides.

Thorax and forewings reddish ocherous. At the basal third is an oblique white costal streak, black margined externally. A broad white stripe through the middle of the thorax is continuous with a dorso-basal white stripe extending to beyond the middle of the dorsal margin. From its end a white dorsal streak extends obliquely upward uniting in the middle of the wing with a similar costal streak to form a somewhat interrupted angulated fascia of which the external dark dusting at the angle is produced backwards on a white ground for a short distance. At the apical third is a white costal spot, with a few dark scales externally, and opposite it is a long, oblique dorsal streak, dark margined externally and uniting with a curved streak, concave toward the costa, which often extends through the cilia, and forms the internal border to the dusting of the apex, which is black upon a white ground. Cilia ocherous, becoming gray toward the tornus, with a dark ocherous line through their middle. Expanse 7-8.5 mm.

Hindwings and cilia grayish ocherous. Abdomen grayish ocherous, with pale anal tuft. Legs whitish, shaded with brown; hind tarsi very faintly tipped with black.

Type.—No. 12006, U. S. N. M.

Sonoma County, California. Described from two specimens, one bred on oak by Mr. A. Koebele, the other collected by Lord Walsingham, May 22-23, 1871.

Closely related to *quercivorella* Cham., from which it differs, however, by the presence of the oblique dorsal streak at the end of the dorso-basal streak. It is also of somewhat greater expanse.

Lithocolletis australisella Chambers.

Plate XXIII, Fig. 20.

Lithocolletis australisella Chambers, Bull. Geol. Surv. Terr., iv, 103, 1878.—Dyar, Bull. 52, U. S. Nat. Mus. 1902, No. 6297.

"No basal streak nor apical spot on the forewings, which are pale golden (about the color of *L. argentinotella* Clem.). There is no distinct hinder marginal line in the pale yellow cilia. The marks on the wings are: first, a small, white, dorsal streak; then an oblique, white costal streak about the basal third of the wing length; a silvery white fascia about the middle, which is posteriorly angulated nearer to the costal than to the dorsal margin; a small, silvery white costal spot, immediately before the cilia, and a longer dorsal one opposite to it, extending obliquely backward; all of these marks are posteriorly dark margined, the dark margin of the last costal and dorsal streaks almost meeting in the apical part of the wing; apex dusted with dark brown on a white ground. Thorax pale golden, with a white streak from its anterior margin to the apex. Head, tuft, palpi and antennæ silvery white, each joint of the antennæ dotted above with brown, and the basal joint pale golden above. Under surface of body, wings, and legs pale luteous, the legs stained with brownish on their anterior surfaces. Alar expansion three lines and one-half. Bosque County, Texas."

The above is Chambers' original description of the species.

Lithocolletis chambersella Walsingham.

Plate XXIII, Fig. 21.

Lithocolletis chambersella Walsingham, Ins. Life, ii, 78, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6300.

Syn. *quinquenotella* Chambers (not Frey), Jn. Cin. Soc. Nat. Hist., ii, 189, 1880.

"Face, palpi and antennæ silvery white, the antennæ faintly stained with fuscous. Vertex, thorax and forewings yellowish saffron (less golden than *argentinotella* Clem.). Forewings with four silvery costal streaks, the first two oblique, and the others perpendicular to the margin, and the last passing into the white ground color of the apex, which is densely dusted with fuscous; none of the costal streaks are dark margined. Opposite to the apex of the first costal streak begins a long, oblique dorsal streak, which, behind the middle of the wing length, becomes confluent with the second costal streak, and is strongly dark margined behind. There is no basal streak, apical spot, or hinder marginal line. Legs silvery white; but the first pair of tarsi are marked on their anterior surfaces with fuscous spots. Abdomen silvery white, stained with pale lead color beneath. Alar expanse a little over one-fourth inch. Texas."

The above is Mr. Chambers' description.

Lithocolletis cervina Walsingham.

Plate XXIII, Fig. 22.

Lithocolletis cervina Walsingham, Proc. U. S. Nat. Mus., xxxiii, 221, 1907.

"Antennæ whitish. Palpi white. Head pale rust-brown; face white.

"Forewings whitish fawn, with very indistinct whitish costal streaklets; the first, before the middle, oblique, outwardly margined with rust brown; the second, at about the middle, also outwardly margined with rust-brown, runs obliquely outward and is angulated on the cell, returning to the middle of the dorsum, its lower half longer and more oblique than its upper; the third costal streak in triangular, not oblique, also outwardly margined with rust-brown, which is continued across the wing to the tornus, where there is also a faint indication of a whitish spot; there is no basal streak, and, except for a slightly paler space before the line of dark scales on the middle of the dorsum, no defined

dorsal streak; the space between the streaks and about the apical portion of the wing is slightly shaded with rust-brown, and the apex is profusely sprinkled with blackish scales mixed with some white ones; a slender blackish line runs around the extreme apex at the base of the pale cilia, which have a pale rust-brown line running through their middle. Alar expanse 6 mm.

"Hindwings and cilia grayish. Abdomen grayish. Legs whitish, unspotted."

Lord Walsingham described the species from a specimen from New York in the Beutenmüller collection.

Lithocolletis platanoidiella Braun.

Plate XXIII, Fig. 23.

Lithocolletis platanoidiella Braun, Ent. News, xix, 106, 1908.

Antennæ whitish, banded with brown above. Palpi shining white. Face shining white, with a slight golden lustre. Tuft golden.

Thorax and forewings deep shining ochereous. Extreme edge of the costa towards the base black. The first costal streak at the basal fourth short, oblique and outwardly dark margined. The second costal streak at the middle of the wing length is also oblique, and its apex meets that of the longer corresponding dorsal streak, which begins at the middle of the dorsal margin, somewhat nearer the base than the costal streak. There is thus formed an interrupted, angulated white fascia, of which the external dark dusting is continuous, and is prolonged backward to the space between the third costal and the second dorsal streaks. These latter streaks are placed opposite to each other, the costal at the apical third, the dorsal at the tornus, and both are dark margined behind. Fourth costal streak somewhat oblique, pointing forwards, and dark margined behind by a few black scales. Apical portion white, dusted with black scales. This dusted portion forms an almost rectangular area. At the base of the costal cilia, but not extending through them, and anterior to the dusted apex, is a small white streak. Marginal line in the cilia brown. Cilia ochereous around the apex, becoming gray towards the tornus. Alar expanse 6.5-8 mm.

Hindwings gray. Cilia gray, tinged with reddish. Abdomen gray above, shining silvery ochereous beneath. Anal tuft ochereous. Front legs dark brown above, with a narrow white stripe beneath. Tarsi white at their bases. Middle and hind legs whitish ochereous, their tarsi tipped with black.

I have bred this species at Cincinnati, Ohio, from blotch mines on the upper surface of leaves of several species of oak, viz.: *Quercus alba* L., *Quercus macrocarpa* Michx., *Quercus platanoides* (Lam.). The larva is of the flat type, and when mature spins an oval flat cocoon. The imagoes appear in August. The larvæ of the fall brood hibernate in silken lined chambers. There is a specimen in the U. S. Nat. Mus. from New York (Beutenmüller collection).

This species superficially resembles *L. bethunella* Cham., from which it can be distinguished by the absence of the dorsal streak at the basal fourth, and by the presence of two costal streaks beyond the fascia, there being but one such streak in *L. bethunella*.

Lithocolletis fletcherella sp. nov.

Plate XXIII, Fig. 24.

Antennæ whitish, banded above with brown. Face white; palpi white internally, dark externally. Tuft ochereous, whitish in the middle.

Thorax and forewings reddish ochereous. Four white costal and three white dorsal streaks, all margined with dark brown externally. First costal and dorsal streaks oblique, the costal at the basal third, the dorsal a little nearer the base, and extending slightly beyond the fold; its pointed apex is directed toward that of the first costal streak. Second pair of streaks at the middle almost parallel to the first pair, meeting to form a more or less interrupted angulated fascia, of which the dark margin is continuous. Third pair of streaks at the apical third, perpendicular and almost meeting in the middle of the wing. Fourth costal streak curved, almost inclosing the more or less dusted apex. In the male, on the middle of the wing, half way between the third pair of streaks and the fourth costal streak, is a white spot, with a few dark scales behind it. Cilia ochereous. Expanse 8.5-9 mm.

Hindwings and cilia grayish ochereous. Abdomen ochereous gray, tuft ochereous. Legs ochereous, hind tarsi pure white.

Described from specimens sent to me by Dr. Fletcher from the Central Experimental Farm, Ottawa, Canada, where they were bred from white oak by Mr. Arthur Gibson.

Lithocolletis arcuella Braun.

Plate XXIV, Fig. 1.

Lithocolletis arcuella Braun, Ent. News, xix, 107, 1908.

Antennæ whitish, annulate with brown above, tips blackish. Palpi silvery white. Face silvery white, slightly tinged with golden. Tuft yellow, mixed with orange at the sides.

Thorax and forewing shining reddish orange, with glistening white markings. There are three costal and three dorsal white spots, the second pair uniting to form a fascia; all black margined externally. The first costal spot at the basal third is short and broad, its dark margin passing around its apex almost encloses it. The first dorsal, almost square, begins nearer the base than the first costal, and extends half way across the wing. A broad white angulated fascia at about the middle, black margined externally, and on the costa internally. Third costal streak strongly arcuate and opposite the more triangular dorsal streak; the external dusting densest immediately behind their apices. Apical portion densely dusted with blackish brown scales, and bordered internally by an indistinct outwardly concave streak of silvery scales. Marginal line in cilia brownish. Cilia golden, becoming grayish toward the tornus. Alar expanse 10 mm.

Hindwings bronzy gray, cilia gray. Abdomen bronzy gray above, silvery beneath. Anal tuft reddish. Legs, except the first pair, ochereous; tarsi whitish and unspotted. First pair striped with dark gray, tarsi banded with gray.

One specimen taken at Mountain Lake, Giles County, Virginia, June 20, 1907. A very large and distinctly marked species, belonging to the same group as *L. bethunella* Cham.

Lithocolletis betulivora Walsingham.

Plate XXIV, Fig. 2.

Lithocolletis betulivora Walsingham, Ins. Life, iii, 326, 1891.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6328.

“Antennæ grayish above, white beneath. Palpi white. Head and face white, crown tufted with reddish saffron. Thorax reddish saffron.

“Forewings shining reddish saffron, no basal streak, a small costal spot at one-fourth the wing length and a small dorsal spot nearer to the base dull white, a slender fascia at the middle of the wing angulated outwardly near the costal margin, has one or two black scales on its outer edge; beyond this a small costal streak and an opposite dorsal streak, both dull white, with a few blackish scales on their outer edges. A group of black scales at the apex of the wing is preceded on the costal and dorsal margins by dull white, not sufficiently conspicuous to be called costal and dorsal streaks; cilia grayish, their bases tinged with saffron, a slender blackish line along their middle, passing round the apex.

“Hindwings dark gray; cilia gray. Abdomen gray, tinged with saffron posteriorly. Hind legs whitish, with a very faint indication of darker scaling on the penultimate tarsal joint. Expanse 7 mm.”

Lord Walsingham has thus described the species from a female specimen bred from birch by Dr. Riley.

The mine is a small, sometimes almost circular, blotch upon the upper side of the leaf.

There is a specimen of this species in the U. S. Nat. Mus. bred from birch, but no locality is given.

Lithocolletis eppelsheimii Frey and Boll.

Lithocolletis eppelsheimii Frey and Boll, Stett. ent. Zeit., xxxix, 272, 1878.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6325.

Face and palpi snow-white; tuft saffron yellow. The antennæ whitish gray, annulate with brown, attain an unusual length. They fully equal the length of the forewings. Thorax saffron; legs whitish, with unspotted tarsi. Abdomen dark gray, light underneath.

The moderately shining forewings have a true saffron color. They show the following shining silvery white markings; on the costa at one-third of the wing length there is a rather small, obliquely placed costal streak, imperfectly margined toward the base with a few black scales. The corresponding dorsal streak is short, blunt, not well developed, placed at the basal fourth of the wing length, and is externally more strongly margined with blackish scales. Then follows, about in the middle of the wing, an angulated, interrupted fascia, inwardly blackish margined, and with a shorter costal and a longer dorsal arm. At three-quarters of the wing length is a pair of streaks, the dorsal placed at the hind angle. The trace of a last costal streak appears just before the apex. The black dusting extends in considerable breadth from the above-mentioned pair of streaks to the hind margin, either in the shape of a broad spot, or to the unaided eye as a dot suddenly ending. Base of the cilia saffron, tips whitish gray. At the hind angle they become entirely of a uniform light gray.

Hindwings and cilia gray. The underside of the forewings dark ochereous gray.

The description given above is a translation of that by Frey and Boll, and appears to be somewhat inconsistent in several details. While it seems to belong to the flat group of larvæ, the internal dark margin of the fascia, if the description is correct, is an anomaly in the group. I have seen no specimen of the species, and it is impossible to determine its position with certainty. It was described from specimens bred from upperside mines on a species of *Carya* in Texas, and is one of the smaller species.

Lithocolletis bethunella Chambers.

Plate XXIV, Fig. 3.

Lithocolletis bethunella Chambers, Can. Ent., iii, 109, 1871.—Cin. Quart. Jn. Sci., ii, 103, 1875.—Can. Ent., xi, 89, 1879.—*bethuniella* Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6326.

Syn. *lebertella* Frey and Boll, Stett. ent. Zeit., xxxix, 266, 1878.—Dyar, Bull. 52, U. S. Nat. Mus., No. 6327.

“Face and palpi silvery white; antennæ silvery white beneath, brownish banded with white above; tuft golden, interspersed with white; thorax and anterior wings reddish orange, with three costal and three dorsal silvery streaks, all dark margined externally. First costal and first dorsal small, the dorsal being the largest and nearer to the base, whilst the costal is a little oblique and at about the basal one-third of the wing. The second dorsal and second costal about the middle, opposite each other, and a little oblique, the dorsal being the longest, and almost meeting the costal near the costa, whilst their dark margins do meet and are posteriorly angulated and produced to the space between the third dorsal and third costal. The third dorsal and third costal are a little behind the apical one-third, opposite, straight, and the dorsal is the longest. Apex dusted with blackish on a white ground. Cilia fulvous, with a dark brown hinder marginal line at their base. Al. ex. a little over one-fourth inch.”

The above is Chambers' original description. As noted by Chambers, the opposite costal and dorsal streaks (except the first pair) are sometimes confluent, forming fasciæ. There is also, just before the apical black dusting, a small white spot, which does not extend through the cilia. Alar expanse 6.5–7.5 mm.

The larvæ, of the flat type, form oval blotch mines on the upper side of several species of oak, and spin flat, oval, silken cocoons. The species occurs in the eastern half of the United States, west and south to Texas.

The description of *lebertella* Frey and Boll in no way differs from that of *bethunella*, and their life history is identical. The synonymy, as above given, will doubtless stand, although there has been no opportunity of comparing specimens of *bethunella* with the type of *lebertella* in England.

Lithocolletis fasciella Walsingham.

Plate XXIV, Fig. 4.

Lithocolletis fasciella Walsingham, Ins. Life, iii, 326, 1891.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6317.Syn. *unifasciella* Chambers (not Tengström), Cin. Quart. Jn. Sci., ii, 103, 1875.

Antennæ gray, banded with dark brown above. Face and palpi whitish, with a faint ochereous tinge. Tuft reddish orange, paler in the center.

Thorax and forewings reddish orange. Near the middle of the wing is an obtusely angulated silvery fascia, margined on the costa before with a brown spot, and strongly dark margined behind. This dark margin is produced backward along the costa, and as a broad band along the middle of the wing. These two streaks of dusting are connected at the beginning of the cilia, and are also sometimes confluent with the apical dusting, which is dark brown on a paler ground, and extends to the tornus. No costal nor dorsal streaks. A dark brown line runs through the middle of the cilia, which are brownish ochereous, becoming gray at the tornus. Expanse 6-7 mm.

Hindwings and cilia gray, with a slightly reddish tinge. Abdomen gray. Hind tarsi tipped with black.

The oval blotch mines are found upon the upperside of various species of oak. Ohio and Kentucky.

Lithocolletis castaneæella Chambers.

Plate XXIV, Fig. 5.

Lithocolletis castaneæella Chambers, Cin. Quart. Jn. Sci., ii, 104, 1875.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6318.Syn. *castanella* Walsingham, Ins. Life, iii, 329, 1891.

Antennæ gray, banded above with dark brown. Face and palpi tinged with ochereous. Tuft reddish orange, paler in the middle.

Thorax and forewings reddish orange. At the basal third is a small white spot, margined behind with black scales. At the middle of the wing is an obtusely angulated, nearly straight fascia, dark margined behind and sometimes on the costa before. At the angle of the fascia the dusting is produced backward along the middle of the wing, uniting with that which forms the external margin of a white costal streak at the beginning of the cilia. Opposite this streak the position of a dorsal streak is faintly indicated. A small, white spot just before the dusted apex. Sometimes the dusting behind the fascia and at the apex is almost entirely lacking. A dark line through the middle of the cilia, which are brownish ochereous, shading to gray at the tornus. Expanse 6-7.5 mm.

Hindwings and cilia gray, the latter with a reddish tinge. Abdomen dark gray. Hind tarsi tipped with black.

Ohio and Kentucky.

The mine occurs upon the upperside of leaves of chestnut and various species of oak, and is a somewhat oval blotch. In this species the larva hibernates on a slight bed of silk beneath the folded epidermis.

Lithocolletis guttifinitella Clemens.

Plate XXIV, Fig. 6.

Lithocolletis guttifinitella Clemens, Proc. Acad. Nat. Sci. Phil., 324, 1859.—Tin. No. Am., 65, 76, 1872.—Chambers, Can. Ent., iii, 110, 1871.—Cin. Quart. Jn. Sci., i, 201, 1874.—Bull. Geol. Surv. Terr., iv, 102, 1878.—Jn. Cin. Soc. Nat. Hist., ii, 82, 1879.—Busck, Proc. Ent. Soc. Wash., v, 189, 1903.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6306.

Syn. *toxicodendri* Frey and Boll, Stett. ent. Zeit., xxxix, 273, 1878.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6304.

“Front silvery, with a reddish hue. Tuft and thorax reddish orange. Antennæ blackish brown. Forewings rather deep reddish orange, with two silvery bands black margined behind, one in the middle of the wing and nearly straight, the other midway between this and the base of the wing and obliquely placed. Before the costo-apical cilia is a costal silvery spot, black margined on both sides, with an opposite dorsal spot, black margined behind. The apical portion of the wing is dusted with blackish, dispersed scales, with a white spot near the tip above the middle of the wing. There are two hinder marginal lines, one the margin of the dispersed scales, the other dark brownish in the cilia.

“The larva may be taken in August and September in the leaf of *Rhus toxicodendron* (poison oak), mining the upper surface in a rather broad, tortuous tract, and there are ordinarily several in the same leaf. The larva belongs to the second larval group. The head is a fine pale brown; the body yellowish posteriorly, becoming brownish above, with dorsal and ventral dark maculæ. The cocoon is circular, formed within the mine as usual in this group in a little circular depression.”

The above is Clemens' description of imago and larva. Mr. August Busck (Proc. Ent. Soc. Wash., v, 189, 1903) has established the synonymy of this species with *Lithocolletis toxicodendri* Frey and Boll, and added important notes upon the variability of the species. The expanse is 7 mm.

Lithocolletis obstrictella Clemens.

Plate XXIV, Fig. 7.

Lithocolletis obstrictella Clemens, Proc. Acad. Nat. Sci. Phil., 322, 1859.—Tin. No. Am., 64, 73, 1872.—Chambers, Can. Ent., iii, 183, 1871.—Bull. Geol. Surv. Terr., iv, 102, 1878.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6307.

Syn. *bifasciella* Chambers, Bull. Geol. Surv. Terr., iv, 101, 119, 153, 1878.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6329.—*ceriferæ* Walsingham, Proc. U. S. Nat. Mus., xxxiii, 222, 1907.

Face and palpi whitish, face tinged with reddish orange, deeper towards the vertex. Antennæ silvery gray beneath, dark gray above, with a lighter joint near the apex.

Thorax and forewings shining reddish brown. Forewings with silvery markings dark margined externally. At the basal fourth is a silvery fascia, nearer

the base on the dorsal margin, and very indistinctly angulated near the costa. At the middle of the wing length is a straight perpendicular fascia. At two-thirds are a pair of opposite silvery streaks, often uniting in the middle of the wing to form a third fascia. Apex overlaid with velvety blackish brown scales, with a few silvery scales before. Cilia reddish brown, shading to gray at the tornus, and with a dark brown line through the middle. Expanse 7-8 mm.

Hindwings and cilia blackish brown. Abdomen blackish brown in the female, gray in the male. Legs pale brownish gray, tarsi whitish, shaded with gray toward their bases.

New York (Beutenmüller collection), Pennsylvania, Ohio and Kentucky.

The external margining is in the males more distinct and of a clearer black than in the females, where it is often dark brown, scarcely darker than the ground color.

The upperside mines occur on several species of oak: *Quercus rubra* L., *Quercus alba* L., *Quercus acuminata* (Michx.) Sarg. The mine is a rather broad Y-shaped tract, sometimes crossing the midrib. The flat, oval, silken cocoon is spun in the leg of the Y. Specimens bred from such mines are in every respect identical with Clemens' type of *obstrictella*. Dr. Clemens was certainly in error when he described the mine of *obstrictella* as a mine on the underside of oak leaves. The imago of this species is typically that of the flat larval group.

Obstrictella may be distinguished from all other allied eastern species by the character of the black scales which form the apical dusting. These scales are more freely tipped with black than is usual in the case of the scales forming the apical dusting of the flat group, and hence the effect is a large black spot rather than a number of small dots. The silvery scales before the apex are also characteristic of the species.

Chambers' type of *bifasciella* is identical with Clemens' type of *obstrictella*; on one wing the third fascia is nearly complete.

The specimen from which Lord Walsingham described *ceriferæ* is identical with the series of specimens of *obstrictella* from the Beutenmüller collection in the U. S. Nat. Mus. All of this series bear the breeding record number 114 (blotch mine on the upperside of red and white oaks). The type of *ceriferæ* is the only specimen bearing on the pin the food plant label, "*Myrica cerifera*." This is certainly an error.

Lithocolletis corylisella Chambers.

Plate XXIV, Fig. 8.

Lithocolletis corylisella Chambers, Can. Ent., iii, 111, 127, 1871.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6308.

Syn. *coryliella* Chambers, Can. Ent., xi, 90, 1879.—*bifasciella* Walsingham, Proc. U. S. Nat. Mus., xxxiii, 223, 1907.

Face, palpi and antennæ white; antennæ annulate with brown above. Tuft ochereous.

Thorax and forewings reddish ochereous. A short white streak from the inner angle to the fold dark margined externally. Two white fasciæ dark margined externally; the first at about the basal fourth, oblique, nearer the base on the dorsum, and slightly convex above the fold. Second fascia at about the middle, nearly erect. At the apical fourth is a white costal streak, and opposite it a nearly erect dorsal streak above the cilia; both are dark margined externally. In the apical portion of the wing is an oblique white streak, not extending through the costal cilia, dusted with fuscous scales behind and around its apex. This dusting is sometimes almost lacking. Hinder marginal line in the cilia brownish, indistinct. Cilia ochereous, grayish toward the tornus. Expanse 6.5-7 mm.

Hindwings and cilia grayish, tinged with ochereous. Abdomen gray. Legs whitish ochereous.

The blotch mines on the upperside of hazel, *Corylus Americana* Walt., are very similar to those of *ostryarella* Chamb. However, the silken chamber in which the larva hibernates is of the usual type, the epidermis not being raised in a circular ridge as in *ostryarella*.

The male specimen which Lord Walsingham described as *bifasciella* Cham. is one of the series from the Beutenmüller collection, bearing the record number 118, and bred on *Corylus*, and identical with specimens of *corylisella* Cham.

Lithocolletis æsculisella Chambers.

Plate XXIV, Fig. 9.

Lithocolletis æsculisella Chambers, Can. Ent., iii, 111, 1871.—Walsingham; Ins. Life, ii, 53, 1889.—Busek, Proc. Ent. Soc. Wash., v, 190, 1903.

Syn. *æsculella* Riley, Smith's List Lep. Bor. Am., 109, 1891.

Antennæ whitish, banded above with dark brown. Face and palpi white. Tuft ochereous, whitish behind. Thorax and forewings reddish ochereous. A whitish streak on each side of the thorax is continuous with a slightly paler shade on the forewings, from the inner angle to the fold. Two white posteriorly dark margined fasciæ. The second, at about the middle of the wing, indistinctly obtusely angled near the costa, with its dorsal arm nearer the base. The first fascia, half way between this and the base of the wing, is broken near the costa. Its dorsal arm is more oblique and diverges from the second fascia. At the beginning of the cilia is a small costal spot, and opposite it a longer almost perpendicular dorsal streak, both black margined behind. Apical black dusting more or less dense, and edged internally by an oblique white streak, sometimes

almost uniting with the dorsal streak. Cilia ocherous, with a slightly darker line through their middle. Expanse 8-9 mm.

Hindwings and cilia gray, with an ocherous tinge. Abdomen gray, tuft ocherous. Legs whitish ocherous. Hind tarsi white, with one or two joints faintly tipped with black.

Central United States. The mine occurs on the upperside of buckeye, *Æsculus glabra* Willd. and *Æsculus flava* Ait. It is a broad linear tract sometimes containing as many as five or six larvæ. The winter is passed in the larval state, the period of hibernation lasting from August until April of the following year.

Æsculisella may be distinguished from all allied species by the form of the first fascia, which is broken near the costa.

Lithocolletis ostryarella Chambers.

Plate XXIV, Fig. 10.

Lithocolletis ostryarella Chambers, Can. Ent., iii, 111, 1871.—Tin. No. Am., 72, 1872.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6335.

Face, palpi and antennæ white; antennæ annulate above with brown.

Thorax and forewings reddish ocherous. A white streak from the inner angle to the fold, faintly black margined externally. Two white fasciæ, the first beginning on the dorsum at about the basal fourth, concave outwardly on the fold, thence extending obliquely to the costa, which it reaches at about the basal third. It is black margined externally. The second fascia, at about the middle, is slightly oblique and black margined externally. At the apical fourth a costal white streak black margined externally. Opposite it above the cilia is a very oblique, long dorsal streak also black margined externally. Just before the apex an oblique white streak on the line of the last dorsal, and not extending through the cilia, is dusted behind with blackish scales. The scales in the apical third of the wing are tipped with brown. Hinder marginal line in the cilia brownish. Cilia ocherous, grayish toward the tornus. Expanse 6-7 mm.

Hindwings grayish ocherous. Cilia grayish, tinged with ocherous. Abdomen gray, tuft ocherous. Legs whitish ocherous, hind tarsi sometimes tipped with black.

The larvæ form irregular blotch mines on the upperside of *Ostrya Virginiana* (Mill.) Willd. and *Carpinus Caroliniana* Walt.; as many as four or five sometimes occurring in one mine. The hibernating larvæ pass the winter in circular silken-lined chambers, the outline appearing on the upper epidermis as a circular narrow ridge; a convex projection appears on the lower side.

The brownish dusting of the apical third of the wing is the distinguishing characteristic of *ostryarella*. *Corylisella* may also be distinguished from *ostryarella* by the dorsal streak above the cilia being nearly erect, while in *ostryarella* it is oblique and nearly parallel to the edge. The fasciæ, especially the first, are also less oblique in *corylisella*.

Lithocolletis aceriella Clemens.

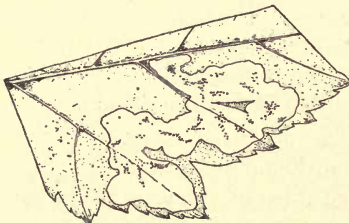
Plate XXIV, Fig. 11.

Lithocolletis aceriella Clemens, Proc. Acad. Nat. Sci. Phil., 325, 1859.—Tin. No. Am., 65, 75, 1872.—Busck, Proc. Ent. Soc. Wash., v, 189, 1903.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6305.

"Front silvery, tuft reddish orange and silvery mixed. Thorax reddish orange. Forewings reddish orange, somewhat metallic, with a white streak, black margined exteriorly, from the inner basal angle to the fold; with two oblique silvery bands, black margined behind, one about the middle of the wing and the other midway between it and the base of the wing. Near the tip is a costal silvery spot, black margined behind, with an opposite, oblique dorsal streak of the same hue, likewise black margined behind, and an oblique costal silvery streak continued on the line of the last dorsal, running into the cilia just before the tip, black margined above, at the tip before, and below at the tip behind; scarcely with a hinder marginal line, cilia of the general hue. Hindwings plumbeous, cilia with a fulvous hue.

"The larva mines the leaf of maple in September. It mines the upper surface of the leaf, making a flat, rather broad tract, casting its frass along the middle of the course of it. Physical characteristics those of the second larval group. Head pale brown; body yellowish green, with oval, dorsal, brown maculæ, darkest on their margins; thoracic rings on their sides pale yellowish. The cocoon is circular."

The above is Clemens' description and represents the typical eastern form of the species. Specimens occur in which the white streak at the base of the dorsal margin is replaced by a pale ochreous shade, bordered externally by brown scales. The dorsal streak above the cilia is also very variable, being in some specimens almost erect, while in others it is oblique and parallel to the termen. The usual expanse is about 7 mm., but specimens collected at Ottawa, Canada, by Mr. C. H. Young expand 8-9 mm. In these specimens the pale streak at the base of the wings is scarcely lighter than the ground color.

Mine of *L. aceriella*.

The mine is common throughout the Atlantic States on leaves of red maple, *Acer rubrum* L., but is rarely found upon sugar maple. The larvæ appearing in July pupate in a silken lined chamber, and do not spin the usual flat silken cocoon.

The insect to which Chambers refers in Can. Ent., iii, 130, 1871, is not *L. aceriella* Clem. but the species described under the name *saccharella* by the writer.

Lithocolletis hamameliella Busck.

Plate XXIV, Fig. 12.

Lithocolletis hamameliella Busck, Proc. Ent. Soc. Wash., v, 189, 1903.
Syn. *hamamelis* Smith's List Lep. Bor. Am., 1903, No. 6844.

Face and palpi whitish. Antennæ whitish ocherous, annulate with dark brown. Tuft reddish orange.

Thorax and forewings deep reddish orange. An oblique white streak from the inner angle to the fold is black margined externally. There are two straight, oblique, parallel, silvery bands black margined externally, the first at the basal fourth, and the second at the middle of the wing length. At the beginning of the costal cilia is a silvery spot, black margined externally. Opposite it is a long, very oblique dorsal streak, parallel to the termen, also black margined behind, and uniting in the apex of the wing with a short apical streak, dark margined at its apex and above and below. Marginal line in the cilia of the wing color. Cilia reddish, becoming gray at the tornus. Expanse 7 mm.

Hindwings and cilia reddish gray. Abdomen dark gray above, ocherous gray beneath. Legs pale brownish red, tarsal joints white, tipped with black.

This species is distributed throughout the Atlantic States wherever the food plant, *Hamamelis Virginiana* L. (witch hazel), occurs. The mine is a whitish blotch, sometimes almost circular; the pupa of the summer brood is formed beneath a flat silken cocoon.

Although it is very closely related to *aceriella*, it may be separated from that species by the deeper and more reddish color of the tuft and wings, and by the more distinct marginal line in the cilia. The hind tarsi of *hamameliella* are also very distinctly tipped with black, whereas, in *aceriella*, they are either faintly blackish tipped or entirely pure white. The oblique dorsal streak, which has been used to separate *hamameliella* from *aceriella*, cannot be relied upon, as this streak is often as oblique in *aceriella* as in *hamameliella*.

Lithocolletis tubiferella Clemens.

Plate XXIV, Fig. 13.

Lithocolletis tubiferella Clemens, Proc. Acad. Nat. Sci. Phil., 208, 1860.—Tin. No. Am., 140, 1872.—Chambers, Can. Ent., iii, 165, 183, 1871.—Walsingham, Ins. Life, ii, 24, 77, 1889; iii, 329, 1891.—Busck, Proc. Ent. Soc. Wash., v, 204, 1903.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6330.

"Head silvery white. Antennæ fuscous, slightly annulated with white; basal joint pale saffron. Forewings pale saffron, with two silvery white moderately broad bands, black margined externally, one near the base, and the other on the middle of the wing, and both somewhat oblique; cilia of the general hue. Hind wings dark grayish, cilia the same.

"The larva belongs to the second larval group of this genus, but the body is much more contracted than that of any other larva I have seen. Its form is almost that of a flattened ovoid, the rings separated by the deep incisions, and each forming in the sides a projecting mammilla.

"The larva mines the upper surface of the leaves of oaks in September, and doubtless also in the summer months. The mine is a linear tract, sometimes curved or wavy, gradually increasing in breadth from the beginning to the end, or, as the larva increases in length, with the frass deposited on each side of the tract, and marking its outline by two black lines. The position of the larva within the mine is likewise a peculiar one, as it is always placed transversely to its course, and hence the deposition of the frass on the sides, and the gradual increase in breadth, as the larva grows in length. Its head is blackish-brown; the body pale greenish, with pale brown dorsal maculæ, darker on their edges. It undergoes transformation in the end of the mine, preparing a circular cell or slightly silk-lined cavity, and leaves the last larval cast outside of it. The fall brood of larvæ become imagoes about the middle of May."

The above is Clemens' complete description of the species.



Mine of *L. tubiferella*.

The very characteristic mine cannot be mistaken for that of any other species. The mine is often branched, the larva returning toward the beginning of the mine, and starting out anew in another direction.

In the apex of the wing, there is sometimes a minute white spot, with a few black scales behind it. The alar

expanse is 8 mm.

PORPHYROSELA,* new subgenus.

Porphyrosela differs from the typical *Lithocolletis* in the following characteristics: forewings somewhat more acuminate, vein 11 of the forewings absent (Plate XX, Fig. 8); basal joint of the antennæ without a pecten; hind tibiæ without hairs.

The subgenus is represented only by the following species:

Porphyrosela desmodiella Clemens.

Plate XXIV, Figs. 14, 15.

Lithocolletis desmodiella Clemens, Proc. Acad. Nat. Sci. Phil., 220, 1859.—Tin. No. Am., 65, 68, 1872.—Chambers, Can. Ent., iii, 127, 162, 1871.—Jn. Cin. Soc. Nat. Hist., ii, 189, 1879.—Frey and Boll, Stett. ent. Zeit., xxxvii, 227, 1876.—Walsingham, Trans. Am. Ent. Soc., x, 202, 1882.—Busck, Proc. Ent. Soc. Wash., v, 187, 1903.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6303.

Syn. *gregariella* Murtfeldt, Can. Ent., xiii, 245, 1881; xv, 139, 1883.—Walsingham, Proc. Zool. Soc. Lond., 146, 1897.

"Antennæ dark brown, tipped with a silvery hue. Front whitish, with a ruby colored lustre; frontal tuft dark brown. Thorax with a splendid ruby hue.

* From *πόρφυρος*, purple; and *σέλας*, signifying sheen.

Forewing ferruginous brown, ruby-tinted at the base, with two silvery bands dark margined on both sides, one near the base, and one in the middle of the wing. A costal and dorsal silvery spot near the tip, opposite to each other, and a costal silvery spot just before the tip, the two former dark margined on both sides, and the latter slightly dark margined. No hinder marginal line; the cilia opposite the last dorsal spot blackish, and the wing beneath the last costal spot golden brown. Hindwings pale brownish gray, cilia the same." [Expanse 4.5-5 mm.]

Originally described by Clemens as above from specimens from tentiform mines on the underside of *Desmodium viridiflorum* L. It has since been bred from mines on several allied plants, among them *Lespedeza capitata* Michx. and *Phaseolus pauciflorus* Benth.

Frey and Boll (Stett. ent. Zeit., xxxvii, 227, 1876) made note of the peculiar enlarged appearance of the apical third of the forewings.

The specimens described as *gregariella* were bred from large inflated mines on the underside of *Phaseolus pauciflorus* Benth., a number of imagoes emerging from one mine. In all other respects, except the gregarious larval habits, these are identical with *desmodiella*.

However, in a series bred by Mr. August Busck from similar mines on *Desmodium* at Washington, D. C., all of the specimens were noticeably smaller, the largest expanding but 3 mm., and almost all lacked any indication of the white costal streak before the cilia (Plate XXIV, Fig. 15).

On various species of *Lespedeza*, where both the gregarious and solitary larval habit is exhibited on the same plant, I have bred both varieties from the same mine.

CREMASTOBOMBYCIA,* new subgenus.

Cremastobombycia differs from *Lithocolletis* proper in the following characteristics: terminal joint of the labial palpi a little longer; vein 5 of the forewings present, 5 and 6 stalked, vein 6 of the hind wings present, 5 and 6 long stalked (Plate XX, Figs. 6, 7), sometimes borne on an independent stalk to near the base, where this stalk is short stalked with the upper median vein. The stalk is obsolete from the middle to the end of the cell (Plate XX, Fig. 6).

Larva cylindrical, without prolegs on 10, usually pale greenish or yellowish becoming darker at maturity. All of the species, as far as known, are miners in the leaves of various species of Compositæ, the mines being found upon the lower side of the leaf, except that of

* From *κρεμαστός*, suspended; and *βομβύκιον*, cocoon.

grindeliella Wlsm., which is also sometimes an upperside miner. The loosened epidermis is very much wrinkled longitudinally at maturity.

The species of this subgenus pupate in an elongate, dense, white cocoon (Plate XX, Fig. 13), sometimes ornamented with longitudinal ridges. This cocoon is suspended inside the mine by two slightly diverging silken threads at the posterior end, and by either one or two threads at the anterior end.

The markings of the forewings consist of a more or less distinctly developed basal streak; four white costal streaks, and two or three dorsal streaks. There may be one or two more or less distinctly angulated fasciæ, formed by the confluence of opposite streaks.

The species herein included represent a more ancestral type, more nearly related to the *Gracilaria* group of genera.

One species, *solidaginis* Frey and Boll, is found from the Atlantic to the Pacific; the other species have a more limited range.

The species may be separated by the following table:

- A. Basal streak distinct, reaching almost to or beyond the basal fourth.
 - B. With an angulated fascia at one-fourth.....**grindeliella**.
 - BB. Without a fascia at one-fourth.
 - C. Basal streak narrow, pointed, unmarginated**solidaginis**.
 - CC. Basal streak much dilated posteriorly**ambrosiella**.
- AA. Basal streak minute or wanting.
 - B. Markings with a brilliant silver lustre; costal and dorsal streaks at three-fourths never confluent**ignota**.
 - BB. Markings not so brilliant; an angulated fascia at three-fourths.

verbesinella.

Cremastobombycia grindeliella Walsingham.

Plate XXIV, Figs. 16, 22.

Lithocolletis grindeliella Walsingham, Ins. Life, iii, 327, 1891.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6299.

“Antennæ dull gray, with slightly paler annulations. Palpi grayish. Crown tufted with mixed iron gray and reddish brown scales; face grayish. Thorax ferruginous.

“Forewings pale ferruginous, dusted with iron gray and clouded with blackish scales beyond the middle of the wing to the apex; three whitish costal streaks, very indistinct, at about equal distances apart, the first and second of which are outwardly oblique and are met at a somewhat acute angle on the middle of the wing by two even less distinct dorsal streaks, faintly dark margined externally; the third is a mere spot, opposite which is a small spot at the base of the cilia at the anal angle; immediately preceding the apex is a conspicuous curved white costal spot divided from a smaller and less conspicuous one below it by the cloudy streak of black scales which runs to the apex; cilia with a ferruginous tinge, becoming gray at and within the anal angle, and having a few black scales below the apex.

"Hindwings and cilia gray. Abdomen dull gray; anal tuft pale. Legs whitish, tarsal joints unspotted, tibiæ barred with gray externally. Expanse 8 mm."

With the exception of the omission of any mention of the basal streak, which is confluent with the first fascia just below the fold, the above description by Lord Walsingham is that of the typical form of the species, in which the first fascia attains the dorsal margin. In another variety (Fig. 22, Plate XXIV), the first fascia ends abruptly just below its angle and does not unite with the basal streak. All gradations exist between these two varieties.

The species was originally described from a specimen from Alameda Co.; I have bred a large series from Marin Co., California.

The mines occur upon either the upper or lower surface of leaves of *Grindelia robusta*. In the upperside mines the leaf is more contracted and the epidermis is thrown into more distinct folds than is the case in the lower side mines. The elongate white silken cocoon is attached at its posterior end by two fine threads, and at its anterior end by a rather broad band of silk.

***Cremastobombycia solidaginis* Frey and Boll.**

Plate XXIV, Fig. 17.

Lithocolletis solidaginis Frey and Boll, Stett. ent. Zeit., xxxvii, 223, 1876.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6298.

Syn. *solidaginisella* Chambers, Jn. Cin. Soc. Nat. Hist., ii, 190, 1880.

Antennæ grayish, distinctly annulate with dark brown. Face and palpi yellowish white. Tuft brownish ochereous, white at the sides. Thorax and forewings reddish ochereous; a white stripe on each side of the thorax continuous with a rather indistinct whitish basal streak on the forewings below the fold, ending at one-third. Four white costal streaks, of which the first two are oblique, and situated at one-third and at the middle of the wing length respectively. The third is at two-thirds, and nearly perpendicular and the fourth just before the apex and inwardly oblique. All are dark margined externally with dark brown, the margin of the last forming the dusting of the apex. A long, oblique dorsal streak commences near the middle of the dorsal margin; its dark margin usually unites with that of the second costal; sometimes the streaks themselves unite. Opposite the third costal an oblique dorsal streak is indicated by a slightly lighter shade and a few dark scales behind it. Hinder marginal line in the cilia brownish, rather indistinct. Cilia ochereous. Alar expanse 7-9 mm.

Hindwings and cilia ochereous gray. Abdomen gray; anal tuft ochereous. Legs whitish, banded with ochereous; tarsal joints tipped with black.

A common species in the United States, making elongate, much wrinkled mines upon the under surface of leaves of goldenrod, *Solidago*. The dense white cocoon, marked with longitudinal ridges, is suspended hammock-like within the mine, by a single silken thread

at the anterior end and by two diverging threads at the posterior end. When the imago emerges the pupa case is thrust through the upper epidermis.

Cremastobombycia ambrosiella Chambers.

Plate XXIV, Fig. 18.

Lithocolletis ambrosiella Chambers, Can. Ent., iii, 127, 1871.—Cin. Quart. Jn. Sci., ii, 100, 1875.—Frey and Boll, Stett. ent. Zeit., xxxvii, 221, 1876; xxxix, 267, 1878.—Walsingham, Ins. Life, ii, 54, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6321.

Syn. *amœna* Frey and Boll, Stett. ent. Zeit., xxxix, 269, 1878.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6285.

Antennæ gray, annulate with dark brown. Face and palpi whitish, sometimes with a deep blue-gray metallic lustre.

Thorax and forewings reddish saffron. A fine white line on each side of the thorax is continuous with a short basal streak broadening toward the end, where it is faintly dark margined. At the basal fourth is an oblique white costal streak, dark margined externally. Very rarely there is a minute white spot on the dorsal margin, with a few black scales behind it. About the middle is a white fascia, sometimes angulated, margined with black behind and with a slightly darker shade before. At the beginning of the cilia there is a white costal streak and a slightly oblique dorsal one opposite, both dark margined behind and faintly so before. Just before the apex is a curved white streak, sometimes attaining the dorsal margin, with a few dark scales behind it in the apex of the wing. Cilia of the wing color, grayish toward the tornus. Expanse 5.5-6.5 mm.

Hindwings gray, cilia with a fulvous tinge. Abdomen gray, somewhat metallic, tuft tinged with ochereous. Legs fuscous, tarsi white, broadly annulate with black.

Widely distributed in the east, also occurring as far south and west as Texas (Boll). The larvæ mine the leaves of *Ambrosia trifida* L. and *Ambrosia artemisiaefolia* (L.) Britton, and of *Verbesina alternifolia* (L.) Britton (*Actinomeris squarrosa* Nutt.). The mine is very small, placed upon the under surface, and is not visible on the upper side as an inflated swelling, as is that of *ignota*. The dense white fusiform cocoon, suspended hammock-like in the mine, has a smooth surface, lacking entirely the longitudinal ridges characteristic of that of *ignota*.

Easily distinguished from *ignota* in its early stages, the imagoes may be distinguished from that species by the broad white basal streak, which in the form described by Frey and Boll as *amœna*, attains the dorsal margin; by the absence of the brilliant silvery lustre of the white markings. *Amœna* lacks the dark margins present on the type of *ambrosiella*. Bred specimens show great variation in the distinctness of these margins.

Cremastobombycia ignota Frey and Boll.

Plate XXIV, Figs. 19, 20.

Lithocolletis ignota Frey and Boll, Stett. ent. Zeit., xxxiv, 215, 1873.—Chambers, Cin. Quart. Jn. Sci., i, 206, 1874.; ii, 230, 1875.—Walsingham, Ins. Life, ii, 54, 119, 1889.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6320.

Syn. *bostonica* Frey and Boll, Stett. ent. Zeit., xxxiv, 216, 1873.—Chambers, Cin. Quart. Jn. Sci., i, 206, 1874.; ii, 230, 1875.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6319.—*helianthisella* Chambers, Cin. Quart. Jn. Sci., i, 205, 1874.—*helianthivorella* Chambers, Cin. Quart. Jn. Sci., ii, 100, 1875.—*elephantopodella* Frey and Boll, Stett. ent. Zeit., xxxix, 268, 1878.—Busck, Proc. U. S. Nat. Mus., xxiii, 247, 1900.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6322.—*actinomeridis* Frey and Boll, Stett. ent. Zeit., xxxix, 268, 1878.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6324.

Antennæ brownish gray, annulate with darker. Face and palpi pale golden. Tuft reddish saffron, intermixed with white.

Thorax and forewings deep reddish saffron. A fine white line on each side of the thorax is continuous with a very indistinct and short basal silvery streak beneath the fold, consisting of a few scales. At the basal fourth of the wing is an oblique silvery costal streak, black margined externally, and sometimes on the costa before; rarely entirely unmargined. On the dorsal margin, slightly nearer the base, is a small dorsal spot, sometimes represented by but two or three silvery scales, rarely margined behind with one or two dark scales. At the middle of the wing is a silvery fascia, varying from nearly straight to acutely angled. In the former case the fascia is broader, strongly margined externally and on the costa before with black. In those specimens having a distinctly angulated fascia, the fascia is narrower, sometimes interrupted at the angle, its external black margin less distinct, and usually not dark margined internally. At the apical third are two opposite rather large, perpendicularly placed silvery streaks, black margined behind, and the costal one sometimes on the costa before. Just before the apex is an outwardly concave silvery costal streak, sometimes attaining the dorsal margin, and sometimes with a few black scales before. Behind it, in the apical portion of the wing, are a few black scales. Cilia slightly paler than the wing color, shading to gray toward the tornus. Expanse 6.5–7.5 mm.

Hindwings and cilia brownish gray, the latter with a purplish lustre. Abdomen above dark brown, with a metallic lustre. Legs fuscous, all the tarsi annulate with black.

Widely distributed, occurring from Massachusetts to Texas, and feeding on various species of Compositæ. Among its recorded food plants are *Verbesina alternifolia* (L.) Britton (= *Actinomeris squarrosa* Nutt.), *Elephantopus Carolinianus* Willd. and *Verbesina Virginica* L. These three are the food plants recorded by Boll from Texas. Mr. August Busck bred the species from *Elephantopus Carolinianus* Willd., at Washington, D. C., and Mr. Chambers on *Helianthus giganteus* L. from Kentucky.

The rather large tentiform mine occurs on the lower surface of the leaf. The loosened epidermis becomes much wrinkled in the

later stages, and the mine is distinctly visible on the upper surface as a tubercular swelling. The larva, which is pale in the earlier stages, becomes dark brown just before pupation. The dense white elongate cocoon, ornamented with longitudinal ridges, is suspended in the mine at each end by two silken threads.

The series of specimens from which the above description was made were bred from mines on *Verbesina alternifolia* (L.) Britton at Cincinnati, Ohio. Frey's description of *actinomeridis* is applicable to those specimens having the straighter fascia, and heavier margins of the silvery marks. A specimen bred by Mr. August Busck on *Elephantopus Carolinianus* Willd. is identical with these. The description of *elephantopodella* agrees with those specimens having the angulated fascia, and narrower and less distinctly dark margined silvery marks. Frey has described *ignota* as having unspotted hind tarsi; in none of my series is this true. This variation in the markings of the tarsi occurs frequently, and cannot be considered of specific value. Chambers' types of *helianthivorella* all have the hind tarsi distinctly annulate with black, show considerable variation in the angulation of the silvery fascia, and have the minute basal streak.

***Cremastobombicia verbesinella* Busck.**

Plate XXIV, Fig. 21.

Lithocolletis verbesinella Busck., Proc. U. S. Nat. Mus., xxiii, 246, 1900.—Dyar, Bull. 52, U. S. Nat. Mus., 1902, No. 6323.

"Antennæ silvery white, with black annulations, last four or five joints white. Labial palpi silvery white. Face golden iridescent white; tuft on head reddish yellow, with a few white scales. Thorax and forewing deep golden yellowish brown. At basal third is a silvery white costal streak directed outward, strongly margined externally with black. At the middle of the wing is a silvery white, outwardly angulated fascia, and at the beginning of costal cilia another similar one, both strongly margined externally with black. Just before apex is a third small silvery white fascia with a few scattered black scales externally. Cilia light golden yellow. Hindwings dark silvery gray, cilia a shade lighter. Abdomen above dark gray; underside silvery and golden yellow. Legs silvery, with broad black annulations. Alar expanse 6.4 mm."

Described as above by Mr. August Busck from a single specimen bred from *Verbesina Virginica*, collected at Palm Beach, Florida, by Dr. Dyar.

Mr. Busck has given the following note upon the early stages: "The larva makes a roomy tent-shaped mine on the underside with the lower epidermis much wrinkled longitudinally, and pupates in an elongate white cocoon suspended at both ends like a hammock inside the mine. Larva belongs to the cylindrical group."

LIST OF SPECIES.

Lithocolletis Hübner.

♀

fitchella *Clem.*
 leucothorax *Wlsm.*
 bataviella sp. nov.
 trinitella *Braun.*
 quercialbella *Fitch.*
 clemensella *Cham.*
 argentifimbriella *Clem.*
 lucidicostella *Clem.*
 albanotella *Cham.*
 insignis *Wlsm.*
 hageni *Frey and Boll.*
 arbutusella sp. nov.
 obscuricostella *Clem.*
 ostryæfoliella *Clem.*
 rileyella *Cham.*
 kearfottella *Braun.*
 caryæalbella *Cham.*
 olivæformis sp. nov.
 martiella sp. nov.
 gemmea *Frey and Boll.*
 morrisella *Fitch.*
 uhlerella *Fitch.*
 robiniella *Clem.*
 auronitens *Frey and Boll.*
 diaphanella *Frey and Boll.*
 minutella *Frey and Boll.*
 scudderella *Frey and Boll.*
 ledella *Wlsm.*
 salicivorella *Braun.*
 deceptusella *Cham.*
 alnicolella *Wlsm.*
 alni *Cham.*
 malimalifoliella *Braun.*
 cratægella *Clem.*
 propinquinella sp. nov.
 incanella *Wlsm.*
 populiella *Cham.*
 sexnotella *Cham.*
 æriferella *Clem.*
 obsoleta *Frey and Boll.*
 argentinotella *Clem.*
 oecitanica *Frey and Boll.*
 apicinigrella sp. nov.
 basistrigella *Clem.*
 celtisella *Cham.*
 lucetiella *Clem.*
 symphoricarpella *Cham.*
 ostensackenella *Fitch.*
 tritænianella *Cham.*
 affinis *Frey and Boll.*

mariæella *Cham.*
 tiliacella *Cham.*
 oregonensis *Wlsm.*
 fragilella *Frey and Boll.*
 salicifoliella *Clem.*
 tremuloidiella *Braun.*
 celtifoliella *Cham.*
 ? lysimachiæella *Cham.*
 ♀ ♀
 gaultheriella *Wlsm.*
 nemoris *Wlsm.*
 caryæfoliella *Clem.*
 lentella sp. nov.
 saccharella *Braun.*
 macrocarpella *Frey and Boll.*
 cincinnatiella *Cham.*
 hamadryadella *Clem.*
 umbellulariæ *Wlsm.*
 agrifoliella *Braun.*
 conglomeratella *Zell.*
 ulmella *Cham.*
 quercivorella *Cham.*
 mediodorsella sp. nov.
 australisella *Cham.*
 chambersella *Wlsm.*
 cervina *Wlsm.*
 platanoidiella *Braun.*
 fletcherella sp. nov.
 arcuella *Braun.*
 betulivora *Wlsm.*
 eppelsheimii *Frey and Boll.*
 bethunella *Cham.*
 fasciella *Wlsm.*
 castanæella *Cham.*
 guttifinitella *Clem.*
 obstrictella *Clem.*
 corylisella *Cham.*
 æsculisella *Cham.*
 ostryarella *Cham.*
 aceriella *Clem.*
 hamameliella *Busck.*
 tubiferella *Clem.*

Porphyrosela new subg.
desmodiella *Clem.*

Cremastobombycia new subg.
grindeliella *Wlsm.*
solidaginis *Frey and Boll.*
ambrosiella *Cham.*
ignota *Frey and Boll.*
verbesinella *Busck.*

INDEX OF SPECIES.

Italicized names are synonyms, or refer to European species formerly included in our fauna.

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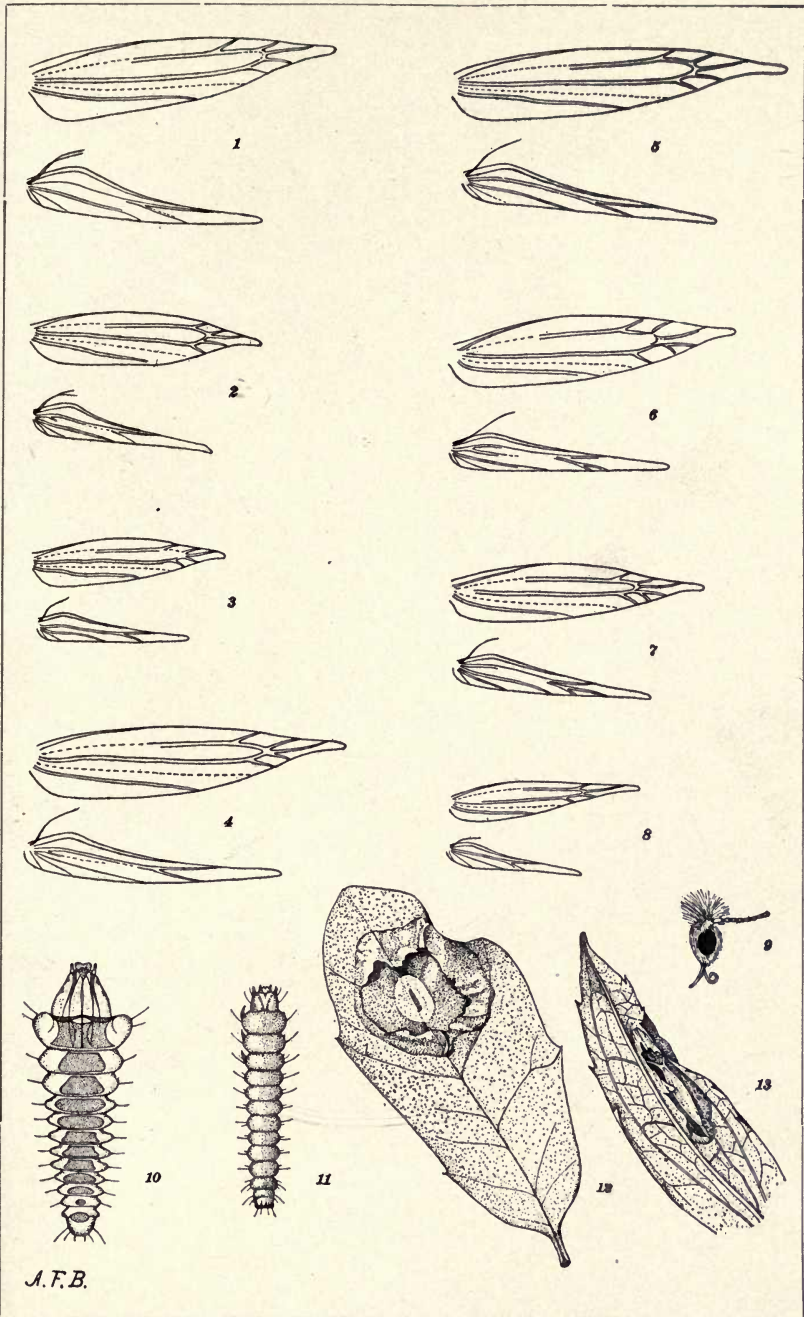
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ERRATA.

- Page 289, line 9 from the top, read *golden* instead of *gilded*.
 Page 291, line 3 from the bottom, read *Argyromiges* instead of *Argyromigea*.
 Page 294, line 17 from the top, read *follow two very small* instead of *follow very small*.
 Page 296, last word of line 2 from the bottom, should be *anal* instead of *and*.
 Page 301, line 26 from the top, read *almost* instead of *also*.
 Page 336, line 4 from the bottom, read *is* instead of *in*.

EXPLANATION OF PLATE XX.

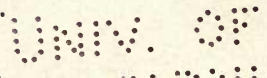
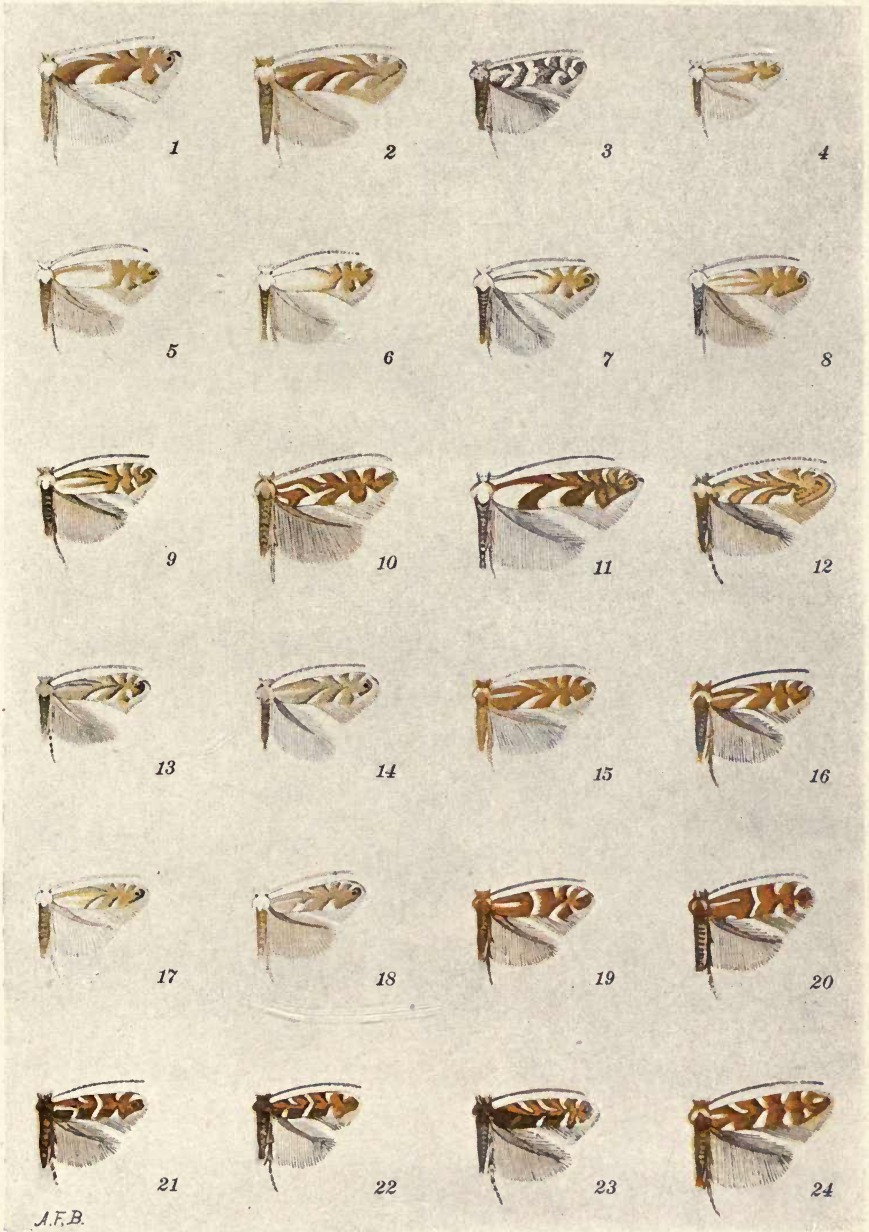
1. Venation of *Lithocolletis hageni*.
2. " " " *lucidicostella*.
3. " " " *robiniella*.
4. " " " *hamadryadella*.
5. " " " *conglomeratella*.
6. " " *Cremastobombycia solidaginis*.
7. " " " *ignota*.
8. " " *Porphyrosela desmodiella*.
9. Head of *Lithocolletis lucidicostella*.
10. Flat larva, *L. agrifoliella*.
11. Cylindrical larva, *L. lucidicostella*.
12. Mine and cocoon of *L. conglomeratella*.
13. " " " *C. solidaginis*.



BRAUN ON LITHOCOLLETIS.

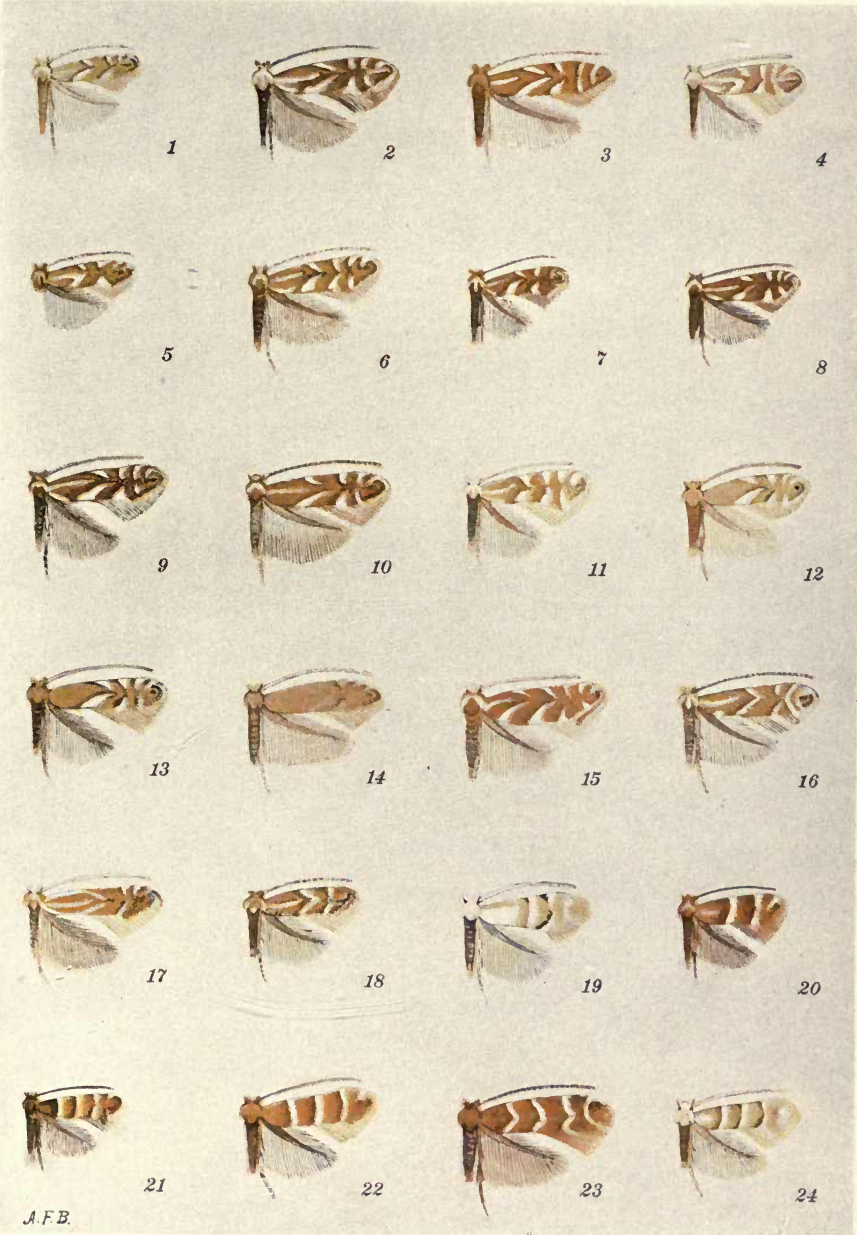
EXPLANATION OF PLATE XXI.

1. *Lithocolletis fitchella* Clem.
2. " *leucothorax* Wlsm., type, U. S. N. M.
3. " *bataviella* sp. nov., type.
4. " *trinotella* Braun, type, coll. W. D. Kearfott.
5. " *quercialbella* Fitch.
6. " *clemensella* Cham.
7. " *argentifimbriella* Clem.
8. " *lucidicostella* Clem.
9. " *albanotella* Cham.
10. " *insignis* Wlsm., type, U. S. N. M.
11. " *hageni* Frey and Boll.
12. " *arbutusella* sp. nov., type, U. S. N. M.
13. " *obscuricostella* Clem.
14. " *ostryæfoliella* Clem.
15. " *rileyella* Cham., type, U. S. N. M.
16. " *kearfottella* Braun, type.
17. " *caryæalbella* Cham., type, Mus. Comp. Zool.
18. " *olivæformis* sp. nov., type, U. S. N. M.
19. " *martiella* sp. nov., type, U. S. N. M.
20. " *gemmea* F. and B., type, Mus. Comp. Zool.
21. " *morrisella* Fitch.
22. " *uhlerella* Fitch.
23. " *robiniella* Clem.
24. " *auronitens* F. and B., type, Mus. Comp. Zool.



EXPLANATION OF PLATE XXII.

1. *Lithocolletis diaphanella* F. and B.
2. " *scudderella* F. and B.
3. " *ledella* Wlsm., type, U. S. N. M.
4. " *salicivorella* Braun, type, coll. W. D. Kearfott.
5. " *deceptusella* Cham., type, Mus. Comp. Zool.
6. " *alnicolella* Wlsm., type, U. S. N. M.
7. " *malimalifoliella* Braun, type.
8. " *cratægella* Clem.
9. " *propinquinella* sp. nov., type.
10. " *incanella* Wlsm., type, U. S. N. M.
11. " *populiella* Cham.
12. " *sexnotella* Cham.
13. " *xeriferella* Clem.
14. " *obsoleta* F. and B., type, Mus. Comp. Zool.
15. " *argentinotella* Clem.
16. " *apicinigrella* sp. nov., cotype, U. S. N. M.
17. " *basistrigella* Clem.
18. " *celtisella* Cham.
19. " *lucetiella* Clem.
20. " *symphoricarpella* Cham.
21. " *ostensackenella* Fitch.
22. " *tritænianella* Cham.
23. " *marixella* Cham.
24. " *tiliacella* Cham.



BRAUN ON LITHOCOLLETIS.



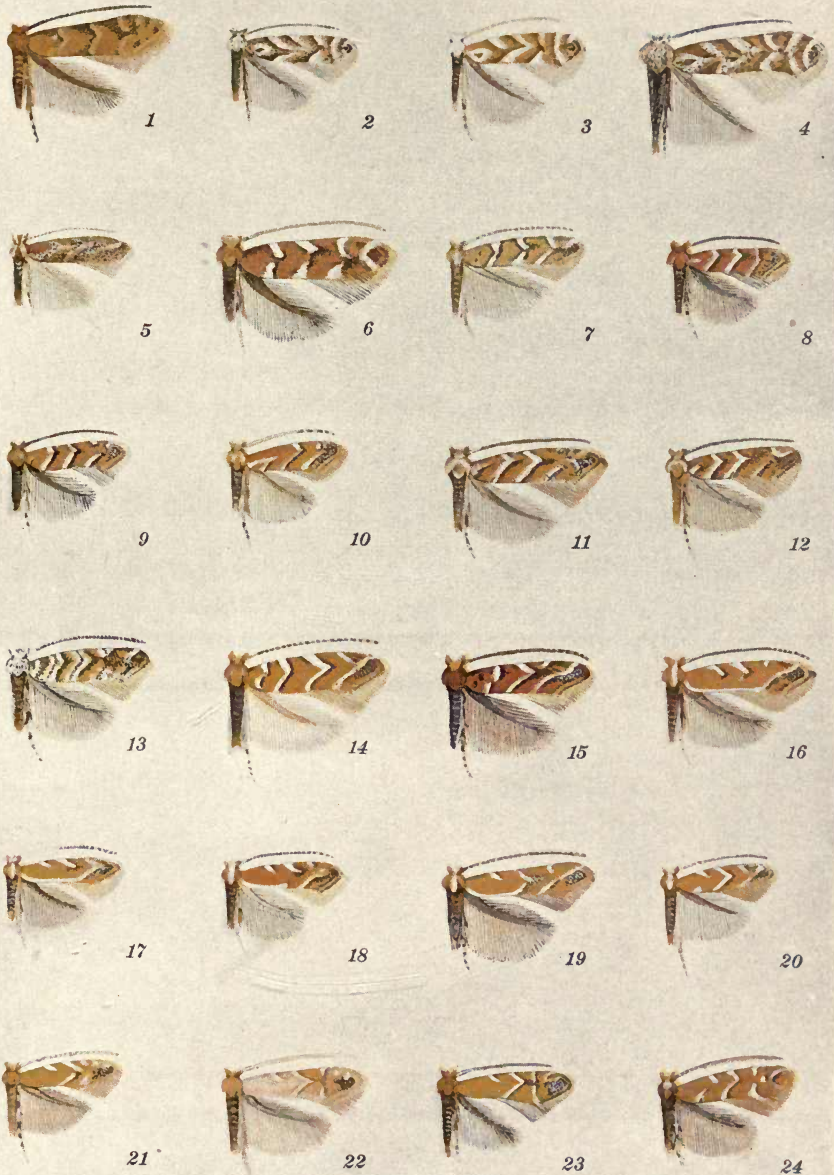
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97. Mr. [Name]	98. Mr. [Name]	99. Mr. [Name]
100. Mr. [Name]		



EXPLANATION OF PLATE XXIII.

1. *Lithocolletis fragilella* F. and B.
2. " *salicifoliella* Clem.
3. " " "
4. " *tremuloidiella* Braun, type.
5. " *celtifoliella* Cham.
6. " *gaultheriella* Wlsm.
7. " *nemoris* Wlsm., type, U. S. N. M.
8. " *caryæfoliella* Clem.
9. " *lentella* sp. nov., cotype.
10. " *saccharella* Braun, type.
11. " *macrocarpella* F. and B.
12. " *cincinnatiella* Cham.
13. " *hamadryadella* Clem.
14. " *umbellulariæ* Wlsm., type, U. S. N. M.
15. " *agrifoliella* Braun, type.
16. " *conglomeratella* Zell.
17. " *ulmella* Cham.
18. " *quercivorella* Cham.
19. " *mediodorsella* sp. nov., type, U. S. N. M.
20. " *australisella* Cham., type, Mus. Comp. Zool.
21. " *chambersella* Wlsm., type, Mus. Comp. Zool.
22. " *cervina* Wlsm., type, U. S. N. M.
23. " *platanoidiella* Braun, type.
24. " *fletcherella* sp. nov., type.

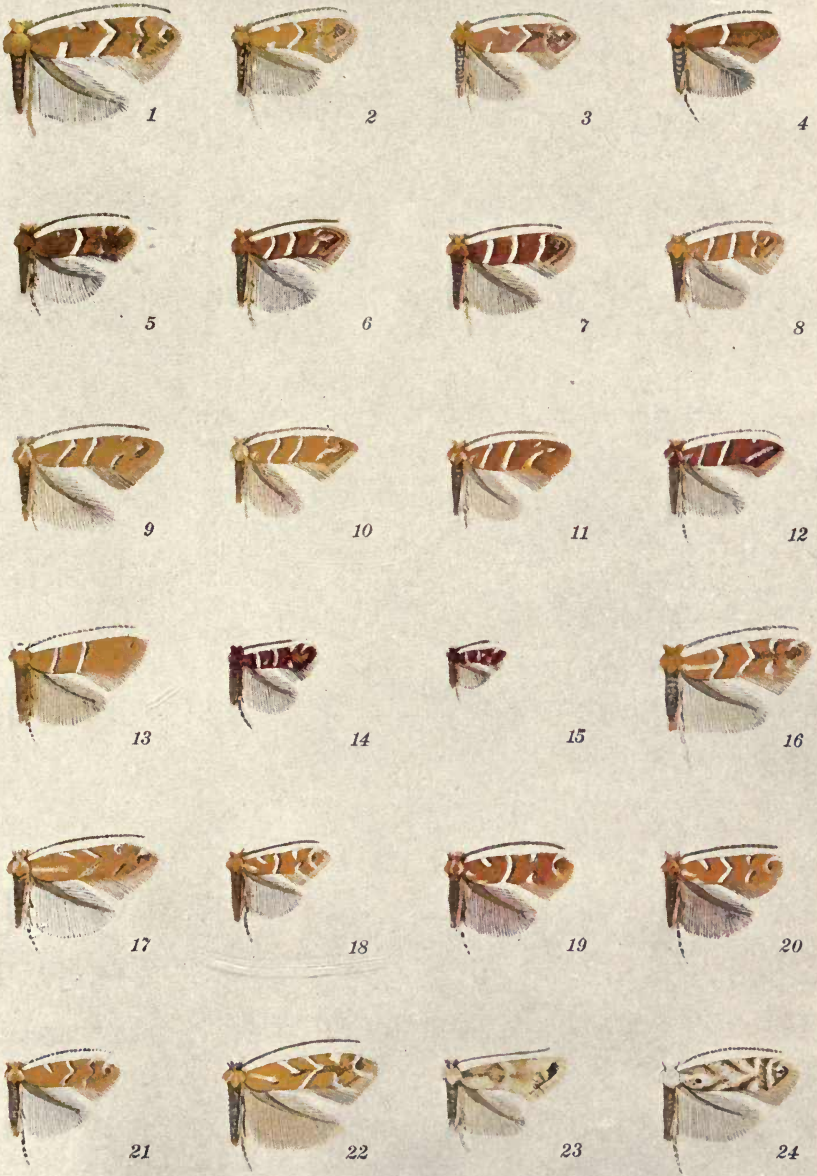


J.F.B.

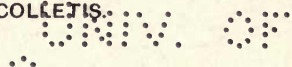


EXPLANATION OF PLATE XXIV.

1. *Lithocolletis arcuella* Braun, type.
2. " *betulivora* Wlsm.
3. " *bethunella* Cham.
4. " *fasciella* Wlsm.
5. " *castaneæella* Cham.
6. " *guttifinitella* Clem.
7. " *obstrictella* Clem.
8. " *corylisella* Cham.
9. " *æsculisella* Cham.
10. " *ostryarella* Cham.
11. " *aceriella* Clem.
12. " *hamameliella* Busek.
13. " *tubiferella* Clem.
14. *Porphyrosela desmodiella* Clem.
15. " " "
16. *Cremastobombycia grindeliella* Wlsm.
17. " *solidaginis* F. and B.
18. " *ambrosiella* Cham.
19. " *ignota* F. and B.
20. " " "
21. " *verbesinella* Busek, type U. S. N. M.
22. " *grindeliella* Wlsm.
23. *Lithocolletis apicinigrella* sp. nov., cotype.
24. " *salicifoliella* Clem. (*atomariella* Zell.).



A.F.B.



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