ON SOME FOREST LEPIDOPTERA WITH DESCRIPTIONS OF NEW SPECIES, LARVAE, AND PUPAE.

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The present paper deals entirely with species in the United States National Museum that have been reared in connection with the forest insect investigations of the Bureau of Entomology, either by the writer at the Eastern Station at Falls Church, Virginia, or by other workers of the Division of Forest Insects at the Pacific Slope Station at Ashland, Oregon. In each case the original collector's name and the "Hopk. U. S." number of the experiment are given. Some thirty-odd forms are treated. From these are erected 1 new genus, 16 new species, and 2 new varieties. Two older species are reduced to the rank of varieties and full larval descriptions are given of 8 species, 6 of which represent genera hitherto undescribed in their immature stages. Five similar pupal descriptions are also given.

The drawings which accompany this paper and which give it special significance were made by Miss Mary Carmody and Miss Eleanor Armstrong of the Bureau of Entomology, under the immediate supervision of the author. It will be noted that, wherever possible, the male genitalia of the type specimen of each new species has been figured. These organs, heretofore so little used in the Microlepidoptera, offer excellent characters for the separation of species, genera, and families and will have to be reckoned with in future attempts at classification in that group.

Family OLETHREUTIDAE.

EVETRIA COLFAXIANA Kearfott.

Evetria colfaxiana Kearfott, Trans. Amer. Ent. Soc., vol. 38, Jan., 1907, p. 3.
Evetria siskiyouana Kearfott, Can. Ent., Mar., 1907.
Evetria taxifoliella Busck, Proc. Ent. Soc. Wash., vol. 16, 1914, p. 146.

This species was originally described by Kearfott from a single specimen collected by Arthur Vachell at Colfax, Placer County, California. Later he described *Evetria siskiyouana* from two collected specimens, one male from Siskiyou County, California, and a male from Oregon.

In 1913 Mr. Josef Brunner of the Bureau of Entomology reared a large series of moths from larvae feeding in the cones of *Pseudotsuga taxifolia* in the neighborhood of Missoula, Montana. These were determined by Mr. Busck as a new species close to, but distinct from, *siskiyouana* Kearfott and described by him under the name *taxifoliella* Busck. Large series of the latter species were also reared by Mr. J. M. Miller from cones of *Pseudotsuga* collected in Oregon, California, and Colorado. *Siskiyouana* Kearfott was also reared in considerable numbers from cones of *Abies concolor*, *Abies shastensis*, and *Abies magnifica* collected in California, Oregon, and Colorado. The California and Oregon specimens of *siskiyouana* agree with Kearfott's type in all details. Similarly the several rearings of moths from *Pseudotsuga* cones in Montana all agree with Busck's type series of *taxifoliella*. In these two forms we have what appear to be two quite distinct species. The California and Oregon *siskiyouana* is nearly twice the size (in adult and pupa) of the Montana *taxifoliella*. The ground color of the fore wings of the latter form is a rich rust brown with only a slight sprinkling of black scales, while in *Siskiyouana* the brown scaling is much paler and limited to a smaller area near the termen and apex of the wing, the ground color is more suffused with black scales and the pale blotches and cross markings a lighter gray white and more sharply defined. In both forms the head and face scales are mixed black and white and the hind wings a smoky brown.

In Oregon and California the *Pseudotsuga* form shows considerable variation from the type. The moths are uniformly larger, about half way between the typical *taxifoliella* and *siskiyouana*. The wings are slightly narrower and the body more slender than those of *siskiyouana* from the same localities. The blotches and cross markings of the fore wings are more extended than in the Montana form and less sharply defined than in the typical *siskiyouana*. The scaling on the face is a uniform pale ochreous and the white scales are absent from the head, also there is much less brown in the ground color than in the Montana *taxifoliella*. The hind wings are smoky brown. This is the form described by Kearfott as *colfaxiana*. I have compared a large series with his type and they agree in all details.

Colorado specimens of both the *Abies* and *Pseudotsuga* moths differ strikingly from the typical forms of *siskiyouana* and *taxifoliella* and also rather markedly from the Oregon and California *colfaxiana*. The hind wings are much paler, the pale spots and cross markings on the fore wings are more extended and run together until the ground color is largely lost and the moths have a decidedly more grayish appearance. The larger moths reared from *Pseudotsuga* are the same size and have the same width of fore wing as the average from *Abies*. They differ slightly in that they have a faint dusting of yellow along the cell that is lacking in the fore wing of those reared from *Abies*. The areas near

the termen and apex are the same color in both, that is, a pale, brownish yellow. The face scalings of the *Pseudotsuga* moths are the same as those of *colfaxiana*, while those of the *Abies* specimens are almost pure white. These differences I am convinced are only superficial and due most probably to the difference in food plant. I have made a careful study of the male genitalia of all the forms from *Pseudotsuga* and *Apies* and find them strikingly alike. The cucullus of the harpes is slightly different in extreme forms of *taxifoliella*, *siskiyouana*, and *colfaxiana* (slightly smaller and more sharply triangonate in the first and third than in *siskiyouana*), but there is less difference between them than between any two males of the typical *siskiyouana*. I am inclined, therefore, to consider them only as local and food plant varieties of one and the same species. Inasmuch as the Colorado variety is different from those of California, Oregon, and Montana and forms such a decided connecting link between the contrasted *Abies* and *Pseudotsuga* specimens, I am proposing for it the following varietal name.

EVETRIA COLFAXIANA COLORADENSIS, new variety.

Plate 1, fig. 2.

Habitat.—Mount Manitou, [type locality] (J. H. Pollock, W. D. Edmonston, G. Hofer, and A. B. Champlain), Cheyenne Canyon, (Edmonston, Pollock, and Hofer), Williams Canyon (W. D. Edmonston), and Garden of the Gods, Colorado (G. Hofer).

Food Plants.—*Abies concolor* and *Pseudotsuga taxifolia*. Male type reared from larvae feeding in cones of *Abies concolor* (Hopk. U. S. No. 14212a) and paratypes from cones of *A. concolor* and *Pseudotsuga taxifolia* (Hopk. U. S. Nos. 12413*a*, 12562*a*, 12563*a*, 12567*a*, 12574*a*, 13283*a*).

Type.—Cat. No. 21797, U.S.N.M. Male genitalia figured.

With the addition of this new variety our amended list of *colfaxiana* varieties will read as follows:

EVETRIA COLFAXIANA COLFAXIANA Kearfott.

Larvae in cones of *Pseudotsuga* (Oregon and California).

EVETRIA COLFAXIANA SISKIYOUANA Kearfott.

Larvae in cones of *Abies* (Oregon and California).

EVETRIA COLFAXIANA COLORADENSIS, new variety.

Larvae in cones of *Pseudotsuga* and *Abies* (Colorado).

EVETRIA COLFAXIANA TAXIFOLIELLA Busck.

Larvae in cones of *Pseudotsuga* (Montana).

EVETRIA ULTERIORANA, new species.

Plate 1, fig. 1.

Labial palpi ashy grey brown, darker above. Antennae greyish brown. Face, head, and thorax brownish dusted with ashy grey.

Forewings a rich dark velvety brown with iridescent grey cross markings between which lie patches and streaks of black scaling; a straight, ill-defined, fairly broad band near base; an angular, narrower, better defined band just beyond basal third and with the apex of the angle pointed toward the termen; just beyond this a straight band from costa to dorsum slanting in the direction of tornus; beyond these on apical half of costa four short dashes of white scales fading out in iridescent grey a short distance from costa; the costal edge of the second and third fascia are also white scaled; an oval ring of iridescent grey scales on tornus; a fine black line along termen; cilia brown. Hind wings dark brown; a dull black line at base of cilia; cilia beyond silver grey. Underside of abdomen and legs brown, sprinkled and marked with silver grey. Underside of hind wings shining brownish grey; underside of forewings slightly darker. Male genitalia of type as figured; extremely close to that of the typical *taxifoliella* Busck; the triangonation of the cucullus is a trifle blunter and the socii are rounder at the tips than those of any of the *colfaxiana* varities. Alar expanse, 13-14 mm.

Habitat.—Waldo [type locality] and Ashland, Oregon. (Sergent and Keen.)

Food plant.—Pseudotsuga taxifolia.

Reared from cones under Hopk. U. S. Nos. 12547*a*, 12547*aa*, 13209*aa*–5.

Type.—Cat. No. 21798 U.S.N.M.

Several of these moths have been reared at the Pacific Slope Station at Ashland, Oregon of the Division of Forest Insects with different lots of *Evetria colfaxiana colfaxiana*, the moths issuing at the the same time and under the same conditions. I have hesitated a long time in naming the species for it is very possible it may be only an extreme variety of *colfaxiana*. The fact, however, that it is not geographically separable or distinguishable by food plant from the other varieties coupled with its distinctly different color scheme and general appearance forbid its being placed as a variety under *colfaxiana* unless it can be proven to be such.

EVETRIA LUCULENTANA, new species.

Plate 1, fig. 3.

Palpi, face, head, and thorax creamy white. Forewings creamy white overlaid with golden brown, with a thin sprinkling of black scales, and cross marked by several narrow, interrupted fasciae of shining steely blue; the white color predominating in the middle of the wing where it forms a broad, poorly defined fascia edged by metallic steel blue scales; on the outer half of the wing the white color is limited to four costal streaks, the first, third, and fourth very short, the second extending as a faint line nearly across the wing;

predominating color of the wing on outer half, a light golden brown; cilia black at base, paler beyond and shading again to black at extremeties. Hind wings pale, smoky brown; underside lighter with small patches of brown scales at apex and a thin interrupted line of brown scales along termen; cilia grey. Fore and mid tibiae and tarsi white, banded and dusted with blackish brown; hind legs white with a few scattered brown scales on tarsi. Abdomen greyish white. Male genitalia of type figured. Alar expanse, 16-17 mm.

Habitat.—El Paso County, Colorado, (W. D. Edmonston) [type locality] and Palmer Park, Colorado (J. H. Pollock).

Food plant.—Pinus scopulorum. Three moths reared under Hopk. U. S. Nos. 10764*a* and 13931*d* from larvae inhabiting pitch nodules and feeding on terminals of branches. Moths issued May 5, 8 and 25, 1916.

Type.—Cat. No. 21799, U.S.N.M.

This species is very close to *E. metallica* Busck but easily distinguished by its lighter and more brilliant coloring. The tegumen and basal half of the harpes of the male genitalia are also somewhat broader than in *metallica.*

EVETRIA ALBICAPITANA ARIZONENSIS, new variety.

Plate 1, fig. 4.

From a number of cuttings of *Pinus cembroides* from the Santa Catalina Mountains, Arizona, infested by nests of a *Tetralopha* species were also reared two specimens of a nodule-making *Evetria* which I at first thought were *E. albicapitana* Busck. A careful study of the genitalia, however, shows a rather consistent difference between the two forms in the shape of the harps. The typical *albicapitana* has the costa almost straight to the tip of the cucullus while in the Arizona specimen it is distinctly concaved (figs. 4 and 5). The Arizona specimens are also smaller than the smallest specimen we have of the true *albicapitana.* The head and face is pale rust color rather than white, and the ground color of the forewings is pale rusty brown; lacking the rich dark reddish brown tinge of the typical *albicapitana.* Otherwise the two forms are identical. While such differences are hardly sufficient in this group to justify the erection of a new species, especially as we have such scanty material from Arizona and are by no means certain as to the range of *albicapitana* (we have it so far only from Canada, Wisconsin, Montana, and Idaho), they do compel at least a varietal differentiation for the Arizona form.

Habitat.—Santa Catalina Mountains, Arizona. (G. Hofer.)

Food Plant.—Pinus cembroides. Two moths reared June 20 and 23, 1917, under Hopk. U. S. No. 13977 from larvae mining the branches.

Type.—Cat. No. 21800, U.S.N.M. Male genitalia of type figured.

EUCOSMA RESCISSORIANA, new species.

Plate 1, fig. 7.

Palpi cream yellow, heavily dusted with black on the outer sides; terminal joint black. Lower parts of face black dusted, the slightly projecting facial tuft and head cream yellow, the head tuft slightly tinged with light rust red on the sides. Antennae narrowly banded with black above, basal joint rust red. Thorax dark rust red on forward part, heavily dusted with silver grey scales behind. Ground color of forewings rich, dark, brick red, with a faint sprinkling of black scales; a narrow, indistinct fascia of silver grey scales near base; at the basal third a distinct, moderately broad, slightly angulate fascia of orange yellow bordered within and without by a thin line of white and silver scales; a similarly marked but narrower fascia running from apical third of costa to tornus, slightly irregular and broadening out at tornus; two short geminate costal streaks of yellow, bordered with white and silver scales between the outer fascia and apex; a similar patch on costa between the two large fasciae, and two faint white streaks on the male costal fold between the basal and submedian fasciae; on middle of termen a faint orange yellow patch margined internally with silver scales; costal fold of male narrow, appressed, reaching nearly to middle of costa; cilia smoky black with two distinct white streaks opposite the patch on termen and with a fainter, narrower white streak at tornus. Hind wings dark smoky; cilia paler with a narrow dark band at base. Male genitalia of type figured. Alar expanse, 23 mm.

Habitat.—Sprague River, Oregon. (P. D. Sergent.)

Food Plant.—Pinus murrayana. Moth reared (under Hopk. U. S. No. 13250*d*) from larva feeding in cones on scales and seeds. Moth issued May 30, 1914.

Type.—Cat. No. 21801, U.S.N.M.

Close to *Eucosma bobana* Kearfott, but readily distinguished from the latter by color markings and male genitalia.

EUCOSMA MONITORANA, new species.

Plate 1, fig. 6.

Palpi white, well dusted with black scales; terminal joint white, broadly banded with black. Head and face cream yellow. Thorax rust red; extremities of patagia and posterior of thorax tipped with black scales. Ground color of forewing rust red, darkest on basal fourth, which is faintly cross marked by two ill-defined streaks of black and silvery scales; a broad irregularly emarginate fascia of cream yellow and white scales from just before middle of costa to

middle of dorsum; beyond this a narrower band of similar coloration extending from outer one-third of costa to tornus, widest at costa and narrowing toward tornus; two small patches of the red ground color on costal edge of the outer fascia; a short geminate white dash on costa just before apex; cilia smoky gray with a narrow black line at base; costal fold of male narrow, long, extending to middle of wing. Hind wings smoky gray brown, almost black at apex, paler on the underside; cilia pale with a dark sub-basal line. Abdomen smoky gray above. Underside of legs and abdomen a dark pepper-and-salt sprinkling of black and white scales. Underside of forewings dull smoky brown. Male genitalia of type figured. Alar expanse 13–16 mm.

Habitat.—Danville, Pennsylvania [type locality] (A. B. Champlain). Falls Church, Virginia (C. Heinrich).

Food plant.—*Pinus*, species. Larvae bore in cones.

Type.—Cat. No. 21802, U.S.N.M.

Seven specimens were reared by the writer (under Hopk. U. S. No. 13908d) from infested pine cones collected at Danville, Pennsylvania, by Mr. A. B. Champlain, of the Bureau of Entomology. All the moths issued between May 4 and 9, 1916. There is also a single collected moth in the United States National Museum taken flying by the author on May 6, 1914, and one labeled in Mr. Pergande's handwriting "*Retinia* on *P. inops*, Va. issued May 28, 1885."

The species is close to, but easily distinguished from, *rescissoriana*, from which it differs in size and color markings, in the size of the harpes and tegumen of the male genitalia, and in the shape of the aedoeagus.

EUCOSMA TOCULLIONANA, new species.

Plate 2, fig. 8.

Palpi ocherous dusted with black scales. Head and face ocherous. Fore part of thorax yellow brown; on the caudal half of thorax and patagia the scales are smoky black tipped with white. Antennae smoky black above, gray beneath. Ground color of forewings yellow brown well dusted with black scales; pattern as in *monitorana* except that the fasciae are ocherous, narrowly bordered with gray-white and the median fascia is much narrower; costal fold of male long, moderately narrow, extending slightly over half the length of costa. Cilia smoky gray. Hind wings dark smoky brown, evenly colored; underside only slightly paler; cilia as in *monitorana*. Underside of abdomen, mid femora, hind femora, and tibiae grayish white; mid tibiae mid tarsi, and hind tarsi black ringed with grayish white. Male genitalia of type figured. Alar expanse, 13–15 mm.

Habitat.—Lyme, Connecticut (A. B. Champlain).

Food plant.—*Picea.*

Five moths reared by the writer (under Hopk. U. S. No. 13921a) from larvae boring in cones, moths issuing late in May, 1916.

Type.—Cat. No. 21803 U.S.N.M.

This species is very close to *monitorana* but is readily distinguished by the ocherous rather than yellowish white cross markings on the forewings, by the narrower median fascia, and the more uniformly dark hind wings. There are also appreciable differences in the male genitalia. In *monitorana* the cucullus of the harpes is more narrowly elongate and the shoulder of the tegumen is slightly broader than in *tocullionana*.

LASPEYRESIA PALLIDIBASALIS, new species.

Plate 2, figs. 9–10.

Palpi and face very pale ocherous. Head and thorax pale grayish drab. Forewings with the basal patch grayish drab, outwardly angulate on middle but not sharply outlined, merging gradually into the deeper lustrous brown ground color of the rest of the wing; five white geminate costal dashes, the first and longest just before middle, each divided by a central dark brown line and terminating in a patch or short line of metallic scales; the costal areas between the dashes darker brown than the rest of the wing; from middle of dorsum a conspicuous white geminate dash partially divided by a faint brown line; this angulate patch nearly meeting the first costal dash, with it forming a broken, outwardly angulated fascia just beyond the gray limits of the basal patch; ocellus a patch of whitish ocherous bordered on inner and outer sides by a vertical bar of metallic scales and containing 4 or 5 longitudinal black lines; a shading of black scales just behind the inner vertical bar of ocellus; cilia shining bronzy brown with a velvety black basal line. Hind wings dark lustrous brown; cilia paler with a dark brown subbasil line. Male genitalia of type figured. Alar expanse, 11–14 mm.

Habitat.—Kaolin Beds, Oregon (Sergent and Patterson, type locality), Colestin, Oregon (P. D. Sergent), Long's Ranch, Oregon (F. P. Keen), Cheyenne Mountain, Oregon (J. H. Pollock), and Quincy, California (F. P. Keen).

Food plant.—Abies concolor. Moths reared in large series from larvae feeding on seeds in cones (Hop. U. S. Nos. 12538*d*–2, 12560*c*, 13263*i*, 13290*c*, 14201*b*). Moths issued during June, August, and September.

Type.—Cat. No. 21804, U.S.N.M.

This species is very close to *bracteatana* Fernald from which it is separable by its habitat, larger size, and by differences in the male genitalia. The latter are larger and the emargination at the anal angles of the harps deeper in *pallidibasalis* than in *bracteatana*.

Family PHALONIIDAE.

COMMOPHILA INFERNALIS, new species.

Plate 2, figs. 11, 13.

Palpi projecting *no more* than *twice* the length of the head beyond it, white shading to creamy white. Antennae grayish white. Face and head white shading to creamy white. Thorax creamy white, the posterior two-thirds overlaid with dull metallic gray scales. Forewings creamy white (almost yellow) with cross markings of metallic gray edged with brown and black scales; to the naked eye these cross markings are a nearly uniform olivaceous hue; a broad outwardly angulate basal patch of the dark scaling; an irregular median fascia of the same color, broadest at the costa, and greatly constricted at the upper margin of the cell; from outer fourth a similarly colored cuneiform band extending nearly to tornus and divided on costa by a patch of creamy white; the white areas of the wing faintly lined and mottled with gray; cilia yellowish white. Under side of forewings pale, shining, grayish, faintly mottled with darker metallic gray. Hind wings shining, grayish white, mottled throughout with pale fuscous; cilia whitish fuscous. Legs white, fore and middle pair heavily dusted with grayish fuscous on the outer sides. Alar expanse: 10-15 mm. Male genitalia of type figured.

Habitat.—Hell Canyon, Manzano National Forest, New Mexico. (Heinrich.)

Food Plant.—Sabina scopulorum ("The Cedro").

A good series of moths reared under Hopk. U. S. No. 13967*a* from larvae feeding in the berries. Larvae collected September 14, 1916. Moths issued May to August, 1917.

Type.—Cat. No. 21805, U.S.N.M.

Very close to *macrocarpana* Walsingham. The two species have practically the same pattern and coloration, but differ in size, length of palpi, color on under side of fore wings and male genitalia. *C. infernalis* is smaller, has shorter palps and is paler on the under surface of the forewings, has a stouter aedoeagus and longer stronger spines (cornuti) on the penis than *macrocarpana*. The genitalia differences are shown in figures 12–13.

The larva is white and unmarked. Legs white, tubercles and spiracles unpigmented; body hairs white; abdominal crochets weak, pale yellowish brown, 7-8; thoracic shield only slightly more yellowish than body with an irregularly triangular fuscous shading on caudal margin on each side of the broad white median line; anal shield very pale yellow. Head pale yellow; a darker patch in ocellar region; endoskeletal ridges, antennal ring of epicranium, and mandibles brown; triangular plates of hypostoma dark smoky

fuscous; ocellar pigment defining and under each ocellus, black. Length of full grown larva, 6 mm, 1-1.2 mm. wide at middle of abdomen.

Family GELECHIIDAE.

GELECHIA PERICULELLA Busck.

Plate 3, figs. 14, 15.

Gelechia periculella Busck, Proc. Ent. Soc. Wash., vol. 11, p. 178, 1909.

Until recently this species has been represented only by the unique type in the United States National Museum collection. In 1915, however, Mr. Miller of the Pacific Slope Station at Ashland, Oregon, of the Branch of Forest insects reared several moths from larvae feeding in the cones of *Pinus ponderosa* (Hopk. U. S. No. 12534*e*-2) and *Pseudotsuga taxifolia* (Hopk. U. S. No. 13209*z*) collected at Ashland, Oregon, by Messrs, Sergent and Keen. Busck's specimen is a male, unfortunately without an abdomen, collected at Humboldt County, California, in July, and has an expanse of 22 mm. The Oregon specimens average a little smaller (15 to 18 mm.). Otherwise they agree with the type and I believe they are the same species. Mr. Busck has also examined them and verifies my determination. The genitalia of the male is shown in figures 14 and 15.

GELECHIA NATALIS, new species.

Plate 4, figs. 23, 24.

Palpi white sprinkled with grayish blue; base of second joint greyish blue; brush well developed, white, with a sprinkling of blue tipped scales; terminal joint grayish blue more or less speckled with white. Face, head, thorax, and forewings white scaled with the tips of the scales bluish, giving the entire insect a grey blue color of varying intensity in different specimens. Costa of forewings in most specimens near the base lighter than the rest of the wing; a faint streak of dark scaling on basal fourth of costa; a similar spot on outer third of costa; near base of cell before middle a faint dark streak, and two dark spots in the cell on its outer costal margin, there often fusing and forming a single short, indistinct, longitudinal streak; in most specimens a narrow, faint, white, outwardly angulate fascia from just beyond outer third of costa to tornus; on outer margin of wing at base of cilia 6 or 7 faint dark dots; cilia bluish gray, slightly paler than the wings. Hind wings pale, a trifle smoky toward apex and along the veins; cilia concolorous. Legs heavily dusted with darker scales on the outer sides, grayish white on the inner. Male genitalia of type as figured; harpes divided, weakly chitinized, costa produced into a narrow, moderately long, free arm, rest of harpe greatly reduced; aedoeagus thick and heavily chitinized, tibular at base only terminal two-thirds produced into

three long, stout prongs, the two lower ones longer than the upper one. Alar expanse: 17-20 mm.

Habitat.—Waldo Canyon, Colorado [type locality] (J. H. Pollock) Monument Park Colorado (G. G. Hedgcock), and Ashland, Oregon (P. D. Sergent).

Food Plant.—Razoumofskya cryptopoda.

A good series of moths reared under Hopk. U. S. Nos. 12187, 12187*d*, 12515*a*2, and 13942*q* from larvae feeding on the mistletoe on *Pinus ponderosa* and *Pseudotsuga taxifolia*. Moths issued during April, June, and August.

Type.—Cat. No. 21806, U.S.N.M.

A large slate-colored species in general appearance near *trilineella* Chambers, easily identified by its peculiar aedoeagus. In the genus *Gelechia* this organ is most elaborately developed and offers very good characters for the separation and identification of species.

The larva is sordid white with a faint indication of pink along the dorsum. Legs yellow with chitinized area of coxal lobes smoky fuscous; abdominal crochets 30–32, yellowish brown (unevenly biordinal and in a complete circle); thoracic shield pale yellow or (in some specimens) brownish yellow, narrowly bordered along caudal margin with smoky fuscous, median line straight, sharp, narrow, white; anal shield pale yellow or brownish yellow with a rather large, triangular, smoky fuscous patch at each anterior lateral angle; tubercles rather broadly chitinized, smoky fuscous; body hairs yellowish white; spiracles brown. Head yellow, pale in some specimens, somewhat darker in others; posterior margins and endoskeletal ridges brown; mandibles amber brown, their fossae almost black; ocellar pigment nearly continuous, contained well within the ring of the ocelli and easily distinguished from the white lenses. Length of full grown larvae 15 mm.; 1.5 mm. wide at mesothorax.

GELECHIA NEGUNDELLA, new species.

Plate 3, figs. 17–18.

Antennae light ochreous fuscous, dusted with blackish fuscous; basal joint covered all but the tip by the darker scaling; extremities of all joints narrowly banded with black. Palpi grayish ochreous on inner and upper surfaces; blackish fuscous beneath. Face, head, and thorax light ochreous fuscous; a few blackish fuscous scales on the sides of the face and a rather heavy dusting of similar scales on the thorax. Fore wings dull ochreous fuscous spotted with black; a small black sub-costal dot at base of wing; from basial third of costa a small black dash; below and beyond this and occupying about the middle of the cell a broad ill-defined patch of blackish scales; on middle of costa a more or less obscure shading of black scales; just before apical third of costa a black dash, and below it, extending to

dorsum, an irregular, ill-defined black line, making with the black dash on costa a broken, inwardly angulate fascia; a faint dusting of black scales near outer margin of wing; cilia pale ochreous fuscous, about same color as the head scales. Hind wings as broad as fore wings; very pale, semitransparent, whitish fuscous; cilia concolorous. Abdomen whitish ochreous, faintly marked with black above, whitish below. Legs pale grayish fuscous, heavily dusted with black; tarsi banded with black. Male genitalia of type figured. Alar expanse 12 mm.

Habitat.—Barton, North Dakota. (M. S. Sudvagen.)

Food Plant.—*Acer negundo.* Three moths reared (under Hopk. U. S. No. 9905*f*–2) from larvae tying the leaves.

Type.—Cat. No. 21807, U.S.N.M.

An inconspicuous species of the *maculimarginella* group very close to *nigrimaculella* Busck. It lacks the white markings on the fore wings of typical specimens of that species; but as these are also absent from other eastern specimens of *nigrimaculella*, the two species are not readily distinguishable in color or markings. The shape of the uncus of the male genitalia of the new species, however, is strikingly different from that of any of the varieties of Busck's species and readily separates the two. In *negundella* it is bluntly arrow-shaped, while in *nigrimaculella* it is roundly oval (figs. 16–17, pl. 3). The entire genital apparatus is also somewhat larger and stouter in the Dakota species.

The larva is pale yellowish white, entirely unmarked. Legs, abdominal crochets, thoracic shield and other chitinized parts pale; tubercles small, pale, obscure; body hairs pale. Head light lemon yellow, pigmentation of ocellar area black, continuous; mouth parts pale except mandibles which are brown along the margins and anterior region of mentum which is a dark brown. Length full grown larva: 12 to 12.5 mm.

RECURVARIA QUERCIVORELLA Chambers.

Plate 5, figs. 25–26.

Recurvaria quercivorella DYAR, List N. A. Lep. No. 5692.

A large male of this species reared from oak (Hopk. U. S. No. 13965*h*–2). Larva collected by the writer in Hell Canyon, Manzano National Forest, New Mexico, September 12, 1916. Moth issued April 24, 1917. It is a very large specimen (17 mm.) for this species and for this reason, as well as on account of the locality, I should hesitate to include it under Chambers' name were it not for the fact that it agrees perfectly in all characters of the male genitalia with the typical eastern form.

RECURVARIA MOREONELLA, new species.

Plate 5, figs. 27, 28, 29.

Antennae grayish fuscous, banded with black above. Palpi white overlaid with black; second joint black except for a white streak along the upper inner side and a ring of white scales at extremity; terminal joint white with a broad black band near base and another near the tip. Face white, with a narrow border of black scales on either side. Head white with admixture of blackish scales. Thorax and fore wings white densely overlaid with black. On basal third of fore wing below the cell a short sinuate, longitudinal line of black scales; beneath this a small raised patch of white scales; another small black patch on outer third of dorsum; above this and extending from the end of the sub-basal black streak to middle of terminal third of wing and terminating in a short hook to dorsum a narrow irregular line of white scales; a faint shading of black scales near tornus; along apical third of costal fourth, and along termen, three black dots inwardly edged with white; cilia dark grayish fuscous. Hind wings smoky fuscous; cilia slightly paler. Legs black with tibial and tarsal extremities white, except hind tibiae which are white with large patches of blackish scales. Alar expanse: 13.5 mm. Male genitalia of type figured.

Habitat.—Cheyenne Mountain, Colorado. (G. Hofer.)

Food Plant.—Pinus scopulorum. A single male reared under Hopk. U. S. No. 13957b–2. Moth issued July 7, 1916. Habits of the larva not noted, probably a needle miner.

Type.—Cat. No. 21808, U.S.N.M.

Close to *Recurvaria milleri* Busck but readily distinguished by its much darker color. It differs also in characters of the male genitalia. In *milleri* the caudo-lateral projections of the tegumen are greatly reduced while in *moreonella* they are conspicuously developed. Otherwise these organs are much the same in both species.

TOSCA, new genus.

Plate 4, figs. 19–21; plate 7, fig. 35; plate 8, figs. 43–46.

Type of the genus.—Tosca Plutonella, new species.

Moth.—Antennae simple. Labial palpi ascending, long, slender; second joint only slightly thickened with rough scales beneath; terminal joint pointed, as long as second joint. Fore wings elongate, pointed; 11 veins, 7 and 8 out of 6, 4 and 5 united, cell somewhat constricted between 5 and 6. Hind wings narrower than fore wings, trapezoidal, apex produced, pointed, termen sinuate; 6 veins, 3 and 4 separate, 5 and 6 absent, 2 and 7 weak, cell open between 4 and 7. (pl. 4, fig. 21).

Male genitalia (pl. 4, figs. 19–20) with 8th abdominal segment developed into a hoodlike covering for the clasping organs; uncus developed, short and broadly spatulate; arms of gnathos fusing into a single strong hook; sicae symmetrical projecting backward from vinculum as far as the tip of the aedoeagus; harpes symmetrical, simple, narrow, elongate, needlelike, slightly curved; aedoeagus fairly long, tubular, tapering, somewhat curved, moderately stout.

Larva (pl. 7, fig. 35; pl. 8, figs. 43, 44, 45, 46). Subcylindrical. Legs and prolegs normal. Crochets unevenly biordinal and in a complete circle, weak on the outer side. No anal fork. Prothoracic shield moderately broad, divided. No mesothoracic or metathoracic shields. Spiracles minute, round; prothoracic and 8th abdominal spiracle somewhat larger than those on abdominal segments 1 to 7. Body setae normal; tubercles small, inconpicuous; setae *III* of 8th abdominal segment directly in front of the spiracle; *IIb* of prothorax closer to *IIa* than *IIa* is to *Ia;* puncture *z* approximate to *Ib*, below the level of *IIb*.

Head capsule flattened, subspherical, square in outline viewed from above, as wide as long; greatest width at middle of head; incision of dorsal hind margin less than one-third the width of the head; distance between dorsal extremities of hind margin nearly one-half the width of the head. Front longer than wide, reaching to incision of dorsal hind margin, pentagonal in outline; adfrontal ridges (*ADFR*) straight and parallel from lower limits of epistoma to points of juncture of tentorial arms thence converging in straight lines to incision of hind margin; points of juncture of tentorial arms at middle of adfrontal ridges; adfrontal areas of frons appreciable, broadest toward the dorsal hind margin.

Ocelli six; *I, II, V,* and *VI* arranged in a parallelogram; *III* and *IV* nearly in a straight line with *II* and *V; I* and *III* larger than the rest.

Epistoma normal.

Frontal punctures (*Fa*) close together well forward of frontal setae (*F1*); adfrontal setae (*Adf1* and *Adf2*) approximate, distance separating *Adf1* and *Adf2* less than distance from *Adf1* to *F1;* adfrontal puncture (*Adfa*) behind *Adf2*.

Epicranium with the normal number of primary setae and punctures. Anterior setae (*A1, A2, A3*) in almost a straight line with lateral seta (*L1*); *L1* approximate to *A3* anterior of the level of *P1;* anterior puncture (*Aa*) directly posterior of *A2;* posterior setae (*P1* and *P2*) situated near middle of head, on a level respectively with *Adf1* and *Adf2; P2* posterior-laterad of and closely approximate to *P1;* puncture *Pa* between *L1* and *P1* nearer the former than the latter; *Pb* midway between *P2* and adfrontal suture; *Pa, P2, Pb,* and *Adfa* lying nearly in a straight line; lateral puncture (*La*) poste-

rior of the seta (*L1*), remote, on a level with incision of dorsal hind margin. Ocellar setae well separated; *O1* equidistant from and ventrad to Ocelli *II* and *III; O2* closely approximate and directly ventrad to Ocellus *I; O3* ventrad to *O2*, remote, equidistant from *O2* and hypostomal ridge; puncture *Oa* obscure, nearly obsolete, approximate and posterior to Ocellus *VI*. Subocellar setae triangular placed; *SO2* and *SO3* closely approximate; puncture *SOa* anterior to and equidistant from *SO2* and *SO3*. Genal seta (*G1*) and puncture (*Ga*) situated on middle of the ventral surface of the epicranium, well separated; seta anterior to the puncture.

Labrum with anterior and lateral margins evenly rounded, median incision broadly triangular but shallow. Seta *M1*, *M2*, and *M3* triangularly placed; *M2* postero-laterad of *M1; M1* and *M2* on a line respectively with *La2* and *La1; M3* and *La3* on a line just behind the anterior margin of the labrum; distance separating them less than that between *La2* and *La3* or *M1* and *M3*.

Epipharyngeal shield conspicuous and sharply defined; rather large; nearly a perfect rectangle, slightly rounded posteriorly. Epipharyngeal setae closely approximate; triangularly grouped near anterior margin of epipharynx; long, pointed, moderately broad.

Maxillulae normal.

Larval habits.—Leaf-miner throughout feeding period; frass voided outside the mine.

This genus is close to and derived from *Recurvaria*. In a great many of the species now listed under the latter genus veins 5 and 6 of the hind wings are weak. In *R. elachistella* Busck they are both absent. But all have 2 and 7 of hind wing strong and the forewing wider at the end of the cell and the cell itself unconstricted between 5 and 6. *Evippe pollostella* Busck (also very probably a leaf miner) belongs in Tosca on venational characters and will probably have to be referred there although the male genitalia differ in one striking detail; in *pollostella* the harps are entirely lacking. The genus *Evippe* itself should be limited to those species having both 4 and 5 of forewings present and connate or stalked.

The new genus differs from *Recurvaria* most strikingly in the larva, the diagnostic characters of which are the close approximation of setae *P1* and *P2*, the position of puncture *Adfa* behind *Adf2* rather than between it and *Adf1*, the linear Tortricid-like arrangement of setae *A1*, *A2*, *A3*, and *L1* and the pentagonal frons reaching to the incision of the dorsal hind margin. *Nealyda*, another leaf-mining Gelechiid genus, has a similar frons and also an even more flattened head but the setal arrangement is quite different. *Tosca* differs from *Recurvaria* also in an important genitalic character. In *Recurvaria* the harps are consistently and strikingly assymmetrical as are also the postero-lateral projections (or flaps) of the tegumen whenever

they are developed. In *Tosca*, on the other hand, the genitalia are symmetrical throughout. In most other respects the organs are similar in the two genera. *Evippe* has the harps symmetrical but the general structure of the genitalia is more like that of some species of *Gelechia*. *E. prunifoliella* Chambers (the type of the genus) has the gnathos developed into a long narrow mandibulate hook (pl. 4, fig. 22) with its two elements opening like a pair of ice tongs and apparently functioning as an uncus, although the uncus proper is also present and rather well developed. The latter is similar in shape to that of *Gelechia negundella* but somewhat longer and stronger.

TOSCA PLUTONELLA, new species.

Plate 4, figs. 19–21; plate 8, fig. 46.

Palpi white; a few black scales on under side of second joint; on terminal joint two narrow black bands. Antennae white, irregularly but strongly marked with black. Face, head, thorax, and forewings white, rather densely dusted with black and blackish fuscous scales. On forewing three conspicuous sub-dorsal black dots; one on vein *Ib* at basal fourth, another on vein *Ib* beyond basal third, and the third at anal angle of the cell; on the middle of the cell and near middle of costa the black scaling is also more pronounced but does not form definite spots or other markings; cilia greyish white. Hind wings pale whitish fuscous, a trifle darker toward apex; cilia concolorous; in the male on the upper side of wing along vein *Ib* a tuft of yellow hair-like scales, closely appressed and not protruding beyond the dorsal margin of the wing. Abdomen silvery white. Legs white, heavily dusted with black; tarsi white banded with black. Male genitalia of type figured. Alar expanse, 8mm.

Habitat.—Hell Canyon, Manzano National Forest, New Mexico. (Heinrich.)

Food Plant.—Prunus.

Type.—Cat. No. 21809, U.S.N.M.

Two moths (male and female) reared under Hopk. U. S. No. 13968 June 4 and 13, 1917, from material collected September 16, 1916. The larvae are leaf-miners in the wild cherry for their entire feeding period. The mine is irregular and somewhat similar to that of a *Parectopa*, with several branching galleries. It begins along the midrib and sometimes develops into considerable of a blotch, but normally is more or less linear and digitate. At the end against the midrib is a hole from which the larva discharges its frass (no frass is left in the mine) and adjacent to this hole along the midrib is a fine silken web under which the larva retires when not feeding.

Larva full grown about 6 mm. long. Body yellowish white faintly tinged with pink on dorsal surface; legs pale; crochets light brown, 16–20; thoractic shield divided by a pale median longitudinal line

broadening caudally, smoky brown on dorsum, growing paler on sides until it is same color as the body of the larva; other chitinized areas not pigmented, tubercles weak, uncolored; hairs short and whitish; spiracles minute, uncolored. Head dark brown, almost black on dorsal surface; ventral side yellow; mandibles brown, black at the tips; labrum dark smoky brown, almost black; ocellar pigment continuous, black.

Family BLASTOBASIDAE.

EUBOLEPIA GARGANTUELLA, new species.

Plate 6, fig. 34.

Palpi whitish gray sprinkled with dark fuscous; under side of second joint near base almost black. Antennae gray; pecten of basal joint yellowish. Face gray sprinkled with fuscous. Head black with a few grayish scales toward sides. Thorax grayish with black shadings on the forward part. Fore wings gray faintly dusted with fuscous, giving them a pale slate colored appearance; near the extreme base of the wing behind the basal tuft an indistinct black cross band, broadest on dorsum; at the middle of the wing from just below the costa, extending diagonally to the middle of the cell, a peculiar and conspicuous, constricted, trident shaped, black marking; near the apex of the cell a black spot; in some specimens a line of 3 or 4 black dots on apical fifth of costa; 3 or 4 similar dots on termen; cilia bluish gray shading to grayish ochreous. Hind wings smoky grayish fuscous; cilia slightly paler. Abdomen grayish fuscous above; under side grayish. Legs grayish, more or less marked with black; trocanter of forelegs black-scaled at outer extremity only; fore and mid femora heavily black-scaled; fore and mid tibiae banded on the outer sides with black; hind tibia grayish with a patch of black scales at base. Male genitalia of type figured. Alar expanse, 17–25 mm.

Habitat.—Brush Corral, Arizona. (Edmonston and Hofer.)

Food plant.—*Quercus*, species. Moths reared under Hopk. U. S. No. 12182 from larvae boring in large woody cynipid galls on branches of twigs of white oak. Moths issued during latter part of April and early in May, 1915.

Type.—Cat. No. 21810, U.S.N.M.

A very striking species easily recognized by the black trident shaped marking on fore wing. It is quite different from *anomalella* Dietz—the only other species listed under this genus. The male has the antennae deeply notched above the basal joint. Fortunately, though the male genitalia of the Blastobasidae are nearly uniform in size and structure, they offer reliable characters for the ready separation of species.

The larva is sordid white with the entire dorsum of the body smoke colored; ventral and lateral sides of prothorax and intersegmental

skin between head and prothorax dark smoke color, almost black. Legs yellow; abdominal crochets brownish yellow, 52–54 (triordinal and in a complete circle); thoracic shield orange yellow, a trifle darker along the caudal, lateral, and cephalic edges; tubercles brown surrounded by small but conspicuous, smoky fuscous chitinizations; tubercle III of abdominal segments 1 to 8 surrounded by a circular white area, this in turn partially surrounded by a rather wide chitinized smoky fuscous ring, broken on its dorsal margin; body hairs sordid whitish; spiracles dark fuscous. Head red-brown, the mandibles, mandibular attachments of epicranium and endoskeletal ridges dark brown, almost black; ocellar pigment irregular, black, not defining the ocelli. Length of full grown larva 18–20 mm. long; 2–2.5 mm. wide at middle of abdomen.

HOLCOCERA CONFLUENTELLA Dietz.

Holcocera confluentella DIETZ, Trans. Amer. Ent. Soc., vol. 36, p. 36, 1910.

Two specimens of this species were reared (under Hopk. U. S. No. 12170*e*–3) by the writer from cuttings of *Pinus rigida* infested by *Evetria frustrana* and a *Recurvaria*, species. Moths issued May 14 and 15, 1915. Larvae collected at Sharon Heights, Massachusetts, (Heinrich) September 23, 1914. The specimens agree in every detail with Dietz's cotype in the United States National Museum collection.

HOLCOCERA AUGUSTI, new species.

Plate 6, fig. 33.

Palpi light yellow, thickly dusted with dark fucus on outer and under sides. Face, head, thorax, antennae, and fore wings a pale, dull, golden yellow. Antennae deeply incised above basal joint. Fore wings shading to a slightly darker yellow near apex; cilia concolorous. Hind wings and cilia a trifle darker than fore wings, shading to pale fuscous. Abdomen silvery yellow above; silvery on under side. Legs pale yellow heavily dusted with dark fuscous; the outer surfaces of fore and mid tibiae and tarsi and of hind tarsi almost completely covered with dark brown scales. Male genitalia of type figured. Alar expanse, 17–19 mm.

Habitat.—Ashland, Oregon. (P. D. Sergent and J. E. Patterson.)

Food plant.—*Pseudotsuga taxifolia.* A good series of moths reared (under Hopk. U. S. Nos. 10808*h*, 10834, 10834*b*–4, 12536*k*, 13266*e*, 14280*g*) from larvae feeding in cones infested by *Evetria colfaxiana* Kearfort. Moths issued May and August.

Type.—Cat. No. 21811, U.S.N.M.

A fine, pale golden species near *inconspicua* Walsingham, but easily distinguished because of the total absence of markings or fuscous scalings on the fore wings. Named in honor of my friend August Busck whose guidance and authority in the study of Microlepidoptera I gratefully acknowledge.

HOLCOCERA PANURGELLA, new species.

Palpi grayish white, heavily dusted with blue-black scales. Antennae silvery gray. Face, head, thorax, and fore wings white dusted with blue-black scales giving the moth a pale slate colored appearance. On fore wings a narrow blue-black half fascia extending diagonally outward from just before middle of costa to dorsal margin of cell; just beyond middle a small, very faint dorsal patch of same color; from just beyond apical third of costa and extending to tornus an inwardly angulate narrow fascia of the same color, broken slightly where it crosses the costal margin of the cell; along the termen a fine line of indistinct dark dots; cilia sordid grayish. Hind wings pale, smoky fuscous; veins slightly darker; cilia concolorous, lighter toward base of dorsum. Abdomen sordid white. Under side of fore wings dull metallic fuscous. Legs whitish, well sprinkled with blue-black scales. Alar expanse, 23 mm.

Habitat.—Santa Catalina Mountains, Arizona. (G. Hofer.)

Food plant.—*Pinus cembroides* (?)

Type.—Cat. No. 21812, U.S.N.M.

A large, easily recognized species. Described from a single female reared (under Hopk. U. S. No. 13977) from branches of *Pinus cembroides* heavily infested by a *Tetralopha*, species. The habits of the larva were not noted; but it is very probably a scavenger guest in the nests of the *Tetralopha*. Moth issued June 16, 1917.

Family COSMOPTERYGIDAE.

CHRYSOPELEIA OSTRYAEELLA Chambers.

Plate 7, fig. 36; plate 9, figs. 52, 53, 57.

Chrysopeleia ostryaeella CHAMBERS, Dyar. List N. Am. Lep., No. 6132.

The work and larval habits of this species have already been so accurately and succinctly described by Clemens [1] and Chambers [2] that it is hardly necessary for me to do more than cite the references. The larva itself, however, is so interesting structurally and forms such a perfect link in the chain of Cosmopterygid genera that it is thought advisable to give a full larval description. Dr. Edna Mosher, in her paper on the classification of Lepidopterous pupae [3] has already described and figured the pupa. Chambers in his notes on the species remarks on the difficulty of rearing any number of moths. I have had a similiar experience. Out of some two hundred-odd leaves of *Ostrya virginica*, all containing mines and larvae, I was only able to rear two moths.[4]

[1] Tin. N. Amer., p. 27.

[2] Can. Ent., vol. 6, 1874, p. 74.

[3] Bull. Ill. State Lab. of Nat. Hist., vol. 12, article 2, Mar., 1916, p. 104, fig. 95.

[4] Material collected September 1915 at Lyme, Connecticut, by Mr. A. B. Champlain who writes that the work was common on all the ironwood in that region. Moths issued June 9th and 15th of the following year.

General characters.—Elongate, cylindrical; slender; broadest at mesothorax, tapering gradually to caudal end. Legs and prolegs normal. Crochets uniordinal, in a complete circle. No anal fork. Thoracic shield broad, divided; prespiracular shield of prothorax horizontally elongate, directly anterior to the spiracle. No meso or metathoracic shields. Spiracles small, circular; prothoracic spiracle hardly larger than those on abdomen; spiracle on 8th abdominal segment on the same level as other abdominal spiracles. Tubercles small, but easily distinguished. Body setae normal; prothorax with *IIa* below the level of *Ia* and *IIb*, equidistant from both; puncture y caudo-laterad of *Ia*, between *Ia* and *IIa; Ib*, *Ic* and *IIc* forming a nearly perfect right angle well separated from *Ia*, *IIa* and *IIb; IIc* almost twice as far from *Ic* as *Ic* is from *Ib; III*, *IV* and *V* in a nearly straight horizontal line, *IV* equidistant from *III* and *V;* meso and meta thorax with seta groups *I* and *II* closely approximate, distance from *Ib* to *IIa* equal to that between *Ia* and *Ib* and *IIa* and *IIb; III* remote from *IV* and *V; III*, *IV*, and *V* in a line; *VI* unisetose; proleg-bearing abdominal segments with *I* and *II* closely approximate, *II* slightly higher than *I*, *IV* and *V* approximate, *IV* caudad of *V*, coxal setae (*VII*) in a line; abdominal segment 8 with *II* slightly lower than *I* and *IV* dorso-caudad of *V*, *VII* unisetose; abdominal 9 with *II*, *I* and *III* in a vertical line, well separated, *I* slightly nearer to *II* than to *III*, *V* antero-dorsad of *IV*, *VI* absent, *VII* unisetose.

Head not retracted within thorax; flattened; circular in outline, viewed from above; as wide or a trifle wider than long; greatest width at middle of head; incision of dorsal hind margin slightly less than one-half the width of the head; distance between extremities of dorsal hind margin one-half the width of the head. Frons triangular, long and narrow, reaching almost to incision of dorsal hind margin; adfrontal ridges straight from lower limits of epistoma to point of juncture of tentorial arms, thence converging in curved lines to a very short (hardly appreciable) longitudinal ridge; points of juncture of tentorial arms at middle of adfrontal ridges; adfrontal areas of frons very narrow; adfrontal sutures nearly straight, extending to incision of dorsal hind margin. Projection of dorsal margin over ventral only slightly less than the diameter of the head.

Ocelli six; equally spaced from *I* to *V*; *VI* equidistant from *IV* and *V*.

Epistoma normal.

Frontal punctures close together, well forward of frontal setae (*Fl*); distance from *Fa* to *Fl* greater than from *Fl* to *Adfl* and about equal to that between *Adfl* and *Adf2; Adf2* at beginning of longitudinal ridge.

Epicranium with the normal setae and punctures. Anterior setae (*A1*, *A2*, and *A3*) forming a very obtuse angle, almost in a straight line; *A1* and *A2* close together; *A2* and *A3* well separated; punc-

ture *Aa* postero-laterad of *A2*. Lateral seta (*L1*) in a line with *A3* and *A2;* as far from *A3* as *A3* is from *A2;* lateral puncture (*La*) postero-dorsad of *L1* as far from *L1* as *L1* is from *A3*. Posterior setae *P1* and *P2* close together, very slightly forward of middle of head; *P1* a little forward of the level of *Adf1*, on the level of *L1;* puncture *Pb* posterior to *P2; Pa* on the level of and remote from *Pb*, as near to *L1* as to *Pb*. Ocellar setae and puncture arranged in a right angle triangle; *O1* ventrad and approximate to Ocellus II; *O2* postero-ventrad of Ocellus I, directly posterior to *O1; O3* directly ventrad of *O2*, as far from *O2* as *O2* is from *O1; Oa* directly between and equidistant from *O1* and *O3*. Subocellar stetae triangularly grouped; *SO1* remote from *SO2* and *SO3; SO2* and *SO3* close together; *SOa* approximate to *SO2*, on a line between *SO1* and *SO3*. Genal seta (*G1*) antero-ventrad of the puncture (*Ga*).

Labrum with median incision shallow and broadly *U* shaped; anterior-lateral margins evenly rounded; lateral setae in a line well within lateral margin, well separated; *La2* slightly nearer to *La1* than to *La3; La3* on extreme anterior margin; median setae in a line; *M2* equidistant from *M1* and *M3; M1* on the level of *La1*, slightly back of the level of *La3*. Epipharyngeal shield large, elongate, situated well back of mediam incision of labrum which is only weakly chitinized. Epipharyngeal setae triangularly grouped just behind anterior margin, moderately long, broad, triangular, pointed. Epipharyngeal rods clearly indicated; posterior projections slender and moderately long.

Maxillulae with prominent, elongate, flexible fleshy lobs fringed with spines; no blades.

Specific description.—Full grown larva 5 mm. long. Body white with nerve ganglia visible through the skin on ventra surface as purple spots in all segments except abdominal 8, 9, and 10; in last instar larvae, a well separated pair of similar purple spots on dorsum of meso and meta thorax and 1st abdominal segment; legs white with lateral margins of the joints narrowly lined with fuscous; around each proleg below the coxal setae (*VII* and *VIII*) a narrow, smoky brown chitinous ring; crochets 16–18, dark brown; thoracic and anal shields smoky fuscous, somewhat more yellowish in some specimens; median line of thoracic shield irregular, broadening posteriorly, white; body tubercles small, dark brown (abdominal setae *I* and *II* especially conspicuous); body hairs whitish, moderately long; spiracles pale, smoky fuscous. Head pale lemon yellow with endoskeletal ridges, mandibles, and mandibular attachments of epicranium light amber brown; a short brown dash on each side at posterior lateral angle; ocellar pigment blackish brown, distinguishing the different ocelli but nearly continuous.

THEISOA CONSTRICTELLA Zeller.

Plate 7, fig. 37; plate 9, figs. 54, 55, 56.

Theisoa constrictella ZELLER, Dyar, List N. Amer. Lep., No. 6130.

On a few elms along the river bank at Great Falls, Virginia, Fr. DeGryse and the writer found most of the foliage attacked by a small caterpillar which makes a web on the underside of the leaf between two of the branching ribs, drawing the leaf together slightly and feeding on that part of the epidermis covered by the web. It also constructs a small tube of frass within the web into which it retires when not feeding. The work is locally common at Great Falls, but I have not seen it on the elms elsewhere in the vicinity of Washington. A quantity of infested leaves were collected during September, 1915, and placed to rearing (under Hopk. U. S. No. 13937). The insects pupated during October in small, smooth cocoons attached to the fallen leaves and overwintered in that stage. During the following July (1916) several moths issued. These proved to be Zeller's species. The general structural characters of the larvae show very close relationship to *Chrysopeleia*. In larval habits the two genera are also very similar except that *Theisoa* does not mine the leaf. This, as well as its more specialized head structures, would point to *Chrysopeleia* as a later development. As nothing has been previously published on the earlier stages of the genus, a full larval description is given. Unfortunately no pupae were saved, so I can not describe that stage.

General characters.—As in *Chrysopeleia* except as follows: Crochets biordinal; prothorax with *IIa* on the level of *Ia*, anterodorsad of *IIb*, closer to *IIb* than to *Ia*, puncture y directly caudad of *Ia*, *IIc* equidistant from *Ib* and *Ic*, *IIc*, *Ic* and *Ib* forming an isosceles triangle; meso and meta thorax with setae groups *I* and *II* not closely approximate, *III*, *IV*, and *V* not in a longitudinal or transverse line on segment, rather forming an obtuse angle; proleg bearing segments of abdomen with *II* remote from and slightly lower than *I;* abdominal 9 with *II*, *I*, and *III* not in a vertical line, triangularly grouped, *I* cephalad to and nearly equidistant from *II* and *III*, *VI* present.

Head ovoid; oval in outline viewed from above; as long or slightly longer than wide; incision of dorsal hind margin less than one-fourth the width of the head; distance between extremities of dorsal hind margin a trifle less than one-half the width of the head. Frons reaching only to just beyond middle of head; adfrontal ridges sinuate, nowhere straight; longitudinal ridge nearly as long as frons. Projection of dorsal margin over ventral about half the diameter of the head. Frontal punctures and frontal setae on nearly the same level; puncture *Adfa* not distinguishable. Anter or setae of epicranium forming a slightly obtuse angle; *A1* and *A2* fairly well separated

but closer together than *A2* and *A3; A2* and *A3* closer together than *A3* and *L1;* puncture *Aa* directly posterior of *A2*, rather remote. Lateral seta (*L1*) in a line with *A3* and *A1;* lateral puncture (*La*) not distinguished. Posterior setae (*P1* and *P2*) well separated, at middle of head; *P1* slightly forward of beginning of longitudinal ridge, on the level of *L1; P2* posterolaterad of *P1; Pb* posterior to *P1; Pa* almost on a line between *P2* and *L1*, slightly nearer to *L1* than to *A3*, remote from *P2*. Puncture (*Oa*) of ocellar group anterior to *O3*, postero-ventrad and approximate to ocellus *VI*. Puncture *SOa* of subocellar group on a line between *SO1* and *SO3*, approximate to *SO3*. Genal seta (*G1*) anterior to the puncture (*Ga*).

Labrum with median incision moderately deep, broadly triangular; anterior lateral margins rather acute; setae *La1* and *La2* approximate; *La3* well separated from *La2;* median setae triangularly placed; *M2* and *M1* on a line or nearly on a line with *La1; M3* farther from *M2* than *M2* is from *M1*. Epipharyngeal shield a very small narrow chitinization in the notch of the median incision, but clearly indicated. Epipharyngeal setae moderately long, rather well separated. Labial palpi extremely long and slender.

Specific description.—Full grown larva 6.5–7 mm. long. Body white with a slight pinkish tinge on dorsum; legs white, tarsal claws and more heavily chitinized parts hardly darker; prolegs unmarked; crochets light brown, 26–30; thoracic and anal shields very pale yellow, almost body color; median line of thoracic shield very obscure; body tubercles brown; body hairs whitish, rather long; spiracles pale brown. Head yellow; mandibles and mandibular attachments of epicranium brownish; a very dark brown spot on each hypostomal ridge near the anterior of triangular plates of hypostoma; ocellar pigment in a round, conspicuous, purplish-fuscous spot, continuous under all the ocelli.

Family GRACILARIIDAE.

PHYLLONORYCTER FELINELLE, new species.

Plate 6, figs. 30–31.

Antennae pale golden yellow above, silvery white beneath, toward the tips smoky fuscous. Palpi and face silvery white. Head tuft pale golden yellow with a very faint indication of fuscous toward the tips of the scales. Forewings light golden yellow with a medium white basal streak evenly dark margined toward costal and more faintly dark margined on dorsal side; two dorsal and four costal streaks; the first dorsal streak placed opposite the first costal, reaches middle of wing and extends toward apex beyond the first costal; second dorsal streak rather narrow, meeting second costal at middle to form an angulated fascia at outer third of wing; third

costal streak extending nearly to tornal cilia; the dorsal and costa margins white from the beginnings of first dorsal and costal streaks to base of wing; the inner sides of these white areas, as well as those of all costal and dorsal streaks, evenly dark margined; the first costal and dorsal streaks also slightly dusted with dark scales on outer margins; a conspicuous dark dot at apex; cilia golden shading to yellowish white with a median band of dark smoky fuscous. Hindwings pale smoky white. Abdomen leaden fuscous above. Alar expanse: 7.5 mm. Male genitalia of type figured.

Habitat.—Los Gatos, California (T. E. Snyder.)

Food plant.—Platanus racemosa.

A good series of moths reared under Hopk. U. S. No. 15187 from tentiform mines on the under side of sycamore leaves. The larvae were collected by Mr. T. E. Snyder, of the Bureau of Entomology, form trees along the river bank. His note states that the mines are so numerous as to produce what amounts to defoliation of the trees. Larvae collected June 12, 1917. Moths issued June 23 and 25 of the same year.

Type.—Cat. No. 21813, U.S.N.M.

A very striking species, close to *olivaeformis* Braun, but easily distinguished by its yellowish head tuft, the narrower second dorsal streak, and the evenly dark margined costal and dorsal dashes.

Family TINEIDAE.

DORATA INORNATELLA Busck.

Plate 7, fig. 38; plate 10, figs. 58, 59, 65, 66; plate 12, figs. 75, 76.

Dorata inornatella Busck, Proc. Ent. Soc. Wash., vol. 6, p. 124, 1904.

Several moths of this striking and interesting species were reared (under Hopk. U. S. No. 12191) by the writer during 1915 from larvae boring in the flower stems of Sotol, collected by Mr. Morris Chrisman in Buehmen Canyon, Santa Catalina Mountains, Arizona. The larvae, in superficial appearance and general shape, resemble the Coleopterous round headed borers (Cerambycidae), but have all the characters of typical Tineids. They form long galleries in the stems of the plant and pupate in the galleries in silk-lined cells near the base of the stems. The moths reared issued from early April until late June. Inasmuch as nothing has been as yet recorded of the early stages of this genus a full description of the larva and pupa is here appended.

General characters—larva.—(pl. 7, fig. 38; pl. 10, figs. 58, 59, 65, 66). Cylindrical; stout, broadest at prothorax, tapering gradually to pointed caudal end. Legs normal. Prolegs short and stout. Crochets uniordinal in a long narrow ellipse. No anal fork. Prothoracic shield broad, divided only by a faint line. No meso or

metathoracic shields. Spiracles moderate, elongate oval; that on 8th abdominal segment slightly smaller than prothoracic spiracle, on the same level, but twice the size of those on abdominal segments 1 to 7. Body setae normal. Tubercles large but weakly chitinized. Prothorax with *IIa* above the level of *Ia;* distance from *Ia* to *IIa* equal to that between *IIa* and *IIb;* puncture x dorso-caudad of *Ia;* puncture *z* approximate to *Ib;* prespiracular shield triangular, situated close to the anterior margin of the segment and with its lower edge on a level with the top of the spiracle. Setae *III, IV* and *V* rather closely approximate and equidistant on prothorax, well separated and equidistant on meso and meta-thorax and abdominal segments; *III* above and *IV* directly caudad of the spiracle on abdominal segments 1 to 7; *I* higher than *II* on first segments of abdomen, latero-cephalad of *II* on abdominal 9; *VI* unisetose on meso and meta-thorax; *VII* unisetose on abdominal 8 and 9.

Head well retracted within prothorax; ovoid; ovate in outline viewed from above; as long or longer than broad; greatest width well forward of middle of head, just back of the level of Ocellus *I;* incision of dorsal hind margin deep and narrow at least one-half the width of head; distance between extremities of dorsal hind margin about one-third the width of the head. Frons very short, somewhat heart shaped, as broad as long; adfrontal ridges nowhere parallel, sinuate and curving to a longitudinal ridge (*LR*) as long as the frons; adfrontal sutures sinuate, extending to incision of dorsal hind margin. Projection of dorsal margin over ventral more than half the width of the head.

Ocelli six; in the normal Tineid arrangement, with *I* and *II* close together, *III* and *IV* close together and well separated from *I* and *II*, *V* approximate to *IV*, *VI* well separated from other ocelli; *I* and *VI* small and weak.

Epistoma normal.

Frontal punctures (*Fa*) close together, only slightly foreward of frontal setae (*F1*); distance from *F1* to *Adf1* about equal to distance from *Adf1* to *Adf2;* puncture *Adfa* forward, closely approximate to *Adf2; Adf2* situated a little forward of beginning of longitudinal ridge.

Epicranium with normal number of setae and punctures. Anterior setae (*A1, A2, A3*) forming a right angle; puncture *Aa* lying between *A1* and *A2; A2* and *A3* on a level with *Adf1;* lateral seta (*L1*) approximate to anterior group, on the level of *P1;* distances between *A2* and *A3* and between *A3* and *L1* equal. Posterior setae (*P1* and *P2*) close togther, forward of middle of head; *P2* postero-laterad of *P1;* posterior punctures well separated; *Pa* laterad of and remote from *P2; Pb* postero-dorsad of *P2,* closely approximate to first ultraposterior seta

Lateral puncture (*La*) posterior and slightly dorsad of *L1*, remote. Ocellar setae well separated; *O1* equidistant from and slightly dorsad of Ocelli *II* and *III; O2* directly ventrad and approximate to Ocellus *I; O3* on a line with Ocelli *V* and *VI* ventrad to and remote from *O2;* ocellar puncture (*Oa*) approximate to and dorsad of *O3*. Subocellar setae triangularly grouped and equidistant from each other; subocellar puncture (*SOa*) equidistant from setae *SO1*, *SO2*, and *SO3*. Genal seta and puncture approximate to ventral hind margin of epicranium, midway between hypostomal ridge and lateral margin; puncture dorsad of the seta.

Labrum anteriorly narrowed, with entire anterior margin very slightly concaved, nearly straight. Setae of median group in the usual Micro arrangement with *M2* postero-laterad of *M1* and with *M3* forward and rather well separated from *M1* and *M2;* lateral setae (*La1*, *La2*, *La3*) on a line within the lateral margin; *La2* approximately equidistant from *La1* and *La3; M3* and *La3* on a level, well behind anterior margin of the labrum.

Epipharyngeal shield very small and poorly defined. Epipharyngeal setae triangularly grouped near anterior-lateral margin of epipharynx; narrow; pointed; moderately long. Epipharyngeal rods well developed; posterior projections long and stout.

Maxillulae normal; with well developed, strongly spined lobes.

Pupa.—(pl. 12, figs. 75, 76.) Elongate; slender; maxilliary palpi present; mandibles, labrum, fronto-clypeal suture and invaginations for anterior arms of tentorium clearly indicated; front extended upward into a point; maxillae short, slender; wings extended to mid venter of 5th abdominal segment; antennae not extending to end of wings; metathoracic legs extending well beyond end of wings; dorsum of abdomen with a row of stout spines on the cephalic margin of segments 2 to 9 and a row of smaller spines on caudal margin of segments 2 to 7[1]; cremaster absent; tenth abdominal segment with a prominent hooked lateral projection on each side; genital opening slit-like in both sexes; anal opening long, slit-like, at extreme caudal end of body.

Specific description—Larva.—Full grown 16–17 mm. long; 5.5 mm. broad at prothorax. Body whitish, unmarked; legs brownish yellow on outer side with darker brown claws; crochets of prolegs brown, 38 to 40; thoracic shield pale yellow on anterior dorsal half, divided by a narrow white median line, posterior and lateral parts concolorous with body of larva; anal shield faintly tinged with pale lemon yellow; body tubercles moderately large, unpigmented,

[1] Dr. Edna Mosher (A Classification of the Lepidoptera Based on Characters of the Pupa, Bull. Ill. State Lab., vol. 12, art. 2, Mar., 1916, pp. 44–45) gives the absence of such caudal spines as diagnostic character for her super-family *Tineoidea*. Their presence in *Dorata* shows that their presence or absence can only be of generic significance. *Phycis* (*Scardia*) also has them well developed on abdominal segments 3 to 6 inclusive.

somewhat paler than the body color; hairs short, whitish; spiracles moderate, rather conspicuous, yellow edged with brown. Head dark brown on frons, and on antero-dorsal, lateral and ventral surfaces of epicranium; postero-dorsal region of epicranium light yellow shading to white; mandibles, hypostomal ridges and mandibular attachments of epicranium black; labrum and other chitinized parts of trophi yellowish brown; ocelli unpigmented.

Pupa.—Light brown, darker on caudal and cephalic ends; dorsal abdominal spines and projections of tenth abdominal segment blackish brown; cephalic row of spines on adbominal segment 2 weak and broken in middle for one-third of the length of the row; caudal row on seventh abdominal segment weak; male 16 mm., female 28 mm. long.

Family AEGERIIDAE.

PODOSESIA COMES, new species.

Male.—Antennae black above, chestnut brown on inner sides and between the joints on upper side near base, rather densely scaled with yellow on outer sides; basal joint whitish yellow. Palpi black, dusted with yellowish white scales above and with a scattering of white scales in tuft of second joint; third joint rather heavily dusted with yellowish white. Head black. Collar yellow above, black and white along the sides. Thorax black with a splash of bright yellow on each side beneath; a yellow scale or two on tips of patagiae and a yellow triangular patch on each side on dorsum of metathorax. Forewings transparent, bordered along costa and dorsum with black interspersed with a few orange scales; cross vein of cell orange scaled; other veins black scaled with a faint sprinkling of orange; a few orange and black scales between the veins near apex; under side of forewings similar to upper except orange dusting slightly heavier and costa yellow scaled, especially toward base; cilia black. Hind wings transparent; veins black scaled; costa dusted with orange especially on under surface; cilia blackish. Abdomen black; on segments 2, 3, 5, 6 and 7 a narrow yellow band on caudal margin of the segments, disappearing on ventre of abdomen; on 4th abdominal a wider yellow caudal band completely circling the body; lateral tufts of 8th abdominal segment black and yellow. Legs blue black; anterior coxae laterally bordered with yellow; inner sides of tibiae and tarsi patched and dusted with white and yellowish white scales; the long hair-like scales in front of anterior pair of spurs on hind tibiae, white. Alar expanse 16 mm.

Female.—Like the male except: only four yellow bands on abdomen; tuft heavier, entirely yellow above and black laterally. Alar expanse. 19 mm.

Habitat.—Brush Corral, Arizona. (Edmonston and Hofer.)

Food Plant.—Quercus, species. Two moths (male and female) reared under Hopk. U. S. No. 12182*a*, from the woody Cynipid galls

on white oak so heavily infested with larvae of *Eubolepia gargantuella*, described elsewhere in this paper. Moths issued May 11 (1915).

Type.—Cat. No. 21814, U.S.N.M.

An easily recognized species. The legs seem a trifle short for a *Podosesia* and are not so roughly scaled as those of *syringae* or *fraxini* but it has the characteristic palpi and belongs quite unmistakably to that genus. There is also a queer freak in venation in the male; 3 and 4 of the hind wing are distinctly separate. In the female they are stalked. The forewing of the male also has 7 and 8 somewhat shorter stalked than the female. Whether these differences are constant between the sexes I can not say as only two specimens were reared.

The larva is white with anal and thoracic shields nearly the body color, only slightly more yellow; a narrow transverse, irregular, and indistinct light brown line on each side of middle of dorsum on thoracic shield; legs yellow with brownish tarsal claws; crotchets brown, 13–16; spiracles light brown, conspicuous; tubercles unpigmented. Head brown, very pale yellow in the posterior regions of the epicranium adjacent to the longitudinal ridge; mandibles, mandibular attachments of epicranium and endoskeletal ridges black; frons thickened into a raised knob above the surface level of the epicranium, dark brown; ocellar pigment black in small individual spots under or nearly under the several ocelli. Length, full grown, 12-13 mm.

The larva is easily recognized by the peculiar elevated frons.

(SESIA) SYNANTHEDON DECIPIENS Henry Edwards.

(*Sesia*) *Synanthedon decipiens* Henry Edwards, Dyar, List N. Am. Lep., No. 4228.

During 1915 a half dozen specimens of this species were reared by Mr. W. Middleton and the writer from material collected at Manitou and North Cheyenne Canyon, Colorado.

Up to this time the species had not been represented in the United States National Museum Collection and as far as I know the food plant and larval habits were unpublished. The larvae are inquiline borers in the woody galls of a Cynipid on scrub white oak, in habit and general appearance very similar to those of *S. scitula* Harris. Larvae collected during September 1914 by A. B. Champlain (Hopk. U. .S No. 12082*m*), and April, 1915, by B. T. Harvey (Hopk. U. S. No. 12153*c*). Moths issued May, June, and July.

Family COSSIDAE.

GIVIRA LOTTA Barnes and McDunnough.

Plate 7, fig. 40; plate 10, figs. 60–64; plate 12, figs. 77–79.

Givira lotta Barnes and McDunnough, Ent. News., vol. 21, p. 464, 1910.

Two adults of this species were reared by the writer during July, 1915 (under Hopk. U. S. Nos. 12425*a* and 13907) from larvae col-

lected by Messrs. George Hofer and B. T. Harvey of the Bureau of Entomology at Garden of the Gods and Manitou, Colorado. The larvae mine the rough outer bark of the yellow pine (*Pinus scopulorum*) and are evidently very common. According to Mr. Hofer's and Mr. Harvey's notes the attack is confined to the living bark of the main trunk of the tree near its base and no higher up than six feet from the ground. Pupation takes place within the mine and covers a period of slightly more than a month. The larvae in general appearance closely resemble those of the Aegeriidae, and on superficial examination might easily be so mistaken. The head characters, however, are all distinctively Cossid, while the pupa is remarkably similar in structure and appearance to that of *Zeuzera* and *Cossula*. As far as I know nothing has hitherto been recorded on the early stages of this genus. A full description of larva and pupa is therefore given.

General characters—larva.—(pl. 7, fig. 40; pl. 10, figs. 60–64). Round; stout, thickest at middle of body; 9th and 10th abdominal segments sharply tapering; caudal end narrowly rounded. Crochets evenly uniordinal, in a narrow ellipse, broken slightly at the inner extremity, weak at the outer extremity. No anal fork. Prothoracic shield small and weak, not divided. Spiracles small, round; 8th abdominal spiracle no larger, and prothoracic spiracle only slightly larger than those on abdominal segments 1 to 7. Body setae normal; tubercles weak; prothorax with *IIa* well above the level of *Ia*, foreward of *IIb*, puncture *y* directly caudad of *Ia*, on the level of *IIb*, *Ic*, and *IIc* closely approximate, *IIc* caudad of *Ic*, *III*, *IV* and *V* triangularly grouped, equidistant and closely approximate; meso and metathorax with *III*, *IV* and *V* well separated, *VI* unisetose; abdominal segments 1 to 7 with *II* much lower than *I*, *IV* and *V* closely approximate under the spiracle; *II* also lower than *I* on abdominal 8; *I* of 9th abdominal lower than *II*, equidistant from *II* and *III*, *IV* and *V* rather well separated, *VI* remote from *IV*, *VII* unisetose on abdominal segments 8 and 9.

Head considerably retracted within prothorax; small; ovoid, nearly spherical; nearly square in outline viewed from above, slightly constricted posteriorly; about as broad as long; incision of dorsal hind margin over one-fourth the width of the head; extremities of dorsal hind margins bluntly rounded, almost straight, distance between them about equal to incision of hind margin. Frons triangular, reaching to middle of head; adfrontal ridges converging in nearly straight lines to a longitudinal ridge (*LR*) about half as long as the frons; adfrontal areas of frons (*ADF*) rather broad; adfrontal sutures (*ADFS*) evenly curved reaching to incision of dorsal hind margin. Projection of dorsal margin over ventral, half the diameter of the head. Ocelli six, in normal Cossid arrangement with *V* and *VI*

well separated from the rest; *II* and *III* closely approximate; *IV* separated from *III*, but closer to *III* than to *V; I* well separated from *II*.

Epistoma with seta *E1* on a chitinous projection beyond its anterior margin, otherwise normal.

Frontal punctures posterior to frontal seta (*F1*); distance separating punctures equal to distance from *Fa* to *F1;* distance between adfrontal setae less than that between *Adf1* and *Fa; Adf2* anterior to beginning of longitudinal ridge; puncture (*Adfa*) approximate to *Adf2*, close to adfrontal ridge (*ADFR*).

Anterior and lateral and posterior setae of epicranium crowded forward on the head; *A1*, *A2*, and *A3* in a slightly obtuse angle; *A1* and *A2* close together; anterior puncture *Aa* not discernible. Lateral seta (*L1*) closely approximate to *A3* on the level of *Fa;* lateral puncture (*La*) posterior of *L1*, quite remote, nearly on a level with incision of dorsal hind margin. Posterior setae and punctures forward of the middle of the head; *P1* nearly on the level of *Adf1; Pb* laterad of *P1; P2* laterad and only slightly posterior of the level of *P1; Pa* approximate to *L1*, on the level of *Adf1*. *O1* of ocellar group between ocelli *III* and *IV; O2* posterior and approximate to ocellus *IV; O3* ventrad to *O2*, below the level of Ocelli *V* and *VI;* puncture *Oa* between *O2* and *O3*, approximate to the former. Subocellar group triangulary placed; puncture *SOa* closely approximate to *SO2*.

Genal seta (*G1*) antero-ventrad of the puncture (*Ga*).

Labrum with anterior margin straight; no appreciable median incision; lateral margins only slightly curved, converging anteriorly; *La1*, *La2*, *La3* in a line on lateral edge, well forward, equidistant; median setae triangularly placed nearly equidistant; *M2* posterolaterad of *M1*, slightly forward of the level of *La1; M1* on the level of *La2*, *M3*, very slightly back of the level of *La3*. Epipharyngeal shield not clearly indicated. Epipharyngeal setae triangularly grouped near anterior lateral angle of epipharynx; closely approximate and equidistant; slender; pointed; moderate. Epipharyngeal rods with long, stout, sharply curved posterior projections.

Maxillulae with strongly spined lobes and single row of short, rounded blades (fig. 64) similar to those in the Sesiidae.[1]

Pupa.—(pl. 12, figs. 77, 78, 79.) Elongate; moderate; maxillae triangular, nearly as broad as long, without lateral projections adhering to them on dehiscence; maxillary palpi present[2]; antennae

[1] See DeGryse: Some Modifications in the Hypopharynx of Lepidopterons Larvae, Proc. Ent. Soc. Wash., vol. 17, No. 4, 1915, p. 176, Fig. 6.

[2] Miss Mosher (Bull. Ill. State Lab., vol. 12, art. 2, pp. 30, 38, 41) gives among other characters for her *Cossoidea*, the absence of maxillary palpi. There are, however, in *Givira* and *Cossula* which resembles it in most pupal characters, small triangular areas along the cephalic margins of the prothoracic legs and directly caudad of the eye pieces which it is difficult to interpret as anything else, particularly as they separate completely from the maxillae on dehiscence. Like many another character, the presence or absence of maxillary palpi in the pupa is probably of no more than generic significance.

with slight lateral projections on the segments[1] not extending beyond middle of wings; wings short, hardly extending beyond 3rd abdominal segment; glazed and sculptured eyes indicated; mandibles conspicuous, roughly produced; labial palpi well developed with a paired thorny projection from middle; labrum small; clypeus scooped, with two pair of setae, strong lateral ridges, and a strong, spoutlike projection at base; front with a prominent cephalad projection; two cuplike protuberances on cephalic margin of genae approximate to lateral margins of front; coxae of pro, meso, and metathoracic legs clearly indicated; pro and mesothoracic legs not extending to end of wings; metathoracic legs extending a trifle beyond end of wings; mesothorax more than twice as long as prothorax; a strong median dorsal ridge on front, pro, and mesothorax; abdomen with segments 3 to 6 free (female) and with double row of dorsal spines on segments 3 to 6 and a single row along cephalic margin on segments 7, 8, 9 (female); genital opening single and slitlike; anal opening at extreme caudal end of body, slitlike; no caudal setae; cremaster absent; a pair of stout thornlike spines at caudo-lateral extremities of abdomen on each side of anal opening; spiracles round, produced, moderate.

Specific description—Larva.—Full grown about 30 mm. long; 6 to 7 mm. wide at middle of abdomen. Body china white, unmarked; legs white with black or blackish brown tarsal claws; crochets of prolegs pale brown, weak, 38–42; thoracic shield pale yellow, weakly pigmented and thinly chitinized; anal shield unpigmented; body tubercles small, unpigmented, weak; hairs short, whitish yellow; spiracles moderate, round, brown. Head pale yellow; a small brown spot at lateral angles of hind margin; antennal ring and anterior margins of epicranium and mandibles dark brown shading to black; more heavily chitinized parts of labium and maxillae pale brown; head setae whitish yellow; ocellar pigment black, not continuous.

Pupa.—Pale smoky brown; dorsal abdominal spines, chitinous projections of head and caudal extremity dark brown to black; cephalic rows of spines on dorsum of abdominal segments twice the size and approximately half the number of those in caudal rows; prothorax roughly rugose on dorsum; mesothorax smooth; labial palpi reaching to extremities of maxillae; coxae of prothoracic legs smaller than mesothoracic coxae; mesothoracic coxae extending half the length of prothoracic legs; prothoracic legs but very little shorter than mesothoracic legs; mesothoracic legs somewhat over three-fourths as long as wings; average length (female) 18 mm.

[1] Evidently the "pectinate antennae" of Mosher.

Family PYRALIDAE.

Subfamily PHYCITINAE.

DASYPYGA ALTERNOSQUAMELLA Ragan.

Plate 7, fig. 41; plate 11, figs. 67, 68, 71, 74; plate 13, figs. 80, 81.

Dasypyga alternosquamella RAGANOT, Dyar, List N. Amer. Lep., No. 4721.

This species is an important enemy of the mistletoe (*Razoumofskya cryptopoda*) on pine and spruce in Oregon and Colorado. Several moths were reared from larvae collected from May until late in September at Williams Canyon, Monument, and Larkspur, Colorado, and Ashland, Oregon (Hopk. U. S. Nos. 12420*m*, 12415, 13942*q*–2, and 12515*a*). According to Mr. Miller's notes the larvae feed singly and externally, and while usually very abundant are easily overlooked on account of their protective coloration. The color of the individual larvae varies in harmony with the color of the individual batches of mistletoe on which they feed. There appeaars to be one generation a year, the species overwintering as pupa in the ground. Moths reared at the Falls Church, Virginia, station issued all through May and in early June. It is probable that in nature the feeding period is comparatively short (about a month) and that the various broods issue continuously throughout the summer, since the larvae of one lot collected by Mr. P. D. Sergent at Ashland, Oregon, May 27, 1914, had all pupated by June 6th of the same year, while from the Colorado points mentioned above, larvae in various stages of development were received as late as September 23. None of the larvae received at the Eastern Station fed long after being received and from none of the lots were adults reared until the year following.

D. alternosquamella is commonly associated with *Gelechia natalis* described elsewhere in this paper, the larvae of both being equally numerous on the mistletoe. The absence of seta *III* on the prothorax as well as the enlarged and curiously chitinized *IIa* of the mesothorax and *III* on the 8th abdominal segment of *alternosquamella* readily distinguishes it from the Gelechiid. As nothing has been previously recorded of its immature stages and as it is the type and sole species of the genus *Dasypyga* a full description of its larva and pupa is appended.

General characters—Larva.—(pl. 7, fig. 41; pl. 11, figs. 67, 68, 71, 74). Cylindrical; slender. Legs and prolegs normal. Crochets evenly biordinal and in a complete circle, the outer series of hooks very short, less than one-fourth the longer series. No anal fork. Prothoracic shield moderately broad, not extending to anterior margin of the segment, divided by a rather broad, median, longitudinal line. Spiracles moderately large, circular in outline; those on prothorax and 8th abdominal segment twice the size of those on abdominal segments

1 to 7. Body setae normal; tubercles moderate; *IIb* of meso-thorax and *III* of 8th abdominal segment surrounded by a heavy, conspicuous chitinized ring; prothorax with *IIa* on the level of or a trifle higher than *Ia*, *IIb* twice as far caudad as *IIa* and farther from *IIa* than *IIa* is from *Ia; Ia*, puncture *z*, *Ib* and *Ic* in a line along the anterior margin of the shield, puncture *x* absent, *y* directly caudad of *Ia*, *z* dorsad and approximate to *Ib*, slightly below the level of *IIb*, *IIc* farther from *Ib* or *Ic* than they are from each other, prespiracular shield directly anterior and close to the spiracle, bearing only two setae, *III* absent, *V* approximate and ventro-caudad of *IV;* meso and meta-thorax with *VI* unisetose; proleg bearing abdominal segments with *II* on a level with or only slightly lower than *I*, *III* directly over the spiracle, *IV* and *V* closely approximate, *IV* caudad to and very little lower than *V*, setae *VII* triangularly grouped, equidistant; abdominal 8 with *III*, *VI* and the spiracle in a vertical line, *VII* bisetose, *II* slightly higher than *I;* abdominal segment 9 with *I* somewhat nearer to *III* than to *II; IV*, *V* and *VI* closely approximate and triangularly grouped, *VII* bisetose.

Head spherical; nearly square in outline viewed from above, as wide or a trifle wider than long; greatest width at middle of head; incision of dorsal hind margin about one-fifth the width of the head; distance between extremities of dorsal hind margin a little over one-third the width of the head. Frons pentagonal, reaching nearly to middle of head, a trifle longer than wide; adfrontal ridges (*ADFR*) parallel from lower limits of epistoma to point of juncture of tentorial arms, thence converging in slightly curved lines to the longitudinal ridge (*LR*) which is as long as frons; adfrontal sutures (*ADFS*) straight, meeting longitudinal ridge half way between end of frons and incision of dorsal hind margin. Projection of dorsal margin over ventral about half the diameter of the head.

Ocelli six with *III*, *IV* and *V* in a straight line; *III* and *IV* approximate; *V* and *VI* approximate.

Epistoma normal.

Frontal punctures (*Fa*) close together, anterior to frontal setae (*F1*); distance between punctures less than distance from puncture (*Fa*) to setae (*F1*); distance from seta *F1* to seta *Adf1* nearly equal to distance from *Adf1* to *Adf2; Adf2* a little behind the beginning of longitudinal ridge; puncture *Adfa* approximate to *Adf2*, between *Adf1* and *Adf2*.

Epicranium with the normal setae and punctures. Anterior setae (*A1*, *A2*, *A3*) in a very slightly obtuse angle; *A2* and *A3* well separated; puncture (*Aa*) posterior to *A2*. Setae (*P1* and *Pa*) and puncture (*Pb*) of posterior group just back of middle of head; *P1* slightly back of the level of *Adf2; P2* postero-dorsad of *P1*; *Pb* between and equidistant from *P1* and *P2: A2 P1* and *P2*

in a straight line; *Pa* approximate to *A3*, nearer to *A3* than to *L1*. Lateral seta (*L1*) closely approximate to *A3*; on the level of *Adf2;* puncture (*La*) postero-ventrad of *L1*, remote, nearly in a line with *L1* and *A3*. Ocellar setae well separated; *O2* equidistant from *O1* and *O3*, postero-ventrad and approximate to Ocellus *I; O1* ventrad and approximate to Ocelli *II* and *III; O3* remote from and ventrad to *O2;* puncture *Oa* postero-ventrad of Ocellus *VI*, lying in a line and about midway between *O3* and *SO2*. Subocellar setae triangularly placed; puncture *SOa* nearly on a line between *SO1* and *SO3*, approximate to *SO3*. Genal puncture (*Ga*) antero-dorsad of seta *G1*.

Labrum with anterior lateral margins rounded; median incision broadly triangular, moderately deep; seta *M2* postero-laterad of *M1*, slightly nearer to *M1* than to *M3*; *M3* and *LA3* well back from anterior margin of labrum; *La3* back of the level of *M3; La1* and *La2* closely approximate; *La1* on the level of *M1;* puncture midway between *M1* and *M2*.

Epipharyngeal shield minute. Epipharyngeal setae triangularly grouped near anterior margin of labrum; short, sharply pointed, and triangular. Epipharyngeal rods indicated by their posterior projections only ; these are rather short.

Labium and maxillae normal; posterior half of submentum broadening out sharply. Maxillulae normal with well-developed spined lobes.

Pupa.—(pl. 13, figs. 80, 81). Short; stout; abdominal segments abruptly tapering; smooth; no hairs or spines except for a transverse row of long, slender, shortly hooked, hair-like spines at extreme caudal end; wings extending to ventro-caudal margin of 4th abdominal segment; cephalic extremity rounded; epicranial suture present; vertex represented by a narrow, long, triangular area adjacent to each antenna; labrum, pilifers, and maxillary palpi well developed; labial palpi represented by a small polygonal piece at extremity of labrum; pro and mesothoracic legs not extending cephalad between sculptural eye piece and antenna; sculptured and glazed eyes distinguishable; femora of prothoracic legs clearly indicated; prothoracic legs extending half the wing length; mesothoracic legs and antennae extending to tips of wings; metathoracic legs not discernible; suture between 8th and 9th abdominal segments indistinct; dorsal suture between 9th and 10th abdominal segments appreciable, bordered cephalad by a prominent, flat, smooth, narrow ridge; spiracles small, round, protruding; anal opening on ventral surface, rather well forward of caudal end; genital and anal openings long, slit-like in both sexes; no cremaster.

Specific description—larva.—Full grown, 20–22 mm. long, by 3.5 mm. broad. Body whitish on underside suffused with faint pinkish

along ventro-lateral surface; along the sides a yellowish suffusion extending in a broad, ill-defined band the entire length of the body; above this, reaching half way on dorsum, a smoky fuscous suffusion; mid-dorsum sordid whitish faintly suffused with yellow and pinkish; in some specimens the entire dorsal half of the body is a bright ocher yellow; in others the yellow lateral markings are replaced with an ill-defined longitudinal striping of dull reddish pink; legs pale yellowish, a short dash of dark brown at the outer angle of the end of each segment; tarsal claws brown; crochets of prolegs yellowish brown, 68–74 alternating long and short; thoracic shield pale yellow dotted and mottled with dark brown; anal shield pale yellow dotted with brown; body tubercles small, brown; chitinized areas surrounding them whitish; setae dark brown, rather long; *IIIa* of abdominal segments absent; spiracles pale yellow, easily discernible but not conspicuous. Head pale yellowish-brown, irregularly and thickly mottled with darker brown; color quite variable in different specimens, in some of the darker ones the mottlings almost black and the head color very dark brown; chitinous edges of mouth rim and base of mandibles black; ventral side of head yellow in some specimens, yellowish brown in others; ocellar pigment pronounced under each ocellus, not continuous; setae and punctures of ultra posterior group not distinguishable with certainty.

Pupa.—Brown, little or no darker at extremities; sutures dark brown, those between abdominal segments indicated by a fine even line; a narrow, brown line along the outer margins of the wings; spiracles dark brown; dorsal ridge bordering furrow between 9th and 10th abdominal segments blackish brown; hairs on caudal extremity yellowish; male and female (normal specimens) 9 mm. long, 3 mm. broad at middle of body.

EUZOPHERA OSTRICOLORELLA Hulst.

Plate 7, fig. 42; plate 11, figs. 69, 70, 72, 73; plate 13, fig. 82.

Euzophera ostricolorella Hulst, Dyar, List N. Amer. Lep., No. 4829.

This species is one of the very few Lepidoptera associated with the tulip tree (*Liriodendron tulipifera*). The larvae mine the bark and are quite common in the neighborhood of Washington City and further south. Large numbers of larvae and pupae were collected by Mr. J. E. Smith during the spring and early summer of 1913 at various points in North and South Carolina. From these several moths were reared during May, June, and July of the same year. The writer has collected full grown larvae in the neighborhood of Washington during late August and had them bring forth moths during September. In one instance a full grown larva was found by Mr. T. E. Snyder of the Bureau of Entomology as late as December 21, 1912. The species evidently overwinters as larva in the mine and quite

possibly produces a couple of generations a year. The larvae attack the larger trees and these only near the base and usually on the side away from the sun or in spots where the bark is continuously moist. They bore into both the cambium and the rough outer bark, making a short, irregular gallery within which they spin a thin silken cocoon when ready to pupate. On emergence of the moth the pupa skin remains within the cocoon. The mine itself is stained black by the watery frass but is otherwise free of accumulations. While very few trees are uninvested they do not seem to suffer much from the attack and I have never found the larvae in smooth or thoroughly dry bark or anywhere except at the base of the tree. A full description of the larva and pupa follows.

General characters larva.—(pl. 7, fig. 42; pl. 11, figs. 69, 70, 72, 73). As in *Dasypyga* except as follows:

Cylindrical; fairly stout. Crochets in a complete circle; triordinal; one of the shortest hooks alternating with each of the longer. Spiracles slightly oval (nearly circular) in outline; spiracle of 8th abdominal segment larger than that on prothorax. Tubercles heavily chitinized; prothorax with *IIa* well above the level of *Ia*, closely approximate to puncture *y*, puncture *y* directly dorsad of *Ia*, *IIb* nearly on the level of *Ia*, remote from *IIa*, *IIc* nearer to *Ic* than *Ic* is to *Ib;* proleg bearing abdominal segments with *II* appreciably lower than *I;* on 8th abdominal segment *II* considerably higher than *I; VII* unisetose on abdominal segments 8 and 9; *V*, *IV* and *VI* of 9th abdominal segment in a vertical line.

Head somewhat ovoid; rectangular in outline viewed from above; greatest width back of middle of head; incision of dorsal hind margin about one-third the width of the head; distance between extremities of dorsal hind margin a little over one-third the width of the head. Frons reaching middle of head; considerably longer than wide; longitudinal ridge shorter than frons; adfrontal sutures extending to incision of dorsal hind margin.

Ocelli *I* and *II* approximate; *II* and *III* approximate.

Frontal seta (*F1*) nearer to *Adf1* than *Adf1* is to *Adf2; P2* posterolaterad of *P1*, on a line with *P1* and *F1; Pa* equidistant from *A3* and *L1; L1* forward of the level of *Adf2* or *P1;* puncture *La* directly posterior to *L1*, remote; *O1* lying immediately between Ocelli *II* and *III*, puncture *Oa* approximate to Ocellus *VI*, lying between Ocellus *VI* and *O3;* puncture *SOa* lying well within the triangle of the subocellar group, equidistant from *SO1* and *SO3* and a trifle nearer to them than to *SO2* genal puncture (*Ga*) anterior to the seta (*G1*).

Labrum with median incision rather shallow; *La1* and *La2* not closely approximate; *La1* on the level of *M2* and *La2* on the level of *M1;* puncture closely approximate to *M2*.

Pupa.—(pl. 13, fig. 82). Faintly pitted on dorsum, otherwise smooth; as in *Dasypyga* except:

More gradually tapering; vertex represented by very small triangular areas adjacent to antennae; 8th, 9th, and 10th abdominal segments fused; no distinguishable suture,or dorsal prominence indicating same, between 9th and 10th abdominal segments; anal opening on ventral surface close to caudal extremity.

Specific description—Larva.—Full grown, 25–30 mm. long by 4 to 4.5 mm. broad. Body sordid whitish; legs, crochets, spriacles, thoracic and anal shields, body setae and chitinous areas around tubercles dark smoky brown; thoracic shield sharply divided by a rather broad, whitish median line; around each proleg below the coxal setae (*VII* and *VIII*) a narrow brown chitinous ring; crochets 70–80; setae moderately long; *IIIa* of abdomen easily discernable. Head rich mahogany brown, the more heavily chitinized portion, black; ocellar pigmentation weak, not continuous; setae and punctures of ultra-posterior group easily distinguishable in a somewhat irregular line continuous with *P1*, *Pb*, and *P2*.

Pupa.—Color brown as in *Dasypyga;* 13 to 14.5 mm. long, 3.5 to 4 mm. broad at middle of body.

Family PYRALIDAE.

Subfamily THYRIDINAE.

HEXERIS ENHYDRIS Grote.

Plate 6, fig. 32; plate 7, fig. 39; plate 8, figs. 47, 48, 49, 50, 51; plate 13, figs. 83, 84.

Hexeris enhydris GROTE, Dyar, List N. Amer. Lep., No. 4137.

Two males of this species were reared May 29 and June 20, 1917 (under Hopk. U. S. Nos. 14996 and 15101) from pupae found in stems of "Sea grape" (*Coccolobis uvifera*) at Miami Beach, Florida. According to Mr. T. E. Snyder of the Bureau of Entomology, who collected the material, the larvae mine and kill the young branches of the trees and are present in such numbers as to be of considerable economic importance. Dr. H. G. Dyar, who very kindly determined the moth, informs me that its early stages and life history are unrecorded. Therefore since it is also the type of the genus *Hexeris* a full larval and pupal description is given.

The male genitalia of the moth is figured on plate 6. (Fig. 32.)

General Characteristics—Larva.—(pl. 7, fig. 39; pl. 8, figs. 47, 48, 49, 50, 51.) Cylindrical; stout; tapering sharply at last three caudal segments; 9th abdominal segment greatly reduced. Legs and prolegs normal. Crochets irregular in length but predominantly uniordinal and in a complete circle. No anal fork. Prothoracic shield broad, faintly divided by narrow median line. Spiracles conspicuous; very narrowly elliptical, almost slit-like on abdominal segments 1 to 7;

prothoracic spiracle broader and more than twice the size of smaller abdominal spiracles; 8th abdominal spiracle very large, broadly elliptical, near caudal margin of the segment and facing caudal extremity of the body. Body tubercles inconspicuous; various body areas heavily chitinized. Body setae normal; prothorax with *IIa* dorso-caudad of *Ia*, puncture *y* between *Ia* and *IIa*, approximate to *Ia*, puncture *z* dorsad of and approximate to *Ib*, *IIb* slightly above the level of *z*, *IIc* widely remote from *IIb*, closely approximate to and below *Ic*, in a line with *Ic*, *Ib*, and *Ia*, seta *III* absent; meso and metathorax with *IIa* anterior or antero-laterad of *IIb*, *IV* anterior to *III*, rather remote, *V* absent, *VI* bisetose; proleg-bearing abdominal segments with *II* considerably lower than *I*, *III* dorso-caudad of the spiracle, *IV* and *V* on the same level but rather well separated, *I*, *III*, and *IV* in a vertical line, group *VII* triangularly placed; abdominal segment 7 with *VII* unisetose; abdominal 8 with *II* on the level of *I*, *II* and *III* in a vertical line almost over the spiracle, *IV* and *V* in a longitudinal line well forward of and slightly lower than the spiracle, *VII* unisetose; abdominal 9 with *I* antero-laterad of *II*, equidistant from *II* and *III*, *IV* and *V* united; *VI* present, *VII* unisetose; setae *VIII* much more widely separated on abdominal segment 9 than on abdominal 8.

Head partially retracted within prothorax; ovoid-spherical; broadly ovate in outline viewed from above; as wide as long; greatest width well back of middle of head; incision of dorsal hind margin very slight; distance between extremities of dorsal hind margin over one-third the width of the head. Frons pentagonal, narrow, short, not reaching to middle of head; longitudinal ridge longer than frons adfrontal sutures nearly paralleling the adfrontal ridges, meeting longitudinal ridge just back of the end of frons. Projection of dorsal margin over ventral a trifle more than half the diameter of the head. Ocelli six; *V* and *VI* well separated from the rest. Epistoma normal.

Frontal punctures close together on a level with frontal setae; *Adf2* at beginning of longitudinal ridge; *Adf1* closer to *Adf2* than to *F1*; *Adfa* between *Adf1* and *Adf2*.

Epicranium with the normal setae and punctures. Anterior setae in very slightly obtuse angle; *A1* and *A2* rather close together; *A3* remote from *A2*; punctures *Aa* remote from *A2*, closely approximate and dorsad to *A3*. Posterior setae and punctures well separated; *P2* postero-dorsad of *P1*; puncture *Pb* postero-laterad and remote from *P2*; *Pa* on a line midway between *P1* and *L1*; the punctures *Aa*, *Pa*, and *Pb* lying almost in a straight line. Lateral seta (*L1*) well above lateral margin, as far from *A3* as *A3* is from *A2*; puncture (*La*) postero-laterad of *L1*. Ocellar setae lying almost in a vertical line; *O1* approximate to and dorsad of Ocelli *II* and *III*; *O2* antero-ventrad of Ocellus *I*, in a line with Ocelli *VI* and *I* and

seta *A3;* puncture *Oa* between *O2* and ocellus *VI; O3* ventrad of *O2*, remote, well below the level of Ocelli *V* and *VI*. Subocellar setae triangularly grouped, nearly equidistant; puncture *SOa* equidistant from *SO2* and *SO3*. Genal seta (*G1*) antero-ventrad of the puncture (*Ga*).

Labrum rather short with median incision a shallow triangular notch; seta *M2* postero-laterad and closely approximate to *M1; M3* on the level of *La3*, close to anterior margin of labrum and remote from *M1* and *M2; La1*, *La2*, and *La3* along anterior lateral margin; *La1* and *La2* close together, on the level of *M2* and *M1*, respectively; puncture posterior to *M-2*. Epipharyngeal shield conspicuous, completely surrounding the notch. Epipharyngeal setae narrow, pointed, rather long; situated well back of anterior lateral margin of labrum. Epipharyngeal rods well developed, continuous under setae *La1*, *La2* and *La3* and extending as far as *M3;* posterior projections long, slender.

Maxillulae (fig. 49) with large fleshy lobes densely clothed with fine hair-like spines; a lateral row of small, tooth-like blades similar to those in the Aegeriidae.

Pupa.—(pl. 13, figs. 83, 84) Long; cylindrical; perceptibly tapering only from abdominal segments 7 to 10; caudal end rounded; 7th abdominal segment free in both sexes; appendages soldered to each other; a belt of heavy thorn-like spines on abdominal segments 7 to 10; primary setae also present, otherwise smooth; wings extending to anterior-ventral margin of 5th abdominal segment; cephalic end rounded, smooth; epicranial suture not distinctly indicated; vertex as long as prothorax; prothorax much shorter than mesothorax; pilifers very large; maxillary and labial palpi not indicated; pro and mesothoracic legs not extending cephalad between sculptured eyepiece and antennae; femora of prothoracic legs clearly indicated; meso and metathoracic legs extending beyond wings; antennae extending only two-thirds the wing length; maxillae short, not over half the wing length; no dorsal suture between 9th and 10th abdominal segments; anal and genital openings slit-like in both sexes; anal rise not armed; cremaster absent; spiracles slightly produced.

Specific description. Larva.—Full grown, 20-22 mm long, by 4.5 mm. broad. Body of mature larva white with thoracic shield and chitinized areas to 8th abdominal segment pale yellow; anal shield and dorsal plate of 9th abdominal segment dark brown; other chitinized areas of 8th, 9th and 10th abdominal segments smoky fuscous; legs yellow; tarsal claws brown; setae short, yellowish brown, crochets long, dark brown; 60-64; prolegs with a narrow brown ring about coxal lobe between coxal setae and crochets; spiracles black. Head pale yellow; anterior and postero-lateral margins of epicranium

brown; mandibles brown; tips and attachments of mandibles and mandibular attachments of epicranium black; setae of post mentum, broad and flattened; ocellar pigment black, individual under each ocellus. In earlier stage larvae the head and all chitinized areas about tubercles are dark smoky fuscous, being quite conspicious.

Pupa.—Light brown, slightly darker at caudal and cephalic ends; spines of last three abdominal segments dark brown; attachments of forewings forming a slightly raised shoulder, blackish brown; spiracles black, that on 8th abdominal segment only slightly larger than the others; metathoracic legs extending as far beyond mesothoracic as mesothoracic legs extend beyond the extremeties of wings; prothoracic legs extending a trifle beyond tips of antennae; maxillae only a little over half the length of antennae; male 16 mm., female 19 mm. long, 4.5 mm. wide.

The Pyraloid origin of this genus is distinctly shown in the large pilifers of the pupa and in several larval characters. Abdominal setae *IV* and *V*, it is true, are rather remote which would indicate a more primitive form; but in the other Thyridids I have seen they are closely approximate. Again in *Hexeris* as well as in *Thyris*, *Dysodia*, and *Thyridopyralis* the prespiracular shield of the prothorax bears only two setae (*IV* and *V*), a distinctly Pyraloid character. Fracker's statement[1] that the Kappa (Prespiracular) group of the prothorax is trisetose in Thyridide is obviously an error in observation. The blown larvae of *Dysodia oculatana* in the United States National Museum which he examined are plainly bisetose. The position of alpha (*I*) on the 9th abdominal segment which he also uses is not a reliable family character, in the Pyraloidea at least. As we now classify the groups it is of somewhat less than subfamily value. In *Dysodia* it is higher than beta (*II*) while in *Hexeris* it is considerably below it. On larval and pupal characters, therefore, we will be compelled to consider the Thyridinae, as a sub-family of the Pyralidae closely related to both the Galleriinae and Phycitinae.

EXPLANATION OF PLATES.

Terms used in description of male genital organs.—(Adopted with slight modifications from T. N. Pierce's Genitalia of the British Noctuidae, Liverpool, 1909; Genitalia of British Geometridae, 1914.)

Ae Aedoeagus (chitinous sheath of penis).
Agl Anal angle of harpe.
Cn Cornuti (spines on penis proper, seen through wall of aedoeagus).
Cs Cucullus of harpe.
Fp Caudo-lateral projections from tegumen.
Gn Gnathos.
Hp Harpe (Sensu J. B. Smith and Pierce; Noctuidae="valva," Pierce: Geometridae).

[1] The Classification of Lepidopterous Larvae, Ill. Bio. Monographs, vol. 2, no. 1, July, 1915, pp. 74-75.

Sc Sacculus of harpe.
Se Sicae (name proposed for ventral clasper like organs projecting backward from vinculum in some Gelechiidae).
Si Soci.
Sp Thornlike spine in anal angle of harpe.
A VIII Eighth abdominal segment of moth (a prominent and highly modified part of genitalia in some Gelechiidae).
Tg Tegumen.
Ts Transtilla.
Vm Vinculum (=saccus of Pierce: Geometridae).
U Uncus.

PLATE 1.

Male genitalia (Family Olethreutidae).

FIG. 1. *Evetria ulteriorana*, new species.
2. *Evetria colfaxiana coloradensis*, new variety.
3. *Evetria luculentana*, new species.
4. *Evetria albicapitana arizonensis*, new variety.
5. *Evetria albicapitana* Busck (right harpe, aedoeagus, and right half of tegumen).
6. *Eucosma monitorana*, new species.
7. *Eucosma rescissoriana*, new species.

PLATE 2.

Male genitalia (Olethreutidae and Phaloniidae).

FIG. 8. *Eucosma tocullionana*, new species.
9. *Laspeyresia pallidibasalis*, new species.
10. *Laspeyresia pallidibasalis* (aedoeagus)
11. *Commophila infernalis*, new species (ventral view of organs spread).
12. *Commophila macrocarpana* Walsingham (lateral view of organs unspread).
13. *Commophalia infernalis* (lateral view of organs unspread).

PLATE 3.

Male genitalia (Gelechiidae).

FIG. 14. *Gelechia periculella* Busck (ventral view of organs with modified eighth abdominal segment and aedoeagus removed).
15. *Gelechia periculella* Busck (aedoeagus).
16. *Gelechia nigrimaculella* Busck (posterior half of tegumen showing uncus and gnathos).
17. *Gelechia negundella*, new species (eighth abdominal segment and aedoeagus removed).
18. *Gelechia negundella*, new species (aedoeagus).

PLATE 4.

Male genitalia, etc. (Gelechiidae).

FIG. 19. *Tosca plutonella*, new species (lateral view of male organs unspread).
20. *Tosca plutonella* (ventral view of organs unspread).
21. *Tosca plutonella* (venation of wings of moth).
22. *Evippe prunifoliella* Chambers (lateral view of part of genitalia showing tegumen, uncus, and gnathos).
23. *Gelechia natalis*, new species (detail of genitalia, ventral view, showing uncus and gnathos).
24. *Gelechia natalis* (gentalia, ventral view, unspread)

PLATE 5.

Male genitalia (Gelechiidae).

FIG. 25. *Recurvaria quercivorella* Chambers (lateral view of male organs with eighth abdominal segment spread apart).
26. *Recurvaria quercivorella* Chambers (detail: ventral view of posterior half of tegumen showing lateral flaps, uncus, and gnathos).
27. *Recurvaria moreonella*, new species (detail: ventral view of tegumen and harpes).
28. *Recurvaria moreonella*, new species (detail: ventral view of vinculum with attached aedoeagus and sicae).
29. *Recurvaria moreonella* (lateral view of male organs with eighth abdominal segment removed).

PLATE 6.

Male genitalia (Gracilariidae, Pyralidae, and Blastobasidae).

FIG. 30. *Phyllonorycter felinella*, new species (detail of aedoeagus, lateral view).
31. *Phyllonorycter felinella*, new species (male organs, spread, ventral view).
32. *Hexeris enhydris* Grote (ventral view of organs, spread).
33. *Holcocera augusti*, new species (ventral view of organs, spread).
34. *Eubolepia garganuella*, new species (ventral view of organs, spread).

Terms used in description of larvae.

A1; A2; A3 Aa=Anterior group of setae and puncture of epicranium.
Adf1, *Adf2 Adfa*=Adfrontal setae and puncture of epicranium.
ADFR=Adfrontal ridge of frons.
ADFS=Adfrontal suture.
E1, *E2*=Epistomal setae.
ER=Epipharyngeal rods.
ES=Epipharyngeal shield.
ET=Epipharyngeal setae.
F1, *Fa*=Frontal setae and punctures.
FR=Frons.
G1, *Ga*=Genal seta and puncture of epicranium.
L1, *La*=Lateral seta and puncture of epicranium.
La1, *La2*, *La3*=Setae of lateral group of labrum.
Lp=Labral puncture.
LR=Longitudinal ridge of frons.
M1, *M2*, *M3*=Median setal group of labrum.
Mxb=Blades of maxillulae.
O1, *O2*, *O3*, *Oa*=Ocellar setae and puncture of epicranium.
P1, *P2*, *Pa*, *Pb*=Posterior group of setae and punctures of epicranium.
SO1, *SO2*, *SO3*, *SOa*=Sub-ocellar setae and puncture of epicranium.
X=Ultra posterior setae and punctures of epicranium.

PLATE 7.

Larval characters (Labra and Epipharynges).

FIG. 35. *Tosca plutonella*, new species (Gelechiidae).
36. *Chrysopeleia ostryacella* Chambers. (Cosmopterygidae.)
37. *Theisoa constrictella* Zeller (Cosmopterygidae).
38. *Dorata inornatella* Busck (Tineidae).
39. *Hexeris enhydris* Grote (Pyralidae: Thyridinae).
40. *Givira lotta* Barnes and McDunnough (Cossidae).
41. *Dasypyga alternosquamella* Raganot (Pyralidae: Phycitinae)
42. *Euzophera ostricolorella* Hulst (Pyralidae: Phycitinae).

PLATE 8.

Larval characters.

FIG. 43. Dorsal view of head capsule showing arrangement of setae (*Tosca plutonella*, new species).
44. Lateral view of head capsule (*Tosca plutonella*, new species).
45. Setal map of first thoracic segment (*Tosca plutonella*, new species).
46. Mine of larva in leaf (*Tosca plutonella*, new species).
47. Dorsal view of head capsule showing setal arrangement (*Hexeris enhydris* Grote).
48. Lateral view of head capsule (*Hexeris enhydris* Grote).
49. Maxillulae (*Hexeris enhydris* Grote).
50. Setal map of first and second thoracic and third, eighth, and ninth abdominal segments (*Hexeris enhydris* Grote).
51. Crochet arrangement of abdominal proleg (*Hexeris enhydris* Grote).

PLATE 9.

Larval characters.

FIG. 52. Dorsal view of head capsule showing setal arrangement (*Chrysopeleia ostryacella* Chambers).
53. Lateral view of head capsule (*Chrysopeleia ostryacella* Chambers).
54. Dorsal view of head capsule showing setal arrangement (*Theisoa constrictella* Zeller).
55. Ventral view of sections of left lobe of spicranium, showing ocellar and subocellar regions (*Theisoa constrictella* Zeller).
56. Setal map of first and second thoracic and third and ninth abdominal segments (*Theisoa constrictella* Zeller).
57. Setal map of first and second thoracic and third, eighth, and ninth abdominal segments (*Chrysopeleia ostryacella* Chambers).

PLATE 10.

Larval characters.

FIG. 58. Dorsal view of head capsule showing setal arrangement (*Dorata inornatella* Busck).
59. Lateral view of head capsule (*Dorata inornatella* Busck).
60. Dorsal view of head capsule (*Givira lotta* Barnes and McDunnough).
61. Lateral view of head capsule (*Givira lotta* Barnes and McDunnough).
62. Setal map of first and second thoracic and third, eighth, and ninth abodminal segments (*Givira lotta* Barnes and McDunough).
63. Crochet arrangement on abdominal proleg (*Givira lotta* Barnes and McDunnough).
64. Maxillulae (*Givira lotta* Barnes and McDunnough).
65. Setal map of first and second thoracic and third, eighth, and ninth abdominal segments (*Dorata inornatella* Busck).
66. Crochet arrangement on abdominal proleg (*Dorata inornatella* Busck).

PLATE 11.

Larval characters.

FIG. 67. Dorsal view of head capsule showing setal arrangement (*Dasypyga alternosquamella* Raganot).
68. Lateral view of head capsule (*Dasypyga alternosquamella* Raganot).
69. Dorsal view of head capsule (*Euzophera ostricolorella* Hulst).

FIG. 70. Lateral view of head capsule (*Euzophera ostricolorella* Hulst).
71. Crochet arrangement on abdominal proleg (*Dasypyga alternosquamella* Raganot).
72. Setal map of first thoracic and eighth and ninth abdominal segments (*Euzophera ostricolorella* Hulst).
73. Crochet arrangement on abdominal proleg (*Euzophera ostricolorella* Hulst).
74. Setal map of first and second thoracic and third, eighth, and ninth abdominal segments (*Dasypyga alternosquamella* Raganot).

Terms used in description of pupa. (Adopted from Miss Edna Mosher, Bull. Ill. State Nat. Hist., vol. 12, article 2, March, 1916.)

a=antenna.
ao=anal opening.
at=invaginations for anterior arms of tentorium.
cl=clypeus.
cs=caudal spines.
cx1=coxa of prothroatic leg.
cx2=coxa of mesthoracic leg.
cx3=coxa of metathoracic leg.
es=epicranian suture.
f=front.
fl=femora of prothoracic leg.
fcs=Fronto-clypeal suture.
g=gena.
ge=glazed eye-piece.
go=genital opening.
lb=labrum.
l1=prothoracic leg.
l2=mesothoracic leg.
l3=metathoracic leg.
lp=labial palpi.
md=mandible.
mp=maxillary palpus.
ms=mesothorax.
mt=metathorax.
mx=maxilla.
p=prothorax.
pf=pilifer.
s=spiricle.
sc=sculptured eye-piece.
v=vertex.
wl=mesothoracic wing.

PLATE 12.

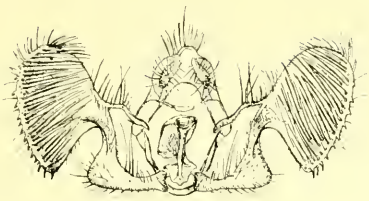
Pupae (Tineidae and Cossidae).

FIG. 75. Ventral view of pupa (*Dorata inornatella* Busck).
76. Dorsal view (*Dorata inornatella* Busck).
77. Lateral view of anterior portion of pupa (*Givira lotta* Barnes and McDunnough).
78. Ventral view of pupa (*Givira lotta* Barnes and McDunnough).
79. Dorsal view (*Givira lotta* Barnes and McDunnough).

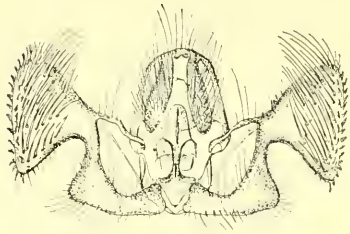
PLATE 13.

Pupae (*Pyralidae*).

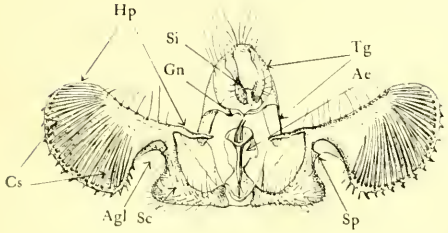
FIG. 80. Ventral view of pupa (*Dasypyga alternosquamella* Raganot).
81. Dorsal view (*Dasypyga alternosquamella* Raganot).
82. Dorsal view of abdominal segments of pupa (*Euzophera ostricolorella* Hulst)
83. Ventral view of pupa (*Hexeris enhydris* Grote).
84. Dorsal view (*Hexeris enhydris* Grote.)



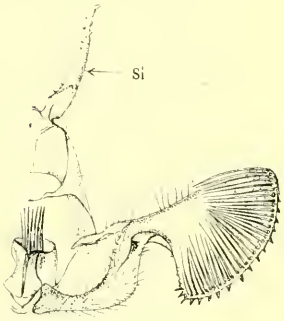
1 *Evetria ulteriorana*



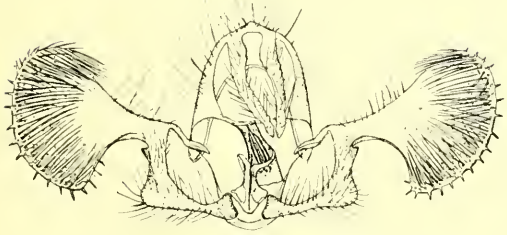
2 *Evetria colfaxiana coloradensis*



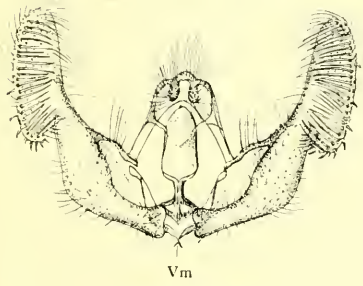
3 *Evetria luculentana*



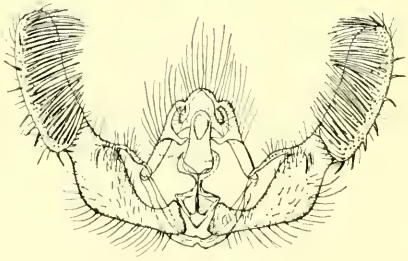
5 *Evetria albicapitana*



4 *Evetria albicapitana arizonensis*



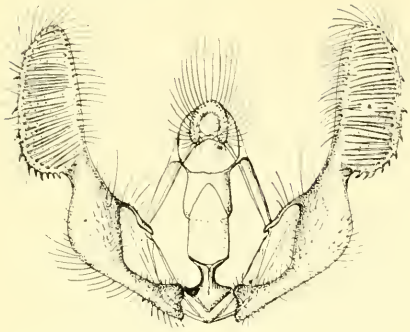
6 *Eucosma monitorana*



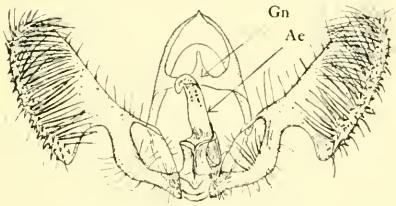
7 *Eucosma rescissoriana*

STRUCTURAL CHARACTERS OF FOREST LEPIDOPTERA.

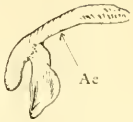
FOR EXPLANATION OF PLATE SEE PAGE 93.



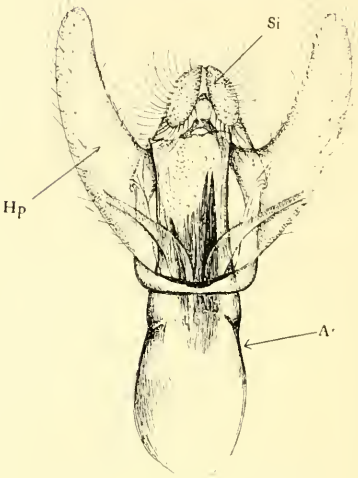
8 *Eucosma tocullionana*



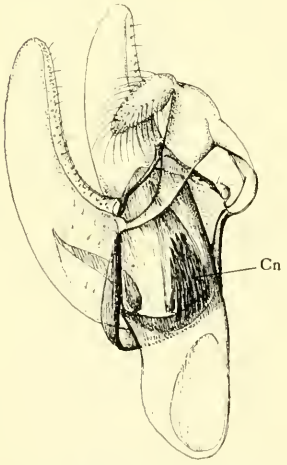
9 *Laspeyresia pallidibasalis*



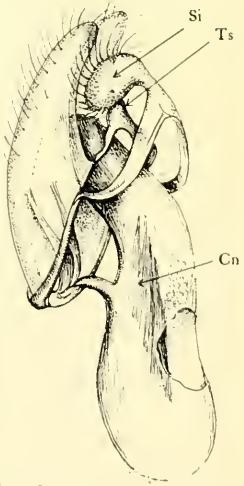
10 *Laspeyresia pallidibasalis*



11 *Commophila infernalis*



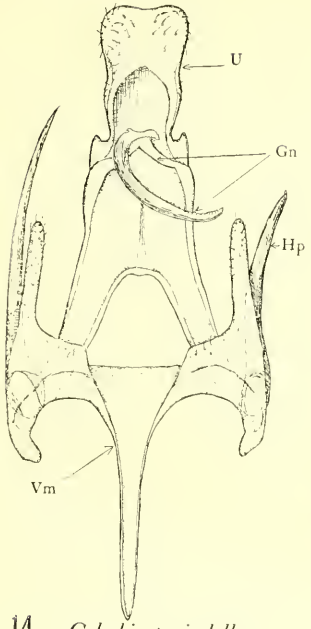
12 *Commophila macrocarpana*



13 *Commophila infernalis*

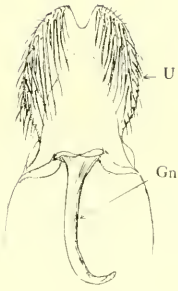
STRUCTURAL CHARACTERS OF FOREST LEPIDOPTERA.

FOR EXPLANATION OF PLATE SEE PAGE 93.

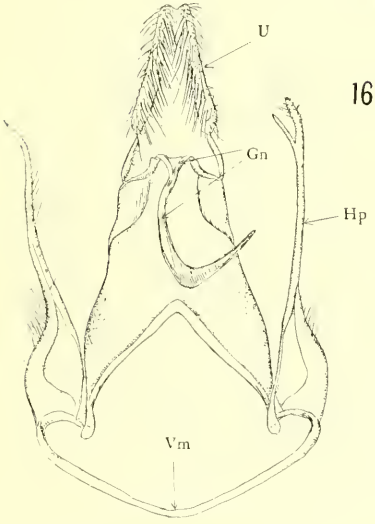


14 *Gelechia periculella*

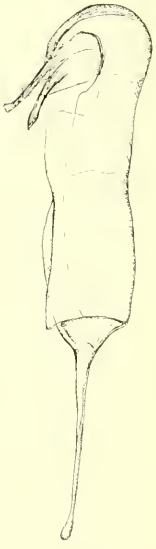
15 *Gelechia periculella*



16 *Gelechia nigrimaculella*



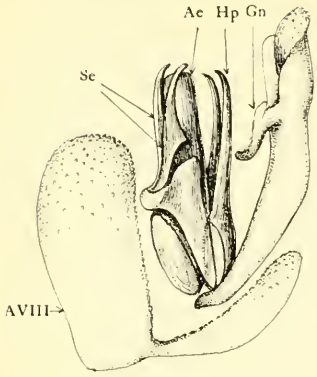
17 *Gelechia negundella*



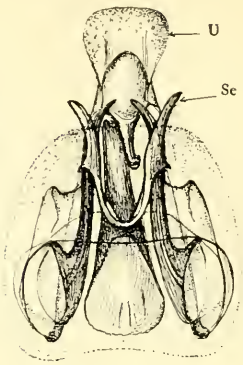
18 *Gelechia negundella*

STRUCTURAL CHARACTERS OF FOREST LEPIDOPTERA.

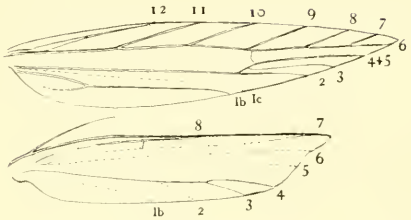
FOR EXPLANATION OF PLATE SEE PAGE 93.



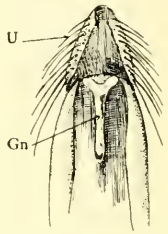
19 *Tosca plutonella*



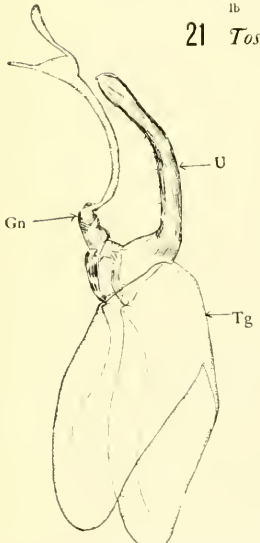
20 *Tosca plutonella*



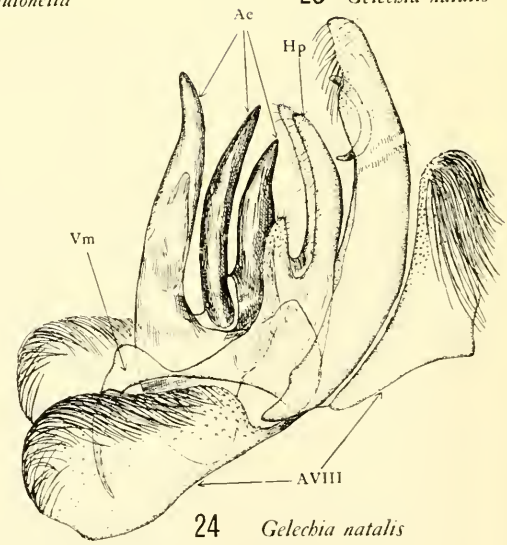
21 *Tosca plutonella*



23 *Gelechia natalis*



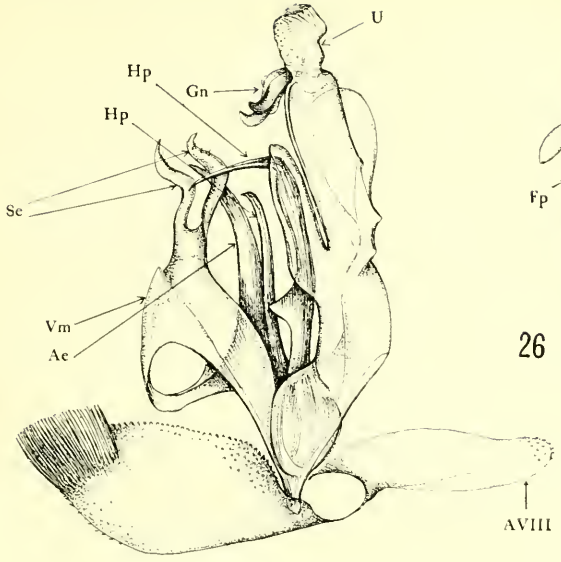
22 *Evippe prunifoliella*



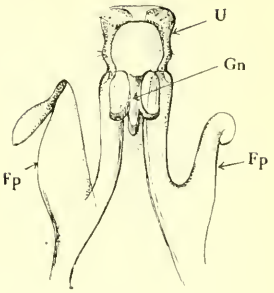
24 *Gelechia natalis*

STRUCTURAL CHARACTERS OF FOREST LEPIDOPTERA.

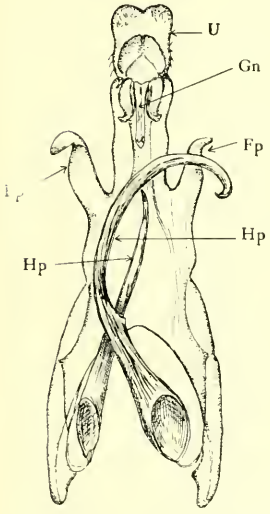
FOR EXPLANATION OF PLATE SEE PAGE 93.



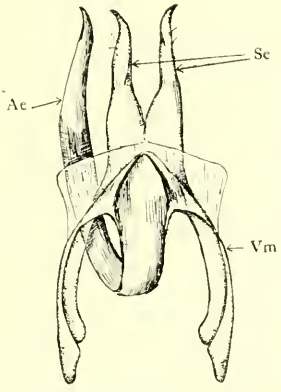
25 *Recurvaria quercivorella*



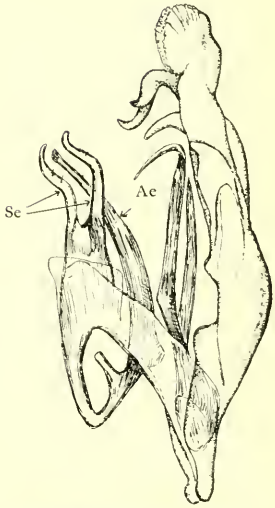
26 *Recurvaria quercivorella*



27 *Recurvaria moreonella*



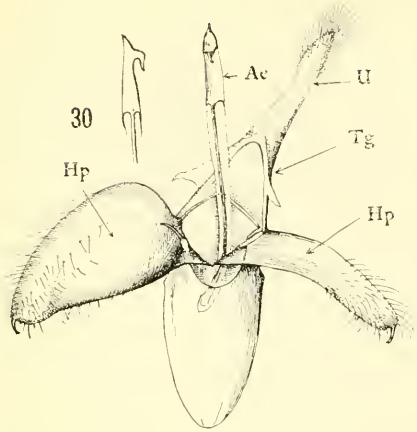
28 *Recurvaria moreonella*



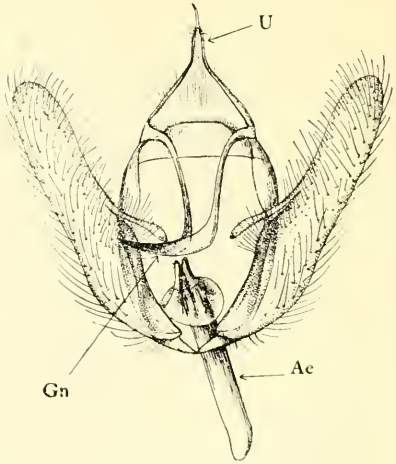
29 *Recurvaria moreonella*

STRUCTURAL CHARACTERS OF FOREST LEPIDOPTERA.

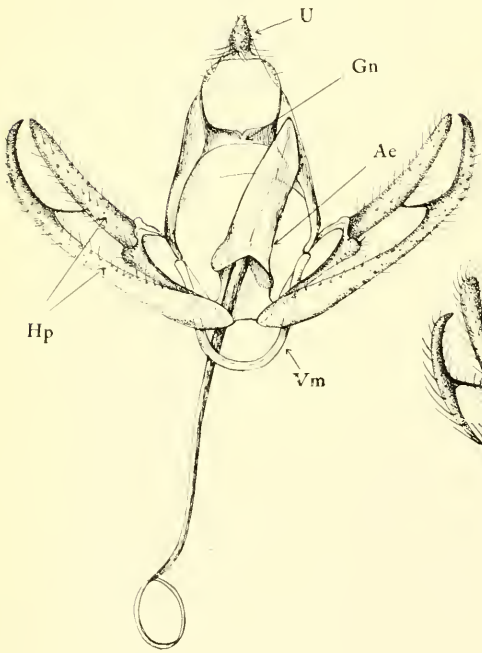
FOR EXPLANATION OF PLATE SEE PAGE 94.



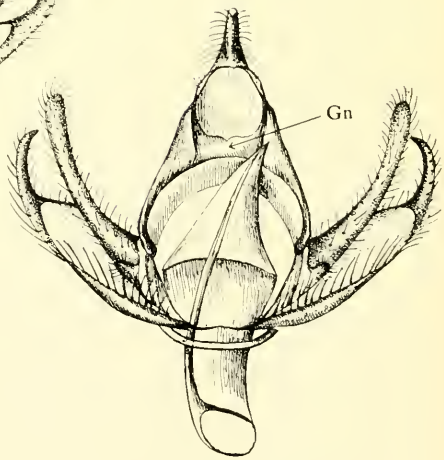
31 *Phyllonorycter felinella*



32 *Hexeris enhydris*



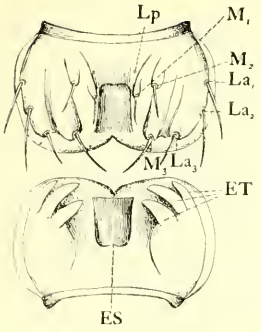
33 *Holcocera augusti*



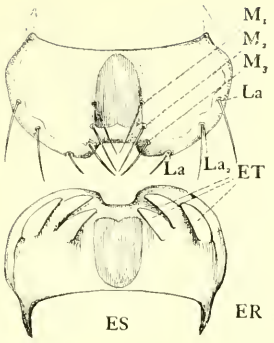
34 *Eubolepia gargantuella*

STRUCTURAL CHARACTERS OF FOREST LEPIDOPTERA.

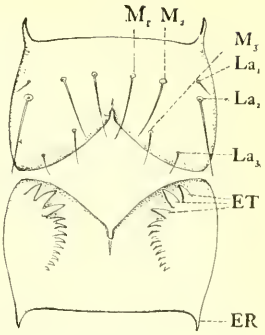
FOR EXPLANATION OF PLATE SEE PAGE 94.



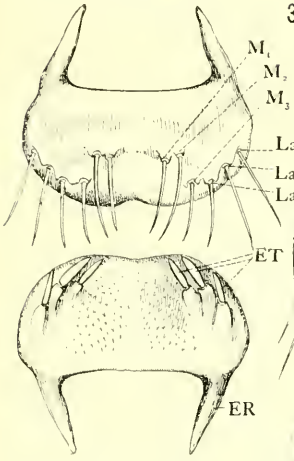
35 *Tosca plutonella*



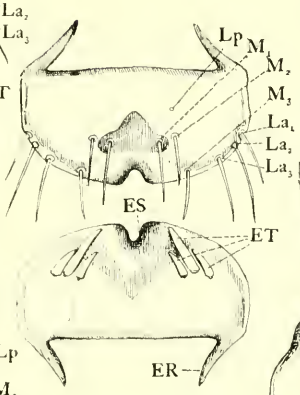
36 *Chrysopeleia ostryaecella*



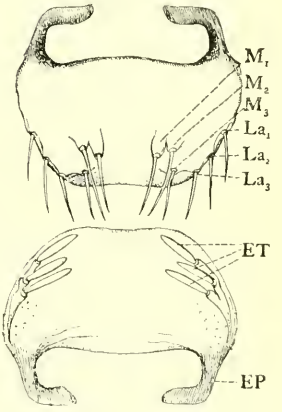
37 *Theisoa constrictella*



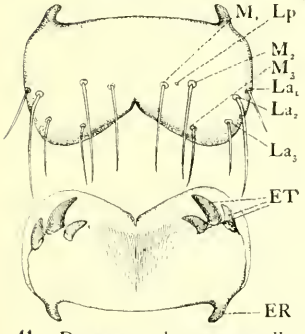
38 *Dorata inornatella*



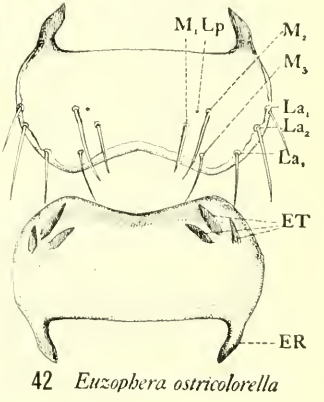
39 *Hexeris enhydris*



40 *Givira lotta*



41 *Dasypyga alternosquamella*



42 *Euzophera ostricolorella*

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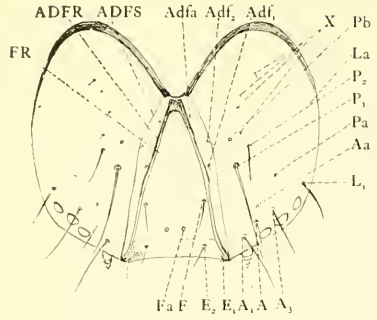
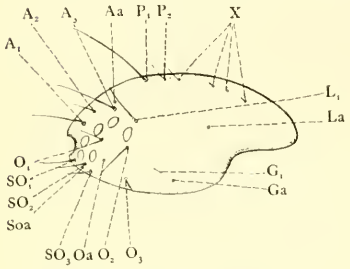
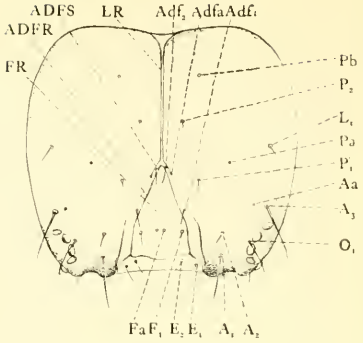
FOR EXPLANATION OF PLATE SEE PAGE 94.



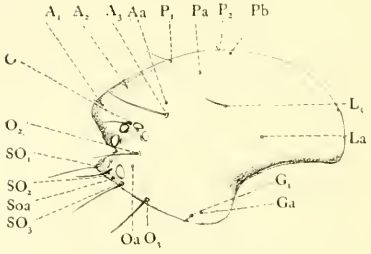
43 *Tosca plutonella*



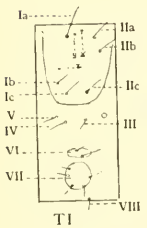
44 *Tosca plutonella*



47 *Hexeris enhydris*

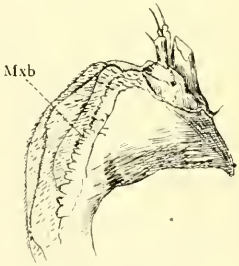


48 *Hexeris enhydris*

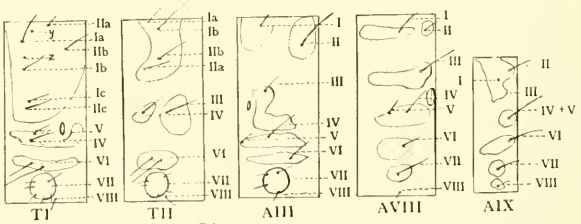


45 *plutonella*

46 *plutonella*



49 *enhydris*

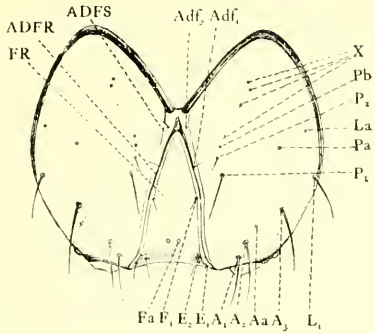


50 *enhydris*

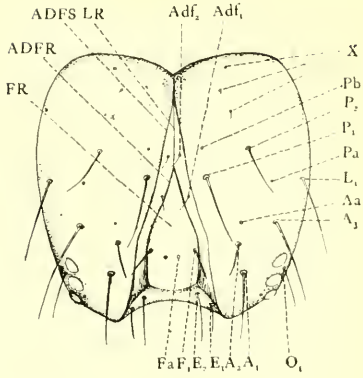
51 *enhydris*

STRUCTURAL CHARACTERS OF FOREST LEPIDOPTERA.

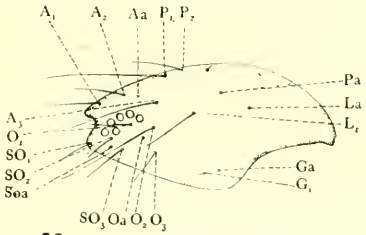
FOR EXPLANATION OF PLATE SEE PAGE 95.



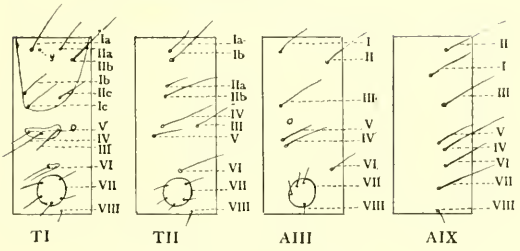
52 *Chrysopeleia ostryaecella*



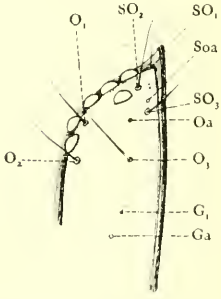
54 *Theisoa constrictella*



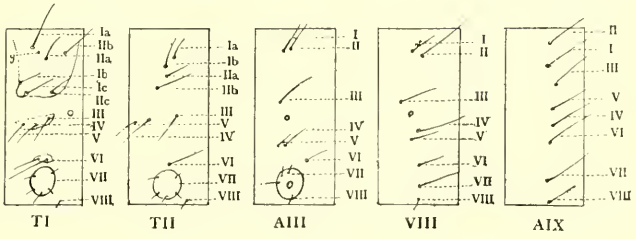
53 *Chrysopeleia ostryaecella*



56 *Theisoa constrictella*



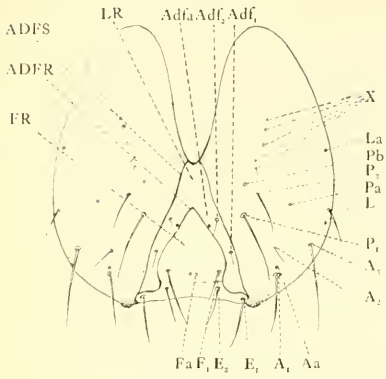
55 *Theisoa constrictella*



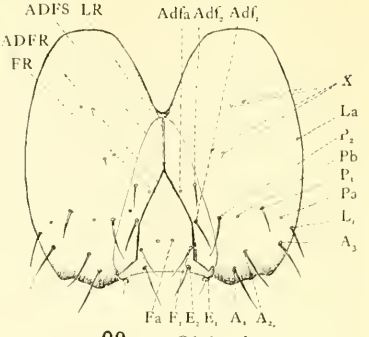
57 *Chrysopeleia ostryaecella*

STRUCTURAL CHARACTERS OF FOREST LEPIDOPTERA.

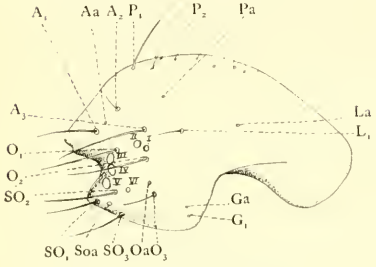
FOR EXPLANATION OF PLATE SEE PAGE 95.



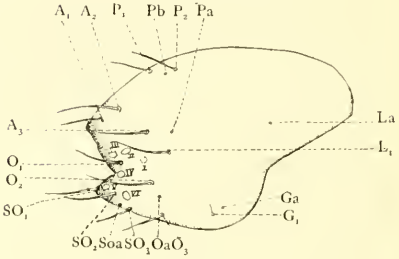
58 *Dorata inornatella*



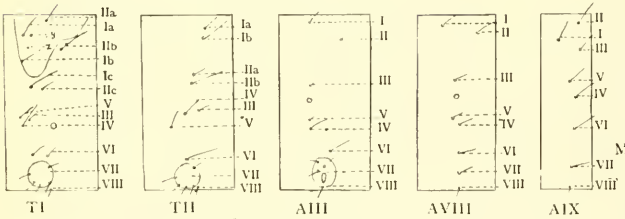
60 *Givira lotta*



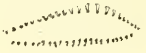
59 *Dorata inornatella*



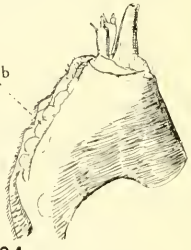
61 *Givira lotta*



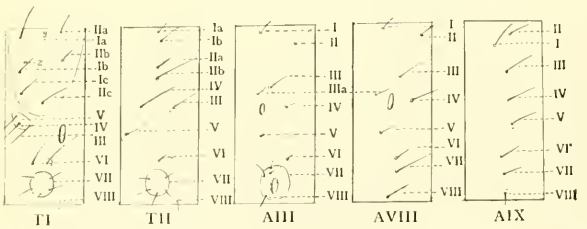
62 *Givira lotta*



63 *Givira lotta*



64 *Givira lotta*

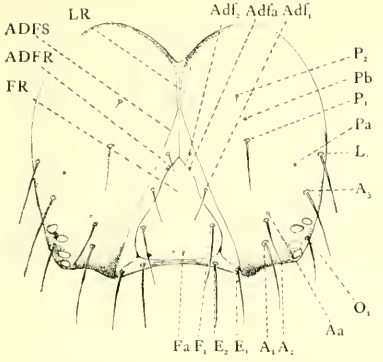


65 *Dorata inornatella*

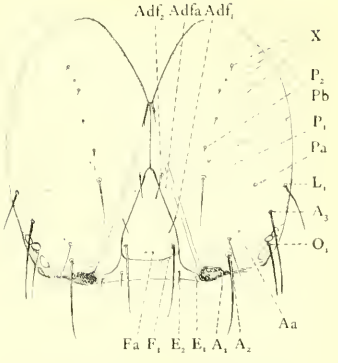
66 *Dorata inornatella*

STRUCTURAL CHARACTERS OF FOREST LEPIDOPTERA.

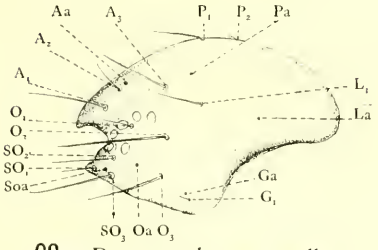
FOR EXPLANATION OF PLATE SEE PAGE 95.



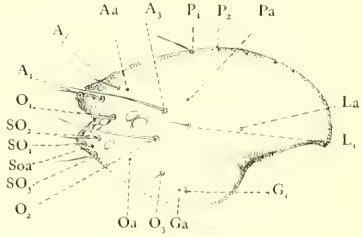
67 *Dasypyga alternosquamella*



69 *Euzophera ostricolorella*

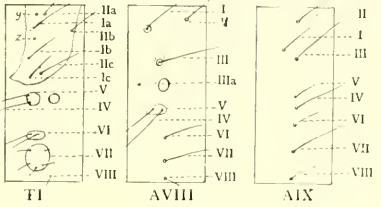


68 *Dasypyga alternosquamella*

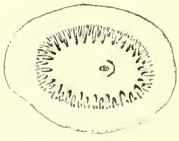


70 *Euzophera ostricolorella*

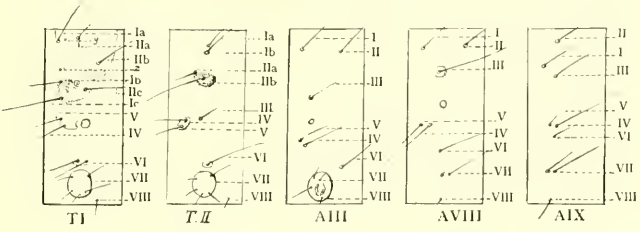
71 *alternosquamella*



72 *Euzophera ostricolorella*



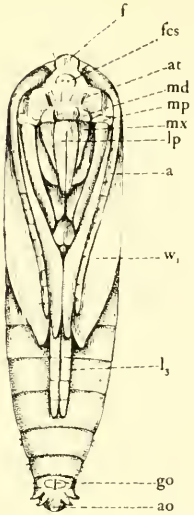
73 *ostricolorella*



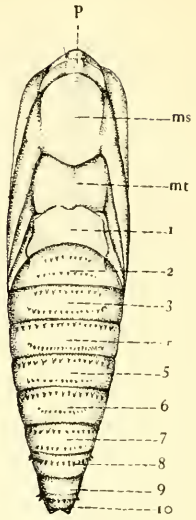
74 *Dasypyga alternosquamella*

STRUCTURAL CHARACTERS OF FOREST LEPIDOPTERA.

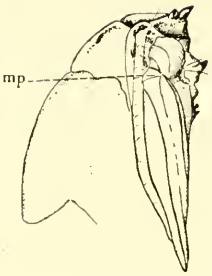
FOR EXPLANATION OF PLATE SEE PAGES 95 AND 96.



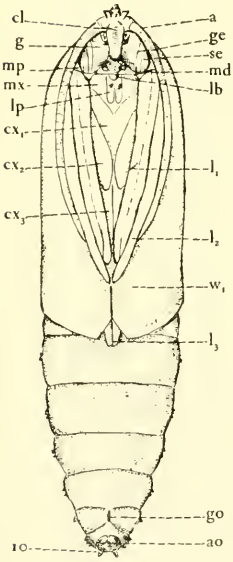
75 *Dorata inornatella*



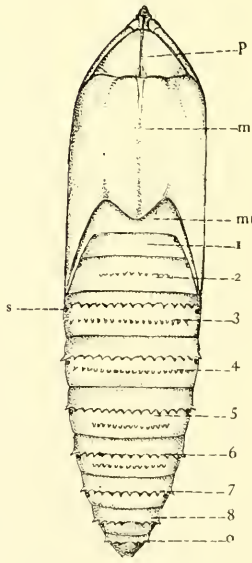
76 *Dorata inornatella*



77 *Givira lotta*



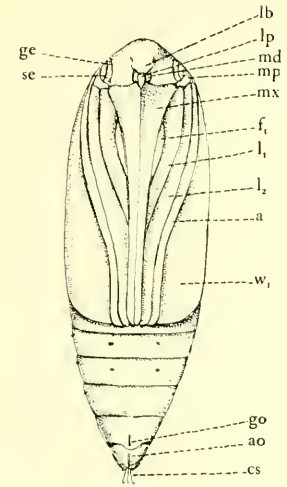
78 *Givira lotta*



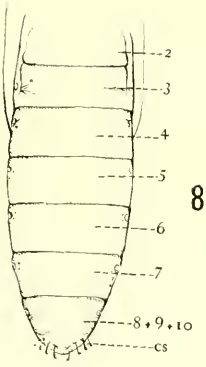
79 *Givira lotta*

STRUCTURAL CHARACTERS OF FOREST LEPIDOPTERA.

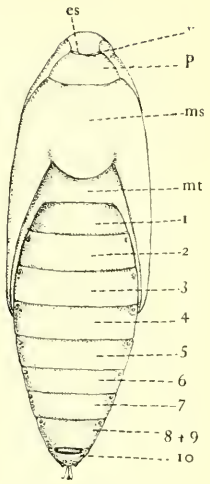
FOR EXPLANATION OF PLATE SEE PAGE 96.



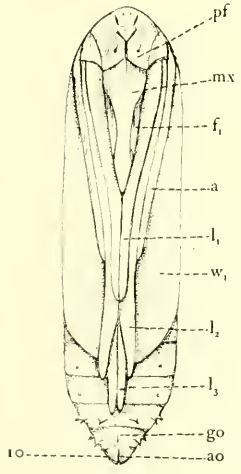
80 *Dasypyga alternosquamella*



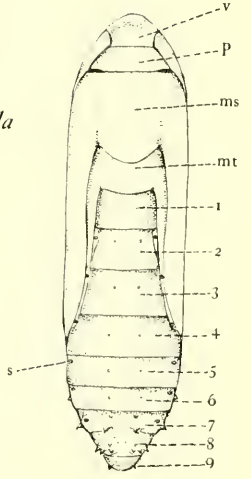
82 *Euzophera ostricolorella*



81 *Dasypyga alternosquamella*



83 *Hexeris enhydris*



84 *Hexeris enhydris*

STRUCTURAL CHARACTERS OF FOREST LEPIDOPTERA.

FOR EXPLANATION OF PLATE SEE PAGE 96.