The Moths of America North of Mexico

FASCICLE 13.1B

PYRALOIDEA

Pyralidae (Part)

EUGENE MUNROE

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The Moths of America North of Mexico

FASCICLE 13.1B

PYRALOIDEA

PYRALIDAE

COMPRISING SUBFAMILIES

ODONTIINAE

GLAPHYRIINAE

EUGENE MUNROE

ENTOMOLOGY RESEARCH INSTITUTE

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PYRALOIDEA

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SUBFAMILY **Odontiinae** Guenée

Type-genus: *Odontia* Duponchel, 1832, now considered a synonym of *Cynaeda* Hübner, [1825].

Odontidae Guenée, 1854, *Species Général des Lépidoptères*, **8**: 111.

Titanii Marion, 1952, *Revue Française de Lépidoptérologie*, **15–17**: 268.
Type-genus: *Titanio* Hübner, [1825].

Dichogamini Amsel, 1956, *Boletín Ent. Venezolana*, **10**: 278.
Type-genus: *Dichogama* Lederer, 1863. Tribe.

Alatuncusiini Amsel, 1956, *Boletín Ent. Venezolana*, **10**: 281.
Type-genus: *Alatuncusia* Amsel, 1956. Tribal synonym.

This subfamily includes minute to moderate-sized moths, resembling the Pyraustinae in external characters, but with the praecinctorium simple, not bilobed as is usual with Pyraustinae. The build is usually robust; the proboscis, the maxillary palpi and usually the ocelli are well developed. The eye is often reduced and the frons is often prominent or armed with sclerotized processes. The wings tend to be relatively small, and the forewing often has a scaled prominence on the posterior margin near the base.

The male genitalia are distinctive. The uncus is usually broad and bilobed, and has the lateral margins decurved and usually strongly setose. The gnathos is basally fused with the tegumen on each side, and is usually strong and V-shaped or Y-shaped, but sometimes is reduced to a transverse bridge. The valves are usually rounded and radially fluted. There is no clasper. There are specialized scalelike sclerotizations associated with the juxta and vinculum midventrally. The penis varies, but is short, curved and tapering in many genera.

The female genitalia are variable, without known subfamily characters.

The larvae in general are poorly known. They resemble those of Pyraustinae. Diagnostic subfamily characters have so far not been identified. The caterpillars vary in habits and include leaf-webbers, leaf-miners and seed-feeders.

This subfamily is of nearly world-wide distribution. It includes about 100 genera and several hundred species. It is rather well developed in the dry warm-temperate parts of the Holarctic region, forming a characteristic element of the faunas of such environments in both the Old and New Worlds. Our fauna consists mainly of distinctively North American genera, but a few extend some distance into the tropics (e.g., *Mimoschinia*, *Heliothelopsis*); *Dichogama* and *Alatuncusia* are primarily neotropical; *Metrea* is closely related to the neotropical *Cliniodes*, whereas *Metaxmeste* belongs to a mainly palaearctic group.

None of the species is known to have serious economic importance in North America, but *Eustixia pupula* is an occasional pest of cabbage, *Brassica oleracea* L.; *Frechinia helianthiales* makes large blotch mines in sunflower leaves (*Helianthus* species); *Mimoschinia rufofascialis* attacks the flowers and seeds of various Malvaceae, though apparently not cotton (*Gossypium* species); and *Dichogama* and *Alatuncusia* species are leaf-webbers on capers (*Capparis* species). For a synopsis of North American species and a list of world genera see Munroe (1961).

KEY TO NORTH AMERICAN TRIBES AND GENERA

1. Uncus of male genitalia bridgelike or T-shaped; ovipositor lobe of female short, high, with strong setae and narrow cross-bar of apophysis ..... Dichogamini, 2 p. 140
— Gnathos of male genitalia strongly developed, conspicuously V-shaped or Y-shaped; ovipositor lobe of female long, low, with weak, sparse setae; cross-bar of apophysis usually expanded ..... Odontiini, 5 p. 146

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— Frons flat or rounded, not prominent; moth without contrasting black dots 3

3. Frons rounded; labial palpus upturned but with third segment turned down at an angle to second; moth white with prominent blackish-gray patches on forewing on end of cell, on posterior margin basad of postmedial line, and between postmedial line and termen ..... *Metrea* p. 140
— Frons flat and oblique; labial palpus upturned with third segment continuing line of second; wings variously marked, but with no contrasting blackish-gray patch on forewing immediately basad of postmedial line 4

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— Frons transversely wedge-shaped or truncated, the ventrolateral angles produced as sharp tubercles 11

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— Frons transversely wedge-shaped anteriorly 12

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TRIBE **Dichogamini** Amsel

Type-genus: *Dichogama* Lederer, 1863.

Dichogamini Amsel, 1956, *Boletín Ent. Venezolana*, **10**: 278.

Alatuncusiini Amsel, 1956, *Boletín Ent. Venezolana*, **10**: 281.
Type-genus: *Alatuncusia* Amsel, 1956.

This tribe consists of robust, mostly fairly large moths. In the male genitalia the gnathos has the median element weak or absent. In the female the ovipositor has normal, short, high, strongly setose lobes, with normal, T-shaped posterior apophyses, in contrast to the low, produced, sparsely setose lobes and posteriorly bladelike posterior apophyses of the Odontiini.

The larvae are mostly leaf-tiers; in at least three genera the hosts are species of Cruciferae or Capparidaceae, suggesting a connection with the Evergestinae and with *Hellula* in the Glaphyriinae.

There are only a few North American species, but there are additional genera and a considerable number of species in the tropics. In my *Synopsis* (Munroe, 1961) I put *Eustixia* in the Odontiini, but the present arrangement seems to be more natural.

GENUS *Metrea* Grote

Metrea Grote, 1882, *Papilio*, **2**: 73.
Type-species: *Metrea ostreonalis* Grote, 1882. Monotypy.

The moth is moderately large, with robust body and rounded wings. The frons is rounded, not prominent. The labial palpi are obliquely upturned, with the third segment short and turned down at an angle to the rest of the palpus and hidden in the scaling of the second. The maxillary palpi are filiform but prominent. The proboscis is well developed. The eyes

are large and the ocelli prominent. The antennae are filiform and ciliated in both sexes. The praecinctorium has a simple, transverse, terminal lobe.

The male genitalia have the uncus rounded and laterally setose; the gnathos has a short central piece arising from a transverse ribbonlike base. The valves are expanded and distally rounded, with fluted inner surface and along the outer rim a row of long thick setae directed towards the base. The penis is short, curved, of nearly even width and has no cornuti.

In the female genitalia the ovipositor lobes are well developed. The ductus bursae is short and slender, with a sclerotized collar near the bursa. The bursa is large, globular, membranous and finely denticulate, and has a large crumpled sclerotized area near the opening of the ductus bursae.

The single known species has a restricted geographical range in the northeastern United States and southeastern Canada. It is closely related to the tropical American genus *Cliniodes* Guenée, which has about 20 species. *Cliniodes* is more specialized structurally than *Metrea*, having the uncus pointed at the end and downcurved at the sides, having the sclerites of the vinculum more complex and having the valve distally truncate (see Munroe, 1964).

Metrea ostreonalis Grote

PL. 1, FIGS. 44, 45 (McD. 5421).

Metrea ostreonalis Grote, 1882, *Papilio*, **2**: 73.
Type-locality: Amherst, Massachusetts.

Botys urticaloides Fyles, 1894, *Can. Ent.*, **26**: 184.
Type-locality: Brome County, Quebec.

This white moth with prominent dark-gray patches and postmedial line on the forewings cannot be mistaken for anything else in its geographical range.

The larva was described by McDunnough (1931). The head and prothoracic shield are gray-blue, sprinkled and dotted with black. The abdomen is dorsally gray-blue, with a double orange dorsal line and a single orange spiracular stripe on each side. The tubercles are large and black. The venter is paler gray-blue. The larva lives in an untidy web of leaves on black buckthorn, *Rhamnus frangula* L., and possibly also on leatherwood, *Dirca palustris* L. It overwinters in a coarse yellowish cocoon mixed with debris and leaves, pupating in the spring.

The species is known from a rather restricted area in the northeast, extending from Shawinigan, Quebec, through the Ottawa-Hull region of Ontario and Quebec to southeastern Michigan, and through the northeastern corner of New York State to Massachusetts and Connecticut. It is rare but comes occasionally to light. It flies in July.

GENUS *Dichogama* Lederer

Dichogama Lederer, 1863, *Wiener Ent. Monat.*, **7**: 396.
Type-species: *Dichogama redtenbacheri* Lederer, 1863. Monotypy.

The moths are large, robust and noctuidlike in appearance, with fairly narrow, rather square-tipped forewings and with long tapering abdomen. The color is usually pale, often with a striking pattern of dark markings on the forewings above. The labial palpi are upturned,

obliquely flattened and densely and smoothly scaled, with the segments hardly distinguishable. The maxillary palpi are short and flattened. The proboscis is stout and prominent. The frons is flat, the eyes large and the ocelli small.

The male genitalia are remarkable for the high narrow tegumen, the small, upturned weakly bilobed uncus and the broad unarmed valve. The latter is emarginated distally in some species. The penis has a complex armature of spinelike cornuti.

In the female genitalia the ovipositor lobes are well developed and heavily setose. The posterior apophyses are weak and the anterior ones somewhat stronger. The ductus bursae is very short. The bursa is heavily and unsymmetrically striated and has conspicuous patches of spines.

The larvae live in nests of leaves spun together on various species of capers, *Capparis*.

The genus has a number of species in tropical America and is well represented in the West Indies.

KEY TO NORTH AMERICAN SPECIES

1. Forewing above with a small dull-red patch on outer margin just behind apex; no distinct antemedial band, postmedial band or discocellular marking .. *amabilis* p. 143

— Forewing above with no dull-red patch; transverse bands and discocellular marking usually indicated, often conspicuous ..... *redtenbacheri* this page

Dichogama redtenbacheri Lederer

PL. 1, FIGS. 46–48 (McD. 5379).

Dichogama redtenbacheri Lederer, 1863, *Wiener Ent. Monat.*, **7**: 396, pl. 13, figs. 10, 11. Type-locality: St. Thomas.

The large pearly-whitish moth most often has a pattern on the forewings consisting of a doubly looped antemedial marking, an eyespot on the discocellular vein, a bent postmedial line and a couple of subterminal black dots near the middle of the wing. Occasionally, the basal and discocellular markings are filled with black, and the latter is connected with the subterminal dots by a broad black bar (ab. *nigra* Amsel, 1956: 277). In other specimens the pattern may be obsolescent or completely lacking. Such weakly marked individuals can be distinguished from *D. amabilis* by the absence of reddish postapical spots.

The male genitalia are characterized by the narrow, weakly setose uncus and the entire outer margin of the valve. In the female the bursa is very strongly striated and has a restricted area of rather large spines.

The larva has been described by Dyar (1900a: 271). It lives in a nest of leaves spun together on Jamaica caper, *Capparis cynophallophora* L. It is greenish, with whitish head marked with dark brown, with semitransparent prothoracic shield with weak brown dots, with yellowish-white subdorsal and spiracular lines, with weak whitish streaks in the lateral space and with a double, waved and brown lateral line. Dyar describes the stages in some detail. The larva turns red before pupating in a cocoon of cut leaves sewn together and lined with silk.

The species is widespread in tropical America. In North America it is known from Florida as far north as Palm Beach and Chokoloskee. It has been collected in April, May and August.

Dichogama amabilis Möschler

PL. 1, FIG. 49 (McD. 5380).

Dichogama amabilis Möschler, 1891, *Abhandl. Senckenb. Naturforsch. Ges.*, **16**: 296.
Type-locality: Puerto Rico.

The moth is of the same size and build as *D. redtenbacheri*, and resembles unmarked specimens of that species. The forewings are silvery white, slightly infuscated on the outer parts, and may have sparse fuscous dusting, especially around the cell. There are faint black subterminal dots on the spaces between the veins, and a small subapical reddish spot in cell R_4. The fringe is gray. Kimball (1965: 204) says that some specimens lack the reddish subapical spot, which normally distinguishes this species from *D. redtenbacheri*. I have not myself seen such specimens, but if encountered they can be told by the more oblique margin of the forewing as well as by the structure of the male or female genitalia. The length of the forewing varies from 14–16 mm.

The male genitalia differ from those of *D. redtenbacheri* in the broader, more strongly setose uncus and the strongly incised outer margin of the valve. In the female the striations of the bursa are not as strong in the present species, and the spinose patches are more extensive and their spines finer.

Dyar (1901: 20) has described the larva briefly. It lives in a boxlike shelter between spun-together leaves of Jamaica caper, *Capparis cynophallophora* L. It is greenish white, with whitish head blotched with olive and dotted with black; the thoracic shield is translucent whitish with black dots and a marginal black line; there is a double yellow dorsal line and an incomplete lateral line below the spiracles. Some of the tubercles are black, with or without a white ring, some are white; the spiracles are light red.

The species occurs in Florida as far north as Palm Beach and Sarasota. It has been collected in March to May and in October. It occurs also in the Antilles.

GENUS *Alatuncusia* Amsel

Alatuncusia Amsel, 1956, *Boletín Ent. Venezolana*, **10**: 280.
Type-species: *Lygropia gilvicostalis* Hampson, 1918. Monotypy.

The moths are similar in appearance to *Dichogama* species, but are smaller, have slightly narrower wings and relatively shorter abdomen. The labial palpi are upturned, with the segments distinctly visible, the second segment long, and the third segment fairly short, cylindrical. The maxillary palpi are scaled but not dilated. The proboscis is thick and prominent. The eyes are large and the ocelli small. The antennae are thick and somewhat compressed. The body is stout. The legs are robust. The praecinctorium is transversely flattened. The wing venation has no outstanding peculiarities.

The male genitalia are unusual. The uncus is basally slender but is dilated at the end into a large pair of broadly triangular flaps. The gnathos is weakly sclerotized, with a slender straplike central portion arising from a transverse element. The juxta is bilobed, with each lobe thin and scalelike. The vinculum is small, but bears a pair of long, broad, valvelike processes. The valves themselves are slender, rounded distally; each bears a slender styluslike process from the costa and a zone of basally directed hairs on the outer margin and outer

ventral angle. The penis is short and cylindrical; it is armed with one large cornutus and a row of numerous smaller ones.

The female genitalia have the ovipositor lobes high, membranous and strongly setose. The posterior apophyses are slender and T-shaped, with the shaft not very long. The anterior apophyses are longer. The ductus bursae has a sclerotized strip at some distance from the ostium and a sclerotized pleated zone leading into the bursa. The bursa is basally contorted, pleated and sclerotized and has a prominent spinose signum on each side; there is a prominent fluted diverticulum near the posterior end; the fundus is membranous, finely denticulated and armed with a diffuse scobinated signum.

The larvae live among spun leaves on Jamaica caper, *Capparis cynophallophora* L. The generic characters have not been worked out.

The genus is small but is widely distributed in the Neotropical region. The precise relationships of its components require further study. Only a single species occurs in North America.

Alatuncusia bergii (Möschler)
PL. 1, FIG. 50, 51 (McD. 5381).

Dichogama bergii Möschler, 1891, *Abhandl. Senckenb. Naturforsch. Ges.*, **16**: 297.
Type-locality: Puerto Rico.

The general appearance of the moth is similar to that of *Dichogama amabilis*, but the size is smaller (length of forewing 8–9 mm), the forewings above lack the reddish subapical spot, are suffused to a varying degree with gray or grayish fuscous and have weakly defined angulate antemedial and curved postmedial lines. The hindwing is translucent white.

The distinctive genitalia are as described for the genus.

The larva was described by Dyar (1901: 21). It lives on Jamaica caper, *Capparis cynophallophora* L., among leaves firmly spun together. The body is pale red, almost unmarked. The head is whitish with dark-brown patches. The thoracic shield is transparent, weakly spotted. There are whitish dorsal, subdorsal and spiracular lines. There are black bands separating the dorsal and subdorsal and the subdorsal and spiracular lines; the dorsal vessel is reddish. There is brownish mottling on the subventral fold. The subventer is colorless. The body is a little flattened and the setae are long and pale.

The species occurs in the Antilles and perhaps South America, and in our territory in Florida from the Keys north to Palm Beach. It has been collected in August to October.

GENUS *Eustixia* Hübner

Eustixia Hübner, 1823, *Zuträge zur Sammlung Exotischer Schmettlinge* [sic], **2**: 24.
Type-species: *Eustixia pupula* Hübner, 1823. Subsequent designation, Munroe, 1961, *Can. Ent., Supplement* **24**: 50.

Thelcteria Lederer, 1863, *Wiener Ent. Monat.*, **7**: 350.
Type-species: *Thelcteria pupula* Zeller, a mistaken citation by Lederer of *Eustixia pupula* Hübner, 1823. Monotypy.

The moth is small but robust, with moderate-sized wings and strong body. The frons is prominent and sharply conical. The labial palpus is porrect, with short scales and exposed third segment. The maxillary palpus is prominent and strongly dilated with scales at its tip.

The proboscis, eye and ocellus are well developed. The gena is naked. The wing venation has no striking peculiarities.

The male genitalia have the uncus bilobed but not strongly setose; the gnathos is short and bridgelike; the juxta is pear-shaped; the valve is relatively small, with straight, inflated costa and tapering sacculus, not striated or armed. The penis is cylindrical and has a single pointed cornutus.

The female genitalia have densely setose, high and membranous ovipositor lobes; the posterior apophysis is short and T-shaped; the anterior apophysis is longer, and is triangularly expanded posteriorly and irregularly bent anteriorly; the ductus bursae is funnel-shaped and sclerotized at the ostial end, membranous at the distal end; the bursa is small and membranous.

The larvae feed on Cruciferae. The larval structure has been briefly described by Dyar (1900) but the diagnostic characters have not been evaluated.

Only one species of the genus is known. The species listed by McDunnough as *Eustixia octonalis* (Zeller) is a pyraustine and will be dealt with under that subfamily.

Eustixia pupula Hübner

PL. 7, FIGS. 25, 26 (McD. 5653).

Eustixia pupula Hübner, 1823, *Zuträge zur Sammlung Exotischer Schmettlinge* [sic], **2**: 24, figs. 327, 328.
Type-locality: Savannah, [Georgia].

The moth is silvery white. The eyes, antennae, maxillary palpi and dorsal parts of the labial palpi are black. There are contrasting black spots on the thorax and a considerable number of similar spots on the forewings above, roughly indicating the normal spots and transverse lines. The hindwings have minute black markings in the postapical and submedian areas. The length of the forewing varies from 6.5–8 mm.

The genitalia are as described for the genus.

The larva has been described by Dyar (1900: 155) and notes on its occurrence and distribution were given by Shapiro (1968: 157). Dyar's description was overlooked by Forbes (1923) as well as by myself (Munroe, 1961) and by Shapiro. The larva feeds on peppergrass, *Lepidium virginicum* L., feeding in a delicate web on the heads, eating unripe seeds out of the flat pods and leaving two holes in the upper surface of each pod. According to Shapiro it is also a leaf-feeder and occurs on cabbage, *Brassica oleracea* L. cultivars, and on *Brassica nigra* (L.) Koch, as well as on peppergrass. On cabbage it occurs on the undersides of leaves on the outer part of the head. The last stage is green. The ocelli are black and the head is mottled with brown. The subventral fold is narrowly whitish. There are dorsal segmental bands of a dull crimson color reaching the subventral fold laterally; the edges of these bands are irregular and project anteriorly at the spiracle. The setae are fine, dusky and rather long. The pupa is formed in a compact, tough, opaque cocoon. The insect may overwinter as a pupa or may emerge the same year.

The species ranges from southern Ontario to Massachusetts, Florida, Wyoming, Missouri and Brownsville, Texas. In the vicinity of Philadelphia it is double-brooded, with adults flying in May and early June and again in late July and early August.

The moth is striking in appearance and can hardly be confused with anything else.

TRIBE **Odontiini** Guenée

Type-genus: *Odontia* Duponchel, 1832, now considered a synonym of *Cynaeda* Hübner, [1825].

Odontidae Guenée, 1854, *Species Général des Lépidoptères*, **8**: 111.

Titanii Marion, 1952, *Revue Française de Lépidoptérologie*, **15–17**: 268.
Type-genus: *Titanio* Hübner, [1825].

This tribe consists of usually robust but often small or even minute moths. The wings are most often broad and rounded, but they may be narrowed or pointed. The eyes are reduced in some genera, and the frons is often produced and sometimes armed with sharp processes. The colors are often bright. These adaptations tend to be associated with daytime activity, often in alpine or desert habitats.

The genitalia are characterized in the male by the bilobed, laterally decurved and setose uncus and the V-shaped or Y-shaped gnathos. The valves are rounded and radially fluted. The penis is often curved and pointed. In the female the ovipositor lobes are reduced and have few, short setae. The cross-bar of the posterior apophysis of each lobe is expanded into a bladelike or platelike structure. The whole ovipositor is sometimes sclerotized. The bursa is usually short, delicate and unarmed.

The larvae of only a few species are known. Diagnostic characters for the group have not been worked out. The larvae are leaf-webbers, leaf-miners or flower or seed feeders.

About 25 genera and 50 species are known from North America. Others undoubtedly remain to be discovered.

GENUS *Microtheoris* Meyrick

Microtheoris Meyrick, 1932, *Exotic Microlepidoptera*, **4**: 245.
Type-species: *Rhodaria ophionalis* Walker, 1859. Monotypy and original designation.

The moths are small and delicate, with wide pointed forewings and rounded hindwings, the former with a brownish band nearly parallel to the outer margin, but separated from it by a distinct pale terminal band. The frons is flat, oblique and prominent. The labial palpi are porrect, with the third segment somewhat decurved and hidden in the scaling at the end of the second. The maxillary palpi are prominent and end in an expanded tuft of scales. The proboscis is reduced. The eyes are of normal size. The antennae are threadlike. The discocellular vein of the forewing is short, straight and erect, but otherwise the wing-venation is not exceptional.

In the male genitalia the uncus is quadrate, with downcurved sides. The valve has one or more distinct costal processes. In the female genitalia the platelike expansion of the posterior apophyses is unusually large.

The early stages seem to be unknown.

There are two species, one relatively scarce and known only from Texas and New Mexico, the other common and widely distributed.

KEY TO NORTH AMERICAN SPECIES

1. Antemedial line of forewing above distinct, pinkish, extending obliquely along cubital stem ..... *vibicalis* this page

— Antemedial line of forewing above absent or obscurely indicated ..... *ophionalis* this page

Microtheoris vibicalis (Zeller)

PL. 7, FIGS. 27, 28 (McD. 5494).

Botis vibicalis Zeller, 1873, *Verh. K.-K. Zool.-Bot. Ges. Wien*, **23**: 208.
Type-locality: Texas, [Dallas County], Boll coll.

NOTE—The specific name was spelled "*ribicalis*" in its first use on p. 208, but is given as "*vibicalis*" on p. 209 and in the legend to the figure. The emended spelling has been adopted by all subsequent authors.

The moth is small and delicate. The forewings are yellowish cream-colored above, with distinct, strongly oblique antemedial and curved postmedial lines, both of moderate width and pinkish brown. The hindwings are dusky. The length of the forewing varies from 4–5.5 mm.

In the male genitalia the uncus is rather small; the valves are relatively narrow, and each has only a single costal process; the penis is short and wide and has a single spinelike cornutus.

The species ranges through most of Texas and into southeastern New Mexico. It has been collected in May and June.

The distinct antemedial band of the forewings distinguishes this from the following species.

Microtheoris ophionalis (Walker)

PL. 7, FIGS. 29–37 (McD. 5492, 5493).

Rhodaria? ophionalis Walker, 1859, *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum*, **17**: 316.
Type-locality: Jacksonville, Florida. Present restriction.

NOTE—The locality of the lectotype, selected by me (Munroe, 1961: 14) is given as "United States, Doubleday". The present restriction is consistent with the characters of the lectotype and with what is known of Doubleday's collecting.

Botis sesquialteralis Zeller, 1873, *Verh. K.-K. Zool.-Bot. Ges. Wien*, **23**: 209, pl. 3, fig. 5.
Type-locality: Texas, [Dallas County], Boll coll.

Botis nasonialis Zeller, 1873, *Verh. K.-K. Zool.-Bot. Ges. Wien*, **23**: 209, pl. 3, fig. 6.
Type-locality: Texas, Belfrage coll.

This species closely resembles *M. vibicalis* but differs in the duller forewings, often suffused with orange-brown, and in the absence of a distinct oblique antemedial pinkish-brown band. It is more abundant and much more widely distributed and variable than *M. vibicalis*, and it averages larger in size.

There is considerable individual and geographical variation. I follow the division into five subspecies given in my 1961 paper, but a comprehensive study of the variation is needed. The general range of the species is from southern Ontario to British Columbia and south to Florida, the Mexican border and southward to Brazil.

Microtheoris ophionalis ophionalis (Walker)

PL. 7, FIGS. 31, 32.

Rhodaria? ophionalis Walker, 1859, *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum*, **17**: 316.
Type-locality: [Jacksonville, Florida].

Botis sesquialteralis Zeller, 1873, *Verh. K.-K. Zool.-Bot. Ges. Wien*, **23**: 209, pl. 3, fig. 5.
Type-locality: Texas, [Dallas County], Boll coll.

Botis nasonialis Zeller, 1873, *Verh. K.-K. Zool.-Bot. Ges. Wien*, **23**: 209, pl. 3, fig. 6.
Type-locality: Texas, Belfrage coll.

This subspecies is small (length of forewing from 4–4.5 mm), and the forewing color varies from pale buff to reddish brown. The veins of dark specimens are usually contrastingly pale. There may be a fuscous antemedial half-line and a discocellular dot or bar, but these are not always present. The postmedial band is usually plainly visible. The hindwings vary from medium gray with a fuscous postmedial shade to uniform dark fuscous.

The subspecies ranges throughout Florida, including the Keys and the Dry Tortugas, and thence to Oklahoma and central Texas.

Microtheoris ophionalis lacustris Munroe

PL. 7, FIGS. 29, 30.

Microtheoris ophionalis lacustris Munroe, 1961, *Can. Ent., Supplement* **24**: 14, fig. 12.
Type-locality: Harrow, Ontario.

This subspecies is on the average larger (length of forewing from 5–6.5 mm) and darker than *M. o. ophionalis*. The forewings are dark fulvous or brown and the transverse bands are very weakly differentiated in most specimens. The hindwings are dark fuscous, rarely with a dark subterminal shade.

The subspecies is known from southern Ontario (Marmora to Grand Bend and Windsor) and southern Michigan. Its distribution southward and the pattern of its transition to the nominate subspecies are poorly known. It flies in July and August.

Microtheoris ophionalis eremica Munroe

PL. 7, FIGS. 33, 34.

Microtheoris ophionalis eremica Munroe, 1961, *Can. Ent., Supplement* **24**: 15, fig. 13.
Type-locality: Limpia Canyon, Jeff Davis County, Texas.

This subspecies averages larger (length of forewing 4.5–7 mm) and is considerably paler than either of the previous two subspecies. The forewings are usually light pinkish ferrugineous. The veins are often paler. The dark markings are usually obscure, but there is an obvious pale subterminal band.

The subspecies ranges from western Texas through New Mexico to the Santa Rita Mountains in Arizona and south into Mexico. It has been collected in April and May.

Microtheoris ophionalis baboquivariensis Munroe

PL. 7, FIG. 35.

Microtheoris ophionalis baboquivariensis Munroe, 1961, *Can. Ent., Supplement* **24**: 15, fig. 14.
Type-locality: Baboquivari Mountains, Arizona.

This subspecies resembles the preceding, but is smaller and paler and has the dark markings very inconspicuous. The length of the forewing varies from 4.5–5.5 mm.

It occurs in the Baboquivari Mountains of Arizona. The type series was collected in April.

Microtheoris ophionalis occidentalis Munroe

PL. 7, FIGS. 36, 37.

Microtheoris ophionalis occidentalis Munroe, 1961, *Can. Ent., Supplement* **24**: 15, figs. 15, 16.

This subspecies is large (length of forewing 5–7.5 mm) and has the forewings above pale buff with a contrasting grayish-fuscous postmedial line. The hindwings vary from white with a fuscous postmedial band to almost uniform fuscous.

The subspecies is common in the interior valleys of British Columbia and ranges southward into Montana and Idaho and as far as central California. There is a certain amount of local variation, and it is possible that a number of distinguishable populations are grouped under this name. There appear to be three generations at the type-locality, with peak flight periods in early May, late June and mid-August. More study of the distribution and variation of this subspecies is desirable.

GENUS *Rhodocantha* Munroe

Rhodocantha Munroe, 1961, *Can. Ent., Supplement* **24**: 15.
Type-species: *Rhodocantha diagonalis* Munroe, 1961. Monotypy and original designation.

The frons is flat and oblique. The labial palpi are porrect, with the third segment pointed and almost hidden in the scaling of the second. The maxillary palpi end in an expanded tuft of scales. The proboscis is slender but well developed. The eyes and ocelli are well developed. The genae are naked. The antennae are threadlike. The moth is much like *Microtheoris* species in build but a little larger and more robust. The wing-venation is normal. The discocellular of the forewings is somewhat curved and oblique, not straight as in *Microtheoris*.

In the male genitalia the uncus is moderately narrow and parallel-sided; it is weakly bilobed distally. The tegumen is not expanded. The gnathos is V-shaped. The juxta is dorsally emarginate. The valve is distally expanded and symmetrically rounded, and has radial fluting; it lacks the costal processes found in *Microtheoris*. The penis is short and stout. In the female genitalia the ovipositor lobes are sclerotized and bladelike and are apparently fitted for cutting and piercing. The posterior apophyses are heavy and are strongly joined to the ovipositor lobes. The ductus bursae and bursa are slender and delicate.

The early stages are unknown.

There is only one known species of the genus.

Rhodocantha diagonalis Munroe

PL. 7, FIGS. 38, 39.

Rhodocantha diagonalis Munroe, 1961, *Can. Ent., Supplement* **24**: 16, figs. 17, 85–87, 176, 217.
Type-locality: Alamogordo, Otero County, New Mexico.

The moths are very attractive in appearance, with pinkish-brown head, thorax and forewings and neat, crisply defined markings. The basal area of the forewings is darker than the rest;

it is bordered by a strongly oblique pale antemedial line. The postmedial band is reddish, narrowing behind and bordered inwardly with white. The terminal area is narrowly reddish. The fringe is broad, reddish basally, pale tan distally. The hindwings above are fuscous with a darker marginal area. The fringe is distally light tan. The length of the forewing varies from 5.5–6.5 mm.

The genitalia are as described for the genus.

The species ranges from southern New Mexico and western Texas south to Monterrey, Mexico.

GENUS *Frechinia* Munroe

Frechinia Munroe, 1961, *Can. Ent., Supplement* **24**: 16.
Type-species: *Titanio helianthiales* Murtfeldt, 1897. Original designation.

The moths are small and of moderate build, with broad forewings with sharp apex and rounded outer margin and tornal angle. The frons is flat or weakly rounded, oblique and somewhat prominent. The labial palpi are porrect or a little downcurved, with the third segment hidden in the scaling of the second. The maxillary palpi end in an expanded tuft of scales. The proboscis is weak or almost lacking. The eyes and ocelli are well developed. The antennae are slender and threadlike. Vein R_2 of forewings is approximated to or stalked with R_{3+4} basally. The wing-venation otherwise is not remarkable.

In the male genitalia the uncus is broad and weakly sclerotized. The tegumen is domed. The gnathos is narrow and its median element is triangular. The valves are short and simple, parallel-sided, with weak flutings. In the female genitalia the ovipositor has short, subquadrate, sparsely setose lobes. The apophyses are short and slender; the vertical cross-bar of the posterior apophysis has a platelike expansion. The bursa is weak and membranous.

The larva of one species is known. It is a leaf-miner in sunflowers (*Helianthus* species). The larvae of other species will probably prove to have similar habits.

Together with *Cymbopteryx* and *Procymbopteryx* this genus forms a compact group which ranges through central and western North America and southward to Bolivia. *Frechinia* differs from the other two genera in lacking a fovea between veins R_{3+4} and R_5 of the forewings and an associated deflection of R_5.

KEY TO NORTH AMERICAN SPECIES

1. Forewing above with postmedial line parallel to outer margin 2
— Forewing above with postmedial line closer to outer margin anteriorly than posteriorly 3

2. Ground color of forewing above tan .. *laetalis* p. 152
— Ground color of forewing above gray *criddlealis* p. 152

3. Apex of forewing acute, almost falcate ..... *lutosalis* p. 151
— Apex of forewing weakly rounded 4

4. Ground color of forewing above tan; postmedial line contrastingly dark .. *texanalis* p. 153
— Ground color of forewing above gray; postmedial line contrastingly pale 5

5. Forewing above with veins distinctly white-lined; hindwing above with narrow, definite, pale postmedial line .. *murmuralis* p. 151
— Forewing above with veins at most weakly white-lined; hindwing above with diffuse, indistinct, pale postmedial line ..... *helianthiales* p. 151

Frechinia murmuralis (Dyar)
PL. 7, FIG. 40 (McD. 5539).

Titanio murmuralis Dyar, 1917, *Ins. Insc. Mens.*, **5**: 72.
Type-locality: Sabinal, Texas.

The moth is closely similar to the following species, from which it is only doubtfully distinct. The stronger pale vein-lines of the forewings and the more distinct postmedial line of the hindwings are not matched in long series of *F. helianthiales* from Illinois, Missouri and Arizona. Topotypical series of *F. murmuralis* are needed to show whether the characteristics of the type are of more than individual significance.

The life history is unknown.

The species is known only from the holotype, from Sabinal, Texas.

Frechinia helianthiales (Murtfeldt)
PL. 7, FIGS. 41–44 (McD. 5538).

Titanio helianthiales Murtfeldt, 1897, *Can. Ent.*, **29**: 71.
Type-locality: Central Missouri.

Pionea thyanalis Druce, 1899, *Biologia Centrali-Americana. Insecta. Lepidoptera-Heterocera*, **2**: 557, pl. 101, fig. 5.
Type-locality: Amula, Guerrero, Mexico.

The moth is broad-winged, gray, with diffuse dark patches over the cell of the forewings and in the bend of the postmedial line. The latter is pale gray and considerably more strongly curved than the termen, which it approaches most closely at vein R_5 or M_1. The veins of the forewings above are not lined or are feebly lined with light gray. The postmedial line of the hindwings above is diffuse. The length of the forewing varies from 6.5–8.5 mm.

The male genitalia have the hump of the tegumen rather high and narrow, the median element of the gnathos narrow and pointed, and the valves relatively long, slender and weakly fluted. The female genitalia have the bursa relatively long.

The larva is a leaf-miner on sunflower (*Helianthus* species), making a large blotch mine. Miss Murtfeldt (*op. cit.*) has given a detailed description.

The species ranges from southern Illinois and Missouri to Arizona and into Mexico. There is considerable variation in the material at hand but I have been unable to distinguish additional species. Further study is desirable. On the whole Arizona specimens seem smaller, paler and narrower-winged than those from Illinois and Missouri. The available material comes from only a few localities, and only the type lot has been reared from larvae.

Frechinia lutosalis (Barnes and McDunnough)
PL. 7, FIGS. 45, 46 (McD. 5541).

Titanio lutosalis Barnes and McDunnough, 1914, *Contrib. Nat. Hist. Lep. N. Am.*, **2** (6): 238, pl. 1, fig. 17.
Type-locality: Jemez Springs, New Mexico.
NOTE—The locality given is that of the lectotype selected by Munroe, 1961, *Can. Ent.*, *Supplement* **24**: 18.

The moth closely resembles *F. helianthiales* but is larger (length of forewing 8.5–9.5 mm). The forewings are sharper; their upper surface is more greenish gray and has more diffuse dark

clouding. The postmedial line is considerably weaker than in *F. helianthiales* and approaches the termen closely and almost acutely behind the apex. The hindwings have the termen straighter than in *F. helianthiales*; and though there is weak terminal infuscation the postmedial line is absent.

The male genitalia have the hump of the tegumen lower and wider and the valves relatively shorter than in *F. helianthiales*, but the differences are slight.

The life history is unknown.

The species ranges from Boulder, Colorado, south through the Jemez and Sangre de Cristo mountains to southern New Mexico and west into Utah and to the Santa Rita Mountains of Arizona. It is relatively uncommon. My wife and I collected it at about 8,000 feet altitude in open pine-Douglas fir forest in Cimarron Canyon, New Mexico, at light. It has been taken in June and July.

Frechinia laetalis (Barnes and McDunnough)

PL. 8, FIGS. 1–3 (McD. 5542).

Titanio laetalis Barnes and McDunnough, 1914, *Contrib. Nat. Hist. Lep. N. Am.*, **2**(6): 238, pl. 2, fig. 16.
Type-locality: Redington, Arizona.

NOTE—The locality given is that of the lectotype designated by Munroe, 1961, *Can. Ent.*, *Supplement* **24**: 19.

The moth bears a general resemblance to the preceding three species but is distinctly smaller (length of forewing 4.5–6 mm). The wings are paler and usually brown-tinted. The dark clouding of the forewings is weaker and more restricted; the postmedial line is nearly parallel to the outer margin and has the inner dark element as strong as the outer pale one. The hindwings are white in males, gray in females, occasionally with traces of a fuscous postmedial line.

The male genitalia have the tegumen only very weakly domed, the central element of the gnathos triangular and the valves relatively short and wide. The female genitalia have the bursa short and weak.

The early stages are unknown.

The species has a wide range in the dry areas of the United States from Washington through Oregon to southern California and east to the Big Bend of Texas. In Oregon and Washington it flies in late August and early September, around Ogden, Utah, in July and September, in southern California in April and May, in western Texas also in May. The moths are taken commonly at light.

Frechinia criddlealis (Munroe)

PL. 8, FIGS. 4, 5.

Titanio criddlealis Munroe, 1951, *Can. Ent.*, **83**: 168.
Type-locality: Aweme, Manitoba.

The moth is very closely similar to *F. laetalis*, but is larger (length of forewing 5.5–6.5 mm), darker and gray rather than brown in color. The hindwings have a distinct fuscous postmedial line in the male and are completely dark fuscous in the female.

The genitalia are almost as in *F. laetalis* except that the median element of the gnathos of the male is cylindrical and pointed at the end rather than flat and triangular.

The species is known only from southern Manitoba where it has been collected in May and August.

Frechinia texanalis Munroe
PL. 8, FIG. 6.

Frechinia texanalis Munroe, 1961, *Can. Ent., Supplement* **24**: 20, figs, 23, 221.
Type-locality: Fort Davis, Jeff Davis County, Texas.

This species is larger than *F. criddlealis* (length of forewing 6.5–8.5 mm). It is pale brown like *F. laetalis*, but with weaker, streakier and less extensive clouding on the forewings and with the hindwings pale yellowish buff with faint terminal clouding. The postmedial line of the forewings diverges from the outer margin rather strongly, as in *F. helianthiales*, but has the dark element stronger than the pale element and interrupted or beaded. The pale-brown, weakly clouded forewings are obviously different from the gray, heavily clouded forewings of *F. helianthiales* and *F. murmuralis*.

The male genitalia are unknown. The female genitalia are much like those of *F. helianthiales*.

The early stages are unknown.

The moth is known thus far only from two specimens, the holotype, collected by the late E. C. Johnston at Fort Davis, Texas, in May and a second specimen collected at The Basin, Big Bend National Park, by Miss Margaret MacKay, also in May.

GENUS *Procymbopteryx* Munroe

Procymbopteryx Munroe, 1961, *Can. Ent., Supplement* **24**: 20.
Type-species: *Pionea belialis* Druce, 1899. Monotypy and original designation.

The frons is flat and oblique, smoothly scaled. The labial palpi are porrect, with fine, close scaling, the third segment hidden in the scales of the second. The maxillary palpi end in an expanded tuft of scales. The proboscis is slender and rather small. The eyes are large and the ocelli distinct. The genae are naked. The antennae are a little thickened in the male and strongly ciliated below; the dorsal scaling is dilated laterally at the end of each segment, giving the antennae a somewhat serrate appearance. The praecinctorium is flaplike, longitudinal, rather long and distally dilated with scales. The build and general appearance are very much as in *Frechinia*, but there is a significant difference in wing-venation, the present genus having vein R_5 of the forewings deflected and approximated to M_1 basally, the enlarged space between R_{3+4} and R_5 being occupied in the male by a fovea.

The male genitalia have the tegumen greatly expanded and extending over the bilobed uncus. The gnathos is V-shaped. The valve is distally constricted and has a sharp costal process.

The larvae are leaf-miners on Compositae.

The genus ranges from Colorado south to Bolivia. There are several species. It is closely related to *Cymbopteryx* but differs in genital characters, particularly in the greatly expanded tegumen and in the presence of a costal process on the valve. Only one species is known from our area.

Procymbopteryx belialis (Druce)
PL. 8, FIGS. 7, 8 (McD. 5540).

Pionea belialis Druce, 1899, *Biologia Centrali-Americana. Insecta. Lepidoptera-Heterocera*, **2**: 557, pl. 101, fig. 4.
Type-locality: Amula, Guerrero, Mexico, 6,000 ft.

The moth resembles *Frechinia* species in general appearance but differs in having the forewings more uniformly dark-suffused and the veins lined with pale buff over the whole wing. The length of the forewing varies from 5–6 mm.

The genitalia are as described for the genus.

The larva is a leaf-miner on tasselflower brickellbush, *Brickellia grandiflora* (Hooker) Kuntze, in Colorado. The mine is a large brown blotch taking up the whole thickness of the leaf at the terminal part and about three-fourths of the area of the leaf. The prepupal larva emerges from the mine and spins a three-cornered cocoon in one of the young soft leaves at the end of the shoot. The larva itself is cylindrical with flat head and divided pronotal shield. The body is pale yellow with conspicuous black tubercles. The head is black with pale sutures. The thoracic legs are black. The prolegs are colored like the body and have the crochets arranged in a broad penellipse, broken outwardly. The spiracles are small and black-rimmed.

The tachinid parasite *Eucoronimyia hastata* (Coquillet) has been reared from this larva by Dyar (1902: 397), from whom the above life-history information is taken.

The species ranges from Colorado through Arizona into Mexico. It has been collected in June, August and September in Arizona.

GENUS *Cymbopteryx* Munroe

Cymbopteryx Munroe, 1961, *Can. Ent., Supplement* **24**: 22.
Type-species: *Cymbopteryx fuscimarginalis* Munroe, 1961. Original designation.

The moths resemble *Frechinia* and *Procymbopteryx* in appearance and structure, differing from the former in the presence of the fovea on the male forewings and in the displacement of vein R_5, and from the latter in the less strongly inflated tegumen, which does not completely overlap the uncus and in the absence of the costal process of the valves.

The life history is unknown but is likely to be similar to those of *Frechinia* and *Procymbopteryx*.

Two North American species are known.

KEY TO NORTH AMERICAN SPECIES

1. Postmedial band of forewing above with pale element conspicuous . . . . . *fuscimarginalis* this page

— Postmedial band of forewing above with dark line much more conspicuous than pale element . . . . . *unilinealis* p. 155

Cymbopteryx fuscimarginalis Munroe
PL. 8, FIGS. 9, 10.

Cymbopteryx fuscimarginalis Munroe, 1961, *Can. Ent., Supplement* **24**: 22, figs. 25, 94–96, 182, 222.
Type-locality: Tucson, Arizona.

The moth is small (length of forewing 5.5–7 mm) and broad-winged. The ground color is light grayish buff, the hindwings a little paler than the forewings. The forewings have the basal and medial areas heavily and evenly dusted with brownish fuscous. Beyond this is a pale postmedial band of the ground color. Both forewings and hindwings have a wide, brownish-fuscous subterminal band, very narrowly separated from the outer margin.

The male genitalia have the tegumen little inflated and the valves constricted near the base. They resemble those of *Frechinia criddlealis* but have the uncus relatively smaller. The female genitalia have the apophyses fine and the ductus bursae and bursa relatively large, the latter with a denticulate signum.

The species is rare in collections and is known only from southern Arizona (Tucson and New River, Maricopa County). It has been collected in May and August.

Cymbopteryx unilinealis (Barnes and McDunnough)
PL. 8, FIGS. 11, 12 (McD. 5496).

Loxostege unilinealis Barnes and McDunnough, 1918, *Contrib. Nat. Hist. Lep. N. Am.*, **4**: 161, pl. 24, fig. 1.
Type-locality: Redington, Arizona.

Loxostegopsis phaeopasta Hampson, 1919, *Ann. Mag. Nat. Hist.*, (9) **4**: 326.
Type-locality: Phoenix, Arizona.

NOTE—So far as I can discover, McDunnough omitted this name from his *Check List.*

The moth has the frons prominent and with traces of a median carina. The wings are broad as in the preceding species and the moth is of about the same size (length of forewing 5.5–7 mm). The ground color is pale grayish buff; the forewings are finely and evenly dusted with dark gray, giving an overall powdery gray effect. The postmedial line of the forewings is dark fuscous, narrow anteriorly, becoming a little wider behind, oblique outward from costa to vein R_4, there rather abruptly curved and oblique inward and slightly waved to the posterior margin beyond the middle.

The male genitalia have the uncus longer than in *C. fuscimarginalis*, the tegumen more strongly inflated, the gnathos longer and the valves with the ventral margin weakly lobed just beyond the base. The female genitalia have the ductus bursae and bursa relatively smaller than in *C. fuscimarginalis*, and the bursa lacks the signum.

The species is known only from southern Arizona.

GENUS *Edia* Dyar

Edia Dyar, 1913, *Proc. U.S. Natl. Mus.*, **44**: 320.
Type-species: *Edia macrostagma* Dyar, 1913. Monotypy and original designation.

The moths have the head strongly produced into a rounded prominence. The labial palpi are slender, porrect, the third segment with scaling tapering to a point and downcurved. The maxillary palpi are fairly prominent and end in a weakly expanded tuft of scales. The body is fairly thick but the legs are slender. The wings are broad and rounded, and the forewings each have two scale-tufts on the posterior margin.

The male genitalia differ considerably in the two species. In *E. semiluna* the tegumen is much inflated and overlaps the uncus; the anellus is wide and dorsally spinulose; and the valves are relatively short and narrow. In *E. minutissima* the tegumen is little inflated; the anellus is narrow; and the valves are relatively longer and wider. The female genitalia also differ in the two species, *E. minutissima* having a pair of strong signa on the bursa, which are lacking in *E. semiluna*. It is possible that the two species should be separated generically, but their external characters and general facies are so similar that I prefer to keep them together.

The life history is unknown.

Only two species are known. Both occur within our limits. The species have a general similarity in appearance to the species of *Cynaeda* Hübner=*Odontia* Duponchel, the palaearctic type-genus of the subfamily. The interested reader should consult the monograph of that genus by de Lattin (1951).

KEY TO NORTH AMERICAN SPECIES

1. Medial brown shade of forewings above with its basal border definite, arcuate ..... *semiluna* this page

— Medial brown shade of forewings above diffuse on basal side ..... *minutissima* this page

Edia semiluna (Smith)

PL. 8, FIGS. 13, 14 (McD. 5526).

Lythrodes semiluna Smith, 1905, *Can. Ent.*, **37**: 67.
Type-locality: Cochise County, Arizona.

Cynaeda bidentalis Barnes and McDunnough, 1912, *Contrib. Nat. Hist. Lep. N. Am.*, **1** (5): 33, pl. 3, figs. 2, 5.
Type-locality: Palmerlee, Arizona.

Edia macrostagma Dyar, 1913, *Proc. U.S. Natl. Mus.*, **44**: 320.
Type-locality: Huachuca Mountains, Arizona.

NOTE—The type-locality given is that of the lectotype male, selected by Munroe (1961: 24).

The moth is of moderate size (length of forewing 8–10 mm). The forewings above are whitish buff with a curved brownish-fuscous fascia across the middle, its inner border sharply defined, and with brown and fuscous stripes along the veins in the apical and terminal areas.

The genital structure is discussed under the generic heading, above.

The species is common in the mountain ranges of southern Arizona and ranges southward into Mexico.

Edia minutissima (Smith)

PL. 8, FIG. 15 (McD. 5527).

Lythrodes minutissima Smith, 1906, *Can. Ent.*, **38**: 234.
Type-locality: Yavapai County, Arizona.

Edia coolidgei Dyar, 1921, *Ins. Insc. Mens.*, **9**: 143.
Type-locality: Palm Springs, California.

The moth is considerably smaller than *E. semiluna* (length of forewing 5–6 mm). The markings are similar but weaker, and the median band on the forewings is broken and diffuse, without a definite curved basal margin as in *E. semiluna*.

The differences in genital characters have been pointed out in the generic description.

The species is known from a territory extending eastward from Palm Springs, California, through the Mojave Desert to Yavapai County, Arizona. It has been collected in April, May and June.

GENUS *Dichozoma* Munroe

Dichozoma Munroe, 1961, *Can. Ent., Supplement* **24**: 25.
Type-species: *Loxostege parvipicta* Barnes and McDunnough, 1918. Monotypy and original designation.

The moth is small in size and delicate in build, resembling in a general way species of *Frechinia* but with a simpler and more definite forewing pattern of two dark transverse bands and a dark discocellular spot. The frons is prominent and bears a pair of sharp tubercles on a transverse ridge above the clypeus and also a single median tubercle about halfway between the transverse ridge and a line connecting the antennae. The labial palpi are very small, porrect and roughly scaled. The maxillary palpi are prominent and distally dilated with scales. They extend beyond the frons. The eye is somewhat reduced. The ocelli are large. The genae are unscaled. The antennae are annulated with scales. On the forewings there is a fovea between veins R_{3+4} and R_5 in the male and R_5 is basally deflected and approximated to M_1. The posterior margin has a single weak scale-tuft.

The male genitalia are much as in the preceding genera. The uncus is bilobed, rather square. The tegumen is somewhat inflated. The vinculum is narrow and rather long. The valves are narrow and distally rounded. The penis is slender and nearly straight. The female genitalia lack obvious diagnostic characters.

The larva is unknown.

There is considerable variation in the intensity, width and exact course of the transverse bands, but I recognize only one species.

Dichozoma parvipicta (Barnes and McDunnough)
PL. 8, FIGS. 16, 17 (McD. 5495).

Loxostege parvipicta Barnes and McDunnough, 1918, *Contrib. Nat. Hist. Lep. N. Am.*, **4**: 161, pl. 23, fig. 10.
Type-locality: Olancha, Inyo County, California.

The moth is whitish. The forewings are weakly tinted with yellowish and have distinct transverse lines and a discocellular spot. These vary from pale orange-brown to dark pink or brown and vary in thickness, intensity and to some degree in position. The antemedial line is joined to the base by a line of the same color along the costa. The length of the forewing varies from 4.5–6 mm.

The moth occurs in the desert portions of California and southwestern Arizona.

GENUS *Cuneifrons* Munroe

Cuneifrons Munroe, 1961, *Can. Ent., Supplement* **24**: 26.
Type-species: *Cuneifrons coloradensis* Munroe, 1961. Monotypy and original designation.

The moth is similar to *Dichozoma* in general appearance but lacks the contrasting dark markings of the forewings. The frons is produced dorsally into a slender wedge-shaped process, grooved dorsally and weakly indented in front. The labial palpi are porrect and smoothly scaled; they hardly exceed the frontal process; the third segment is short, obscured by scales and downcurved. The maxillary palpi are fairly prominent but are not distally dilated with scales. The eyes are large. The genae are angularly expanded in front of the eyes, but do not form broad, toothed flanges. In the forewings there is no fovea between R_{3+4} and R_5.

In the male genitalia the uncus is broadly rounded and weakly bilobed. The gnathos is V-shaped, with a triangular median element. The anellus is long and parallel-sided, somewhat broadened ventrally. The vinculum is wide and short ventrally. The valves are long, slightly expanded and strongly fluted. The penis is narrow and nearly straight. The female genitalia are unknown.

The early stages are unknown.

Only one species is known.

Cuneifrons coloradensis Munroe

PL. 8, FIG. 18.

Cuneifrons coloradensis Munroe, 1961, *Can. Ent.*, *Supplement* **24**: 26, figs. 31, 109–111, 187. Type-locality: Moffat County, Colorado.

The moth is mostly light grayish green, with the hindwings whitish gray. The forewings are fuscous beneath with pale fringes. The length of the forewing is 7 mm.

The genitalia are as described for the genus.

The species is known only from the holotype, which was collected in late June.

GENUS *Gyros* Henry Edwards

Oribates Henry Edwards, 1881, *Papilio*, **1**: 22.
Type-species: *Oribates muirii* Henry Edwards, 1881. Subsequent designation, Munroe, 1961, *Can. Ent.*, *Supplement* **24**: 27.

NOTE—This name is a junior homonym of *Oribates* Dugès, 1834. The somewhat difficult circumstances bearing on the type-species designation are discussed in my 1961 paper.

Gyros Henry Edwards, 1881, *Papilio*, **1**: 117.
Type-species: *Oribates muirii* Henry Edwards, 1881. Subsequent designation, Munroe, 1961, *Can. Ent.*, *Supplement* **24**: 27.

NOTE—*Gyros* was proposed as a substitute name for the preoccupied *Oribates*. It consequently automatically has the type-species that I designated for *Oribates*, even though Henry Edwards only doubtfully included *O. muirii* in the list of species that he associated with his substitute name.

Monocona Warren, 1892, *Ann. Mag. Nat. Hist.*, (6) **9**: 174.
Type-species: *Monocona rubralis* Warren, 1892. Monotypy and original designation.

The moths are fairly small, but robust, with short, broad, rounded wings. The frons is produced, ending in an acute vertical wedge. The labial palpi are rather short and obliquely upturned; the third segment is exposed. The maxillary palpi end in a tuft of scales.

The eyes are reduced. The genae have fugitive scales in fresh specimens, but in flown ones are unscaled. The antennae are rather thick. The legs are stout and smoothly scaled.

The male genitalia are hardly different from those of *Cuneifrons*, though the moths look very different externally. The female genitalia are characterized by the large unarmed bursa and the narrow sclerotized collar near the ostial end of the ductus bursae.

The early stages are unknown.

The species relationships in this genus require further study. It is not impossible that all the names apply to populations of a single species. For the present I follow the arrangement given in my 1961 paper with one alteration, to take account of the difference between the northern and central populations.

KEY TO NORTH AMERICAN SPECIES

1. Hindwing brick red, with black border 2
— Hindwing black, or very dark red with black border ..... *atripennalis* p. 160

2. Dark basal area of forewing above extending to middle of wing ..... *muirii* this page
— Dark basal area of forewing above not occupying more than one-third of wing ..... *powelli* p. 160

Gyros muirii (Henry Edwards)

PL. 8, FIGS. 19–22 (McD. 5521).

Oribates muirii Henry Edwards, 1881, *Papilio*, 1: 22.
Type-locality: Tuolumne County, California.

Monocona rubralis Warren, 1892, *Ann. Mag. Nat. Hist.*, (6) 9: 174. Subspecies.
Type-locality: California (see restriction below).

This species has the basal part of the forewings dark reddish brown; the distal part is somewhat paler, with a black discocellular bar, a weak fuscous line parallel to the termen and a black terminal line and fringe. The hindwings are brick red with a narrow black terminal line and black fringe. The body is dark reddish brown with the distal part of the abdomen brick red. The head and pectus are covered with pale greenish-gray scales.

The male genitalia have the median element of the gnathos spikelike and the valves relatively narrow. The female genitalia are as described for the genus.

Since my 1961 paper was written I have, through the kindness of Frederick H. Rindge, of the American Museum of Natural History, examined a long series of approximately topotypical specimens collected by him in Yosemite National Park, California, about half a mile west of Tioga Pass. These are substantially smaller than the more northern material that I had examined earlier, and have the dark basal area of the forewings very slightly restricted. I accordingly distinguish two subspecies, using the name *rubralis* (Warren) for the northern one.

Gyros muirii muirii (Henry Edwards)

PL. 8, FIGS. 21, 22.

Oribates muirii Henry Edwards, 1881, *Papilio*, 1: 22.
Type-locality: Tuolumne County, California.

As noted above the moth is smaller (length of forewing 4.5–6.5 mm) and has the basal area

of the forewings above a little more restricted than in the following subspecies. I have seen material from Tioga Pass, Yosemite National Park, California, and very similar specimens from Crooked Creek Laboratory, 10,500 feet, White Mountains, Mono County, California. The Yosemite material was collected in July, that from the White Mountains in July.

Gyros muirii rubralis (Warren), NEW STATUS
PL. 8, FIGS. 19, 20.

Monocona rubralis Warren, 1892, *Ann. Mag. Nat. Hist.*, (6) **9**: 174.
Type-locality: California.

NOTE—As the type-locality is not sufficiently precise, I hereby restrict it to Lassen Peak Trail, Shasta County, California, where the subspecies has been collected by F. H. Rindge.

This subspecies is larger than the nominate subspecies (length of forewing 6–7.5 mm). The forewings are deeply and richly colored and have the basal dark area very broad.

The subspecies ranges from Santa Clara County, California, north through the Coast Range and Cascades to Crater Lake, Oregon and east to Lassen Peak. The transition through the Sierras to the nominate subspecies has not been studied.

Gyros atripennalis Barnes and McDunnough
PL. 8, FIGS. 23–25 (McD. 5522).

Gyros atripennalis Barnes and McDunnough, 1914, *Contrib. Nat. Hist. Lep. N. Am.*, **2**(6): 235, pl. 1, fig. 12.
Type-locality: Mineral King, Tulare County, California, 10,000 ft.

NOTE—The male lectotype designated by Munroe (1961: 29) is shown on our plate.

The moth is in general similar to *G. muirii*, but has the forewings above darker, the reddish-brown areas very dark and the paler areas gray dusted with blackish fuscous, not buff dusted with reddish brown. The hindwings above and beneath are black or very dark red. The abdomen is entirely blackish fuscous. The pale scaling of the head and thorax is longer and bushier than in *G. muirii*.

The genitalia are much as in *G. muirii*.

The species is known only from the original collections made at Mineral King, Tulare County, California, in July by Pilate. In addition to the type series of six males and five females from which I selected a lectotype in 1961, there is a series of over 100 specimens in the Barnes Collection duplicates, in the United States National Museum.

The dark hindwings distinguish this from other species of *Gyros*, but it could be confused with *Anatralata versicolor*, which differs in the smooth frons, white fringes and in details of the pattern.

Gyros powelli Munroe
PL. 8, FIG. 26.

Gyros powelli Munroe, 1959, *Can. Ent.*, **91**: 726, figs. 3, 4.
Type-locality: La Grulla, Lower California, Mexico, 6,500 ft.

The moth is similar in general appearance to *G. muirii*, but is smaller (length of forewing 4.5–5 mm), has the dark basal area of the forewings above much restricted, and has the pale

vestiture of the face and palpi much less bushy, and composed of flattened normal scales rather than long hairlike ones.

The male genitalia are much like those of *G. muirii*, but the gnathos is triangular rather than spike-shaped and the valves are relatively wider.

The species ranges from the San Pedro Martir Mountains of Baja California north to Ventura County and Short Canyon near Inyokern, California. The possibility of intergradation to *G. muirii* in more northerly localities should be investigated.

GENUS *Anatralata* Munroe

Anatralata Munroe, 1961, *Can. Ent., Supplement* **24**: 30.
Type-species: *Aporodes versicolor* Warren, 1892. Monotypy and original designation.

The moths are moderately small, with broad rounded wings. The frons is broad, rounded and weakly prominent. The labial palpi are porrect, long-scaled, the third segment hidden in the scaling of the second. The maxillary palpi are fairly prominent and have a long slender tuft of scales distally. The proboscis is normal. The eyes are reduced and are surrounded by an unscaled zone. The wing-venation is unremarkable. In the forewings vein R_2 arises just before the end of the cell; R_5 is not approximated to either R_{3+4} or M_1. The male has no fovea associated with these veins.

In the male genitalia the uncus is broad and rounded, with parallel, downcurved, setose sides. The central element of the gnathos is slender and pointed. The juxta is of moderate size. The vinculum is narrow and not prolonged or keeled ventrally. The tegumen is weakly inflated. The valves are of moderate width, expanded and fluted at the tip, and with a rounded lobe ventrally near the base. The penis is short and curved. The female genitalia are much as in *Gyros*, but there is a diffuse spinulose signum on the bursa.

The early stages are unknown.

There is only a single known species, with an alpine and montane range in the Cordillera from British Columbia to southern California. The variation and habitat associations in this wide range require study. The genus appears to be related on the one hand to *Gyros*, *Frechinia* etc., and on the other hand to the European genus *Atralata* Sylvén.

Anatralata versicolor (Warren)

PL. 8, FIGS. 27–31 (McD. 5644).

Aporodes versicolor Warren, 1892, *Ann. Mag. Nat. Hist.*, (6) **9**: 175.
Type-locality: Washington Territory.

The moth is black, tinted to a varying degree with dark wine red. The head and the postmedial parts of the forewings are dusted with greenish white. The fringes are white at least on the hindwings and often on the forewings also. The length of the forewing varies from 5–7 mm.

The genitalia are as described for the genus.

The species has a wide range in the mountains from British Columbia through Washington, Idaho and the Sierras to southern California, mostly at considerable altitudes. The geographic variation and the detailed distribution require study.

GENUS *Eremanthe* Munroe, NEW GENUS

Gender: feminine.

Type-species: *Eremanthe chemsaki* Munroe, NEW SPECIES.

DIAGNOSIS: The moths resemble *Anatralata* in general habitus, reduced eye and domed frons. The new genus differs in the smooth labial palpi with distinct third segment, in the small smooth maxillary palpi, in the dorsal narrowing of the scaleless zone around the eyes, in the fasciculate male antennae, as well as in several characters of wing venation and male genitalia.

DESCRIPTION: The frons is domed and slightly prominent. The vertex is of moderate length and roughly scaled. The eyes are reduced; each is surrounded by an unscaled zone, narrowed above. The ocelli are large, situated close to the unscaled zones bordering the eyes. The labial palpi are rather short, with smooth compressed scaling, obliquely ascending, the third segment drooping, well marked off from the second. The maxillary palpi are short and smoothly scaled. The proboscis is prominent, smoothly scaled at its base. The body and legs are robust; the outer tibial spurs of the male are considerably shorter than the inner ones. The praecinctorium is prominent, longitudinally compressed, with a globular scale-tuft distally.

The forewings are wide, with straight costa, rather acute apex, curved termen and curved posterior margin, the latter with a weak sub-basal scale-tuft. The cell is about two-thirds the length of the wing. Vein R_1 arises far before the anterior angle of the cell. R_2 arises a little before the anterior angle and is basally weakly approximated to R_{3+4}. The latter is much longer than the free parts of R_3 and R_4. R_5 arises from the anterior angle of the cell; it is straight and not approximated to R_{3+4}. M_1 arises considerably behind the anterior angle of the cell. The discocellular is weak and slightly oblique, almost straight. M_2 arises a little before the posterior angle of the cell; M_3 arises from the angle and Cu_1 from a little basad of the angle. These three veins are not approximated basally. Cu_2 arises from the cell at about two-thirds from the base. 2nd A is broadly separated from Cu_2. The anal loop is large and complete.

The hindwings are fairly wide, with rounded termen and anal angle and long fringe. $Sc + R_1$ is strongly anastomosed with R_s. The latter is not stalked with M_1. M_1 arises just behind the anterior angle of the cell. The cell is about three-fifths the length of the wing. The discocellular is long and curved and the posterior angle of the cell is acute. M_2, M_3 and Cu_1 arise close to the posterior angle of the cell; these three veins are basally approximated. Cu_2 arises from a little basad of posterior angle of cell. There are three anal veins.

In the male genitalia the uncus is long and parallel-sided, distally weakly bilobed, laterally downcurved and clothed with setae. The tegumen is weakly humped. The gnathos is long, fairly stout but parallel-sided, distally pointed and with a few dorsal spinules. The juxta is round, dorsally excavated in a rounded sinus; the lateral dorsal processes are spinose. The vinculum is fairly narrow. The valves are rather small and slender. Each is unsymmetrical around its long axis, with the costa arched, the ventral margin weakly sinuated but with its general course fairly straight. The distal parts of the valves have a few striations, and there is a strengthening ridge across each valve from the transtilla to about the middle of the anterior field of the valve. The penis is nearly straight and rather long. It tapers distally and is armed with a single strong, slightly sinuated cornutus.

The female genitalia are unknown.

There is only one known species.

Eremanthe chemsaki Munroe, NEW SPECIES
PL. 8, FIG. 32; PL. C, FIG. 9.

Eremanthe chemsaki Munroe.
Type-locality: Red Rock Canyon, Kern County, California.

DIAGNOSIS: The moth is somewhat similar to *Anatralata versicolor* in general appearance but is lighter in color and has the ground color of the forewings and hindwings different. The former are olivaceous with two reddish radial streaks and a single reddish terminal streak. The hindwings are fuscous with a whitish streak traversing the anal fold. The fringes of forewings and hindwings are completely white, not white in the distal half only as in *A. versicolor*.

DESCRIPTION: The frons is olivaceous buff, with whitish-buff lateral margins. The vertex is olivaceous buff. The labial and maxillary palpi are whitish buff, shading to olivaceous buff distally. The basal scaling of the proboscis is whitish buff. The eyes and ocelli are brown. The antennae are fuscous beneath, with whitish-buff scaling above. The body is olivaceous buff above, shading to whitish laterally and posteriorly. The body beneath and legs are white.

The forewings above are olivaceous buff; a V-shaped reddish marking begins in the postcubital region near the base and extends distally through the cell and along the anal fold to the postmedial region. There is a reddish terminal band of even width. There is some gray scaling along the posterior margin near the middle of the wing. The fringe is white with some buff scaling in its base posteriorly.

The hindwings above are dark fuscous. There is a whitish streak from the base along the anal fold, displaced toward the anal margin beyond the middle of the wing and expanding into a triangular terminal patch. There is a second whitish streak near the anal margin. The fringe is white.

The forewings beneath are white with a fuscous postmedial patch. The fringe is white.

The hindwings beneath are white, with fuscous patches at the apical and anal angles, the apical patch larger than the anal one. The fringe is white.

The length of the forewing varies from 5–6 mm.

The genitalia are as described for the genus.

TYPES: Holotype: ♂. Red Rock Canyon, Kern County, California; 10 April 1960; J. A. Chemsak. CAS.

Paratypes: 4 ♂♂. Same data as for holotype (3 ♂♂). Victorville, San Bernardino County, California; 16 May 1955; W. R. Richards (1 ♂). UCB; type no. 8945, CNC.

Chemsak found this species flying in large numbers in the daytime at the type-locality, though unfortunately he collected only a short series, thinking it must be a well-known insect. It is a most interesting and striking addition to our fauna. The single specimen collected several years earlier by Richards was damaged in preparation and was not suitable for description. The early stages of the species are unknown.

GENUS *Metaxmeste* Hübner

Metaxmeste Hübner, [1825], *Verzeichniss Bekannter Schmettlinge* [sic], 352.
Type-species: *Pyralis phrygialis* Hübner, 1796. Subsequent designation, Munroe, 1954, *Can. Ent.*, **86**: 499.

The moths are of medium size, with robust build, very broad rounded wings and hairy vestiture. The frons is flat and oblique. The vertex is short. The eyes are reduced and bordered by an unscaled zone ventrally, anteriorly and dorsally. The labial palpi are porrect, with the third segment drooping somewhat, not hidden by the long bushy scaling of the second. The maxillary palpi are short, not dilated with scales distally. The proboscis is well developed. The antennae are stout, with short segments, densely covered with very short pile below. The body is robust, covered with long hair below. The praecinctorium is narrow and short, with a transverse terminal lobe. The legs are robust and hairy, with subequal spurs.

In the wing venation the outstanding feature is the fact that Sc and R_s of the hindwings are only approximated and not anastomosed.

The male genitalia have the uncus trapezoidal, bilobed and laterally setose. The gnathos is triangular or spike-shaped, with some dorsal spinules. The tegumen is weakly domed. The juxta is bilobed and extended into a spinulose anellus. The valves are ovate, weakly fluted distally. The penis is straight or curved, with a single slender cornutus. In the female genitalia the ovipositor is weak; the apophyses are fairly long; the ductus bursae and bursa are slender and membranous; and the ductus bursae has a small sclerotized collar.

The larva of the European *M. phrygialis* (Hübner) is said to be polyphagous, sheltering under stones at high altitudes. It is dark brown with narrow darker stripes dorsally, above and below the spiracles and ventrally. The head, thorax and anal shield are dark brown. The head is normal, not flattened and prognathous as in the leaf-mining genera. Brief structural descriptions are given by Bollmann (1955) and Hasenfuss (1960). More species and genera will have to be compared before the characters can be evaluated.

The genus belongs to the group centering on *Titanio* Hübner, which has a number of genera and species in Europe and temperate Asia, mostly occurring at high altitudes. Only one species is known from North America. It is closely related to the palaearctic *M. phrygialis*.

Metaxmeste nubicola Munroe

PL. 8, FIGS. 33, 34.

Metaxmeste nubicola Munroe, 1954, *Can. Ent.*, **86**: 499
Type-locality: Hall Valley, Park County, Colorado, 11,500–12,500 ft.

The moth is of moderate size (length of forewing varying from 8.5–9.5 mm) and is robust and hairy, with rounded wings. The body is blackish fuscous. The forewings have the costa strongly arched at the base. The color of the forewings above is dark silky gray; there are obscure, blackish-fuscous, dentate antemedial, postmedial and subterminal bands and considerable infuscation in the medial area; this infuscation surrounds paler, uninfuscated orbicular and reniform spots. The hindwings above are blackish fuscous, paler towards the costa and with the fringe contrastingly light gray.

The genitalia are as described for the genus. They differ in the male from those of *M. phrygialis* in having the median element of the gnathos shorter and spikelike, not triangular, and also in having the valve broader.

The early stages are unknown, but no doubt are closely similar to those of *M. phrygialis*, noted in the generic description, above.

The species is known only from Park and Clear Creek counties, Colorado, but may well prove to have a much wider range. It is a day-flying species of the alpine tundra. It cannot

be confused with any other known North American odontiine, but it might be mixed with dark-colored alpine species of other subfamilies and families, with which it flies. In particular some of the species of *Orenaia* (Evergestinae) and *Udea* (Pyraustinae) resemble it closely. The genitalia will distinguish it easily in cases of doubt.

GENUS *Pogonogenys* Munroe

Pogonogenys Munroe, 1961, *Can. Ent., Supplement* **24**: 32.
Type-species: *Titanio proximalis* Fernald, 1894. Original designation.

The moths are of small to moderate size and fairly narrow-winged. The frons is produced in a horizontal wedge, somewhat domed above. The eyes are reduced but not surrounded by a scaleless zone. The genae are broad and scaled. The ocelli are large. The labial palpi are porrect, are long-scaled below and have the third segment hidden in the vestiture of the second. The maxillary palpi are small but exposed and conspicuous and end in a strong tuft of scales. The proboscis is well developed. The antennae are filiform in both sexes. The body is stout. The legs are rather long; the coxae have fine woolly vestiture. The tibial spurs are long; in the male the outer spurs are about two-thirds as long as the inner ones. The praecinctorium is elongate, keel-like, distally thickened and scaled. The wing venation has no unusual features.

In the male genitalia the uncus is bilobed. The gnathos is rodlike and robust. The anellus is tubular. The tegumen is of moderate width, not domed. The vinculum is fairly wide, medially expanded. The penis is somewhat curved, with a robust comma-shaped cornutus. The valves are distally rounded and radially fluted. In the female genitalia the ovipositor has rounded, somewhat sclerotized, sparsely setose lobes, rimmed with a conspicuous row of setae or clothed with setae with specialized bases. The apophyses are slender and fairly long. The ductus bursae is convoluted. The bursa is membranous with one or two thornlike signa.

The early stages are unknown.

This genus contains three species, all from the western United States. Of these, *P. masoni* differs in its small size, inconspicuous maculation, uniformly setose ovipositor lobes and single signum. It may need a separate genus, but I am reluctant to erect one until the male characters are known.

KEY TO NORTH AMERICAN SPECIES

1. Hindwing above red, or exceptionally orange-yellow ..... *proximalis* this page
— Hindwing above gray or brown 2

2. Hindwing above warm brown; length of forewing about 9 mm ..... *frechini* p. 166
— Hindwing above gray; length of forewing about 6 mm ..... *masoni* p. 166

Pogonogenys proximalis (Fernald)

PL. 8, FIGS. 37–39 (McD. 5535).

Titanio proximalis Fernald, 1894, *Insect Life, Washington*, **6**: 256.
Type-locality: San Bernardino County, California.

The moth is fairly large (length of forewing 9–11.5 mm). The body is dark gray above, paler

below. The forewings above have confused dark-gray maculation with diffuse paler areas on the distal half of the wing. The hindwings above are brick red (rarely orange-yellow), paler anteriorly, are weakly infuscated at the base and along the anal margin and have a narrow dark-fuscous terminal line, ending before the anal angle, and also a minute dark-fuscous subterminal dot just behind vein Cu_2.

The male genitalia have the uncus almost parallel-sided, truncate distally, the sides strongly setose. The gnathos is rodlike, blunt, dorsally spinulose at the tip. The tegumen is weakly humped. The juxta is bilobed, with a process from the outer angle of each lobe abutting on the conical anellus. The vinculum has a triangular dorsal projection. The valve is ovate, rather long and narrow, strongly fluted distally, with a subcostal supporting carina and somewhat inflated sacculus. The penis has a large cornutus. The female genitalia are as described for the genus. They have a conspicuous row of strong setae on each ovipositor lobe and a pair of depressed, denticulated signa.

The species is fairly common in the dry areas of southeastern California. It has been recorded from Inyo, San Bernardino and Riverside counties. The red hindwings distinguish it from other Odontiinae, but it resembles some Pyraustinae, especially *Loxostege triumphalis* (Grote), which, however, has broader forewings with a very different pattern, as well as fundamentally different genitalia in both sexes.

Pogonogenys frechini Munroe

PL. 8, FIGS. 35, 36.

Pogonogenys frechini Munroe, 1961, *Can. Ent., Supplement* **24**: 33, figs. 38, 193, 231.
Type-locality: Vantage, Washington.

The moth in general resembles *P. proximalis*, but is smaller (length of forewing 9 mm). The forewings are a little narrower and have the outer margin more oblique. The pale areas of the forewings above are duller and less contrasting. The hindwings above are brown, not red, and have a strong fuscous streak on the anal fold and some fuscous suffusion in the apical area as well as the dark markings that are present in *P. proximalis*.

In the male genitalia the uncus is ovate, not parallel-sided as in *P. proximalis*. The central element of the gnathos is longer and thinner. The valves are relatively short and wide. The penis is proportionally somewhat shorter, and the cornutus is relatively thicker and not so strongly curved. The female genitalia are much as in *P. proximalis*, but the signa are thornlike and stronger and deeper than in that species.

The species is known only from the type series collected at Vantage, Washington. The flight date is in April (given erroneously as November in the original description). The occurrence of this close relative of *P. proximalis* at so great a distance from the known range of the latter is extremely interesting, and further investigation of the comparative habits and ranges of the two species is greatly to be desired.

Pogonogenys masoni Munroe

PL. 8, FIG. 40.

Pogonogenys masoni Munroe, 1961, *Can. Ent., Supplement* **24**: 34, figs. 169, 232.
Type-locality: White Water, Riverside County, California.

This species is much smaller than the other two species of the genus but resembles them in a

general way in build and pattern. The color is gray, without red tints, though with a suggestion of brown on both forewings and hindwings. On the forewings above the medial area is a little paler than the basal and terminal areas. The hindwings above are dull brownish gray, with broader terminal infuscation than in the two other species. The length of the forewing is 6 mm.

The male is unknown. The female genitalia have the ovipositor lobes elongate, semiovate, covered with short setae with strong annular bases. The apophyses are long and slender. The ductus bursae and bursa are delicate and membranous. There is a single thornlike signum.

The species is known only from the holotype, which was taken at White Water, California, in early March by W. R. M. Mason.

The structural differences from other members of the genus have already been noted under the generic heading. In general appearance the species closely resembles *Psammobotys fordi*, which differs in the rounded frons and other structural characters. It also somewhat resembles *Plumipalpia martini*, of which the female is unknown. However, the present species differs in such striking features of structure and maculation from *P. martini* that I think it unlikely that they can be sexes of the same species.

GENUS *Chrismania* Barnes and McDunnough

Chrismania Barnes and McDunnough, 1914, *Contrib. Nat. Hist. Lep. N. Am.*, 2(6): 239.

Type-species: *Chrismania pictipennalis* Barnes and McDunnough, 1914. Monotypy and original designation.

The moth is of medium size and robust build. The frons is prominent, truncate or somewhat depressed anteriorly, with its anteroventral angles produced. The eyes are reduced. The genae are scaled in fresh specimens. The labial palpi are obliquely upturned; the first and second segments are fringed below with long scales; the third segment is cylindrical and somewhat more porrect than the first two. The maxillary palpi are filiform and do not reach the anterior edge of the frons. The proboscis is well developed. The antennae are filiform. The legs are robust; the midtibia is fringed with hairlike scales. The wing-venation is unremarkable, except that R_3 and R_4 of the forewings are very short-stalked.

In the male genitalia the tegumen is elevated. The uncus is elongate, bluntly bilobed at its tip. The gnathos is broadly triangular, tapering to a sharp upturned apex. The juxta is narrow and slender. The valves are subovate, radially fluted, with a weak ridge behind the costa. The penis is cylindrical, thinner in the middle than at the ends. In the female genitalia the ovipositor lobes are rather long, sparsely setose. The apophyses are fairly long and heavy. The ductus bursae is fairly long and has a sclerotized collar. The bursa is small, membranous and ovate.

The genus is related to the Old World complex of genera centering on *Tegostoma* Zeller. The single known species occurs in southern California and Arizona.

Chrismania pictipennalis Barnes and McDunnough

PL. 8, FIGS. 41, 42 (McD. 5543).

Chrismania pictipennalis Barnes and McDunnough, 1914, *Contrib. Nat. Hist. Lep. N. Am.*, 2(6): 240, pl. 1, fig. 20.

Type-locality: Redington, Arizona.

The head and body above are olivaceous brown, beneath they are light gray. The forewings above are light buff, suffused to a varying degree with dull brown, especially in the basal and terminal areas. The antemedial line is outwardly oblique, the postmedial line is curved and shallowly retracted on the anal fold. The hindwings above are uniformly light orange, with the fringe pale buff. The length of the forewing varies from 7–9 mm.

The genitalia are as described for the genus.

The early stages are unknown. The greasiness of many of the specimens suggests that the larva may be a borer.

The species is widespread in southern California and Arizona. It appears to be common on the Mojave Desert.

GENUS *Plumipalpia* Munroe

Plumipalpia Munroe, 1961, *Can. Ent., Supplement* **24**: 36.
Type-species: *Plumipalpia martini* Munroe, 1961. Monotypy and original designation.

The moth is small and narrow-winged. The frons is prominent, rounded and roughly scaled. The eyes are somewhat reduced. The labial palpi are porrect and plumose. The maxillary palpi are bushy. The proboscis is rudimentary. The body is robust. The legs are of moderate size. The praecinctorium is low and rounded. The forewings are narrowly oval, with rounded apex and strongly oblique outer margin, curving gradually to the posterior margin. M_1 arises from the middle of the cell. Cu_2 and 2nd A converge strongly towards the outer margin. The hindwings are narrow, with the outer margin weakly excised in the middle. Veins Sc and R_s are strongly anastomosed. M_1 is briefly stalked with R_s. The cell is very short. Veins M_2 and M_3 are absent. Cu_1 arises from the posterior angle of the cell and Cu_2 a little basad of it. There are three anal veins.

The male genitalia have the uncus moderately wide, ovate, weakly indented distally, the sides rolled under and setose. The gnathos is narrow, its median element long and spike-shaped. The tegumen has a small hump. The juxta is bilobed and joins a tubular anellus. The valves are ovate and strongly fluted. The penis is short, conical and unarmed. The female genitalia are unknown.

Only the type-species is known. The female characters are likely to be less abnormal than those of the male.

Plumipalpia martini Munroe

PL. 9, FIG. 1.

Plumipalpia martini Munroe, 1961, *Can. Ent., Supplement* **24**: 36, figs. 41, 127–129, 195.
Type-locality: Dove Springs, Mojave Desert, Kern County, California.

The moth is small (length of forewing 4.5 mm). The head, body and legs are dark grayish fuscous, with some admixture of light-gray scales. The forewings above have the basal area dark grayish fuscous, its outer edge strongly oblique outward. The median area is light gray with some yellowish and fuscous scales. There is a diffuse fuscous discocellular spot. The terminal area is fuscous, with an obscure gray subapical crescent. The fringe is fuscous. The

hindwings above have the costal part grayish white, thinly scaled. The posterior half is dark fuscous. The fringe is white, infuscated towards the apex.

The genitalia are as described for the genus.

The life history is unknown.

The species is known only from the type lot, collected by Lloyd M. Martin at Dove Springs, Mojave Desert, Kern County, California, at 3,000 feet altitude on "2-10-46". The moths were flushed from the ground during the day.

GENUS *Nannobotys* Munroe

Nannobotys Munroe, 1961, *Can. Ent., Supplement* **24**: 36.
Type-species: *Botis commortalis* Grote, 1881. Monotypy and original designation.

The moth is small but robustly built. The frons is prominent, somewhat rounded. The eyes are reduced. The ocelli are large, and there is a scaleless space between the eye and the ocellus. The genae are naked. The labial palpi are smoothly scaled and porrect, with the third segment drooping slightly. The maxillary palpi are prominent and dilated with scales. The proboscis is well developed. The antennae are filiform. The body is robust. The legs are strong, with the outer tibial spurs nearly as long as the inner ones. The praecinctorium is large, prominent and longitudinal and has paired scale-rows along its ventral margin. The wing venation is unremarkable except for the absence of vein M_2 in the hindwings.

The male genitalia have the uncus bluntly bilobed. The gnathos is strong, with long, triangular, basally trough-shaped medial element. The tegumen is humped. The vinculum is narrow. The anellus is prolonged into a bilobed sheath surrounding the penis. The valves are rounded, with strongly curved costa and weak fluting; there is a weak sclerotized ridge below the middle. The penis is strongly bent at about the basal third. The seminal duct enters at about the same point. The aedoeagus tapers to a slender tip. The female genitalia have the ovipositor minute and sharp. The apophyses are slender and straight but are strongly sclerotized.

The early stages are unknown.

The single species is known from southern California and from Washington, but doubtless occurs in intervening areas.

Nannobotys commortalis (Grote)

PL. 9, FIGS. 2, 3 (McD. 5664).

Botis commortalis Grote, 1881, *Can. Ent.*, **13**: 233.
Type-locality: Havilah, California.

Noctuelia minima Dyar, 1917, *Ins. Insc. Mens.*, **5**: 132.
Type-locality: Pasadena, California.

The moth is small (length of forewing 3.5–4.5 mm). The frons is dark gray, bordered with white at the sides. The rest of the head and the body are dark gray above, sometimes tinted with reddish brown, and pale gray beneath. The forewings above are gray, sometimes with a brownish or olivaceous tint or occasionally light rufous. There is a curved black antemedial line at one-third, followed by a diffuse grayish-white band. The ground color is

somewhat darkened over the discocellulars. The postmedial line is black and weakly sinuous but almost parallel to the outer margin. It is preceded by a diffuse grayish-white band. The fringe is white, with a dark line at its base. The hindwings are white in the male, grayish fuscous with a white fringe in the female.

The genitalia are as described for the genus.

The species is found in dry areas throughout southern California. I have seen it from San Diego, Los Angeles, Riverside, San Bernardino, San Luis Obispo and Kern counties and also from Yakima County, Washington.

The species flies in the daytime and is attracted to flowers of Compositae. It sometimes occurs in great abundance.

GENUS *Porphyrorhegma* Munroe

Porphyrorhegma Munroe, 1961, *Can. Ent., Supplement* **24**: 37.
Type-species: *Porphyrorhegma fortunata* Munroe, 1961. Monotypy and original designation.

The moth is small and robust, with narrow, stubby wings. The frons is broad, rounded and slightly prominent. The eyes are reduced and surrounded by an unscaled ring. The labial palpi are obliquely upturned, with the third segment porrect, short, conical and partly hidden in the scales of the second. The maxillary palpi are prominent and considerably exceed the frons, ending in an expanded tuft of scales. The antennae in the male are fasciculate, in the female pubescent; in both sexes the shaft is filiform. The ocelli are placed just behind the antennae and are well removed from the eyes. The proboscis is normally developed. The body is robust and hairy; the legs are strong and hairy, with the outer tibial spurs somewhat shorter than the inner ones. The praecinctorium is long and rather narrow and ends in a tuft of scales. The wing-venation has no striking peculiarities.

The male genitalia have the uncus oval and bilobed distally, rolled down and setose laterally. The gnathos is divided nearly to its apex; it tapers to a sharp point and has a low hump on each side at the middle. The tegumen is narrow and not domed. The juxta is bilobed and joins a broad anellus. The vinculum is narrow. The valves are broadly ovate and strongly fluted; they have a low angulate process from the costa near the base and a strengthening ridge behind the middle. The penis is cylindrical and tapers distally; it is armed with a large hook-shaped cornutus. The female genitalia have narrow ovipositor lobes and long, strong apophyses. The bursa is globular and has a pair of indented, strongly spinose signa.

The early stages are unknown.

Only the type-species is known.

Porphyrorhegma fortunata Munroe

PL. 9, FIGS. 4, 5.

Porphyrorhegma fortunata Munroe, 1961, *Can. Ent., Supplement* **24**: 38, figs. 45, 133–135, 197, 235.
Type-locality: Fish Creek Mountains, Imperial County, California.

The moth is small (length of forewing 5–5.5 mm) but is striking in appearance. The body is blackish, with head and thorax thickly dusted with greenish gray. The forewings above are

greenish gray, with broad, contrasting, bright-purple antemedial, postmedial, costal and discocellular bands. The hindwings above are black.

The genitalia are as described for the genus.

The holotype is from Imperial County, California, but all other specimens so far collected have been from San Bernardino County: Ibanpah Mountains, Mirage Lake and five miles southwest of Lucerne Valley. The species flies in April and early May.

The Lucerne Valley specimens are a little darker than the others and have the postmedial band of the forewings expanded to reach the termen. This is perhaps only a minor local variation.

The moth somewhat resembles *Noctueliopsis pandoralis* but is darker and has better-defined markings and darker hindwings as well as bushy palpi and reduced eyes.

GENUS *Psammobotys* Munroe

Psammobotys Munroe, 1961, *Can. Ent., Supplement* **24**: 39.
Type-species: *Psammobotys fordi* Munroe, 1961. Monotypy and original designation.

The moths are small, with fairly broad wings with rounded tips. The frons is broad, rounded and somewhat prominent. The eyes are reduced. The genae are naked, but the orbits are otherwise scaled. The ocelli are large. The labial palpi are porrect or drooping with long bushy scaling; the third segment is hidden in the scaling of the second. The maxillary palpi are prominent and have a loose apical tuft of scales. The proboscis is prominent. The antennae are filiform, long-ciliated in the male, pilose in the female. The forewings have R_2 bent and approximated to R_{3+4} basally. R_3 and R_4 are short-stalked. M_1 arises well behind the anterior angle of the cell. Otherwise the wing-venation has no peculiarities.

The male genitalia have the uncus broadly ovate, bilobed distally, laterally decurved and setose. The tegumen is narrow, not humped. The gnathos is bottle-shaped, with a few spines dorsally at the tip. The valves are finely fluted, with excavated anterior margin, narrowly rounded apex and broadly rounded distal and ventral margins. The penis is short, curved and conical and has a curved needlelike cornutus.

The genus is known only from California. There are two known species, very different in appearance and habitat.

KEY TO NORTH AMERICAN SPECIES

1. Forewing above with basal and terminal areas dark gray, medial area somewhat paler ..... *fordi* this page

— Forewing above dark brown with paler antemedial and postmedial bands; medial area not markedly paler ..... *alpinalis* p. 172

Psammobotys fordi Munroe

PL. 9, FIGS. 6, 7.

Psammobotys fordi Munroe, 1961, *Can. Ent., Supplement* **24**: 39, figs. 46, 136–138, 198.
Type-locality: El Segundo, Los Angeles County, California.

The moth is small (length of forewing 5–7 mm). The body and wings are powdery dark gray, with the disc of the forewings paler and the terminal zone of the hindwings infuscated. It

closely resembles *Pogonogenys masoni* but has the terminal infuscation of the hindwings narrower and evenly tapering posteriorly as well as having the genae naked, not scaled.

The genitalia are as described for the genus.

The early stages are unknown.

The species was described from a long series taken at the type-locality by R. J. Ford in March. A single specimen has subsequently been collected three miles east of Keen Camp Station, Riverside County, California, in April by C. MacNeill, D. Rentz and R. Brown. This specimen is darker than the type series and in particular has the hindwings uniformly infuscated, but I believe it is conspecific.

Psammobotys alpinalis Munroe, NEW SPECIES

PL. 9, FIGS. 8, 9; PL. C, FIG. 10; PL. H, FIG. 6.

Psammobotys alpinalis Munroe.
Type-locality: Ebbetts Pass, Alpine County, California.

DIAGNOSIS: The moth is larger than *P. fordi* (length of forewing from 6–8 mm), has broader wings and is dark brown rather than dark gray in color. The maculation of the forewings above is more uniform in texture, the basal area is broader, and the median area is suffused with dark brown so that it is no paler than the basal and terminal areas. In the male genitalia the uncus is wider than in *P. fordi*; the gnathos is stouter; and the valves are longer, narrower and more strongly unsymmetrical.

DESCRIPTION: The frons varies individually from dull buff to dark brown, with scattered pale-buff scales on the disc and with a concentration of pale-buff scales at the sides. There are some long ferrugineous or rufous scales between the antennae. The vertex has broad pale-buff scales on the median area and narrow ferrugineous or rufous ones laterally, the latter curved and converging towards the median area. The labial palpi have the lateral scaling fuscous, the dorsal and ventral scaling pale buff. The maxillary palpi have mixed fuscous and pale-buff scaling. The proboscis has pale-buff basal scaling. The eyes and ocelli are dark fuscous. The antennae are filiform, with pale-buff dorsal scaling and pilose dark-fuscous ventral surface. The thorax above has broad dark-fuscous scales, heavily intermixed with more slender rufous ones. The abdomen above is dark fuscous, with some rufous scaling at the base and with the posterior margin of the second segment narrowly pale buff. The body beneath and legs are pale buff; the femora and the bases of the abdominal segments are infuscated.

The forewings are rather broadly triangular; the costa is slightly sinuated; the apex is rounded; the termen is rounded and oblique; the tornus is fairly well marked; the posterior margin is somewhat rounded and has a weak scale-tuft near the base. The ground color above is mixed rufous and fuscous, the general effect being chocolate brown. The antemedial band is pale buff, bordered inwardly by a black line; the band runs obliquely distad for a short distance from the costa at one-fourth, then is erect to the posterior margin at two-fifths. There is a fuscous discocellular lunule. The postmedial band is pale buff, bordered outwardly by a black line; the band is outwardly oblique from the costa to vein M_2, then it is bent basad and is strongly oblique to Cu_1, then it curves gradually distad to the anal fold, whence it is erect to the posterior margin. There is a weak pale-buff subterminal line parallel to the margin. The fringe is fuscous, with paler lines medially and distally.

The hindwings above are fuscous, with a few scattered rufous scales. There is a double pale-buff subterminal band between M_2 and the anal fold; there is some admixture of rufous scales on the band. The fringe is basally fuscous, distally pale buff with a fuscous line.

The wings beneath are fuscous. The posterior margin of the forewings is broadly buff. The fringes are basally fuscous, distally dull buff with a broad fuscous band.

The length of the forewing varies from 6–8 mm.

The male genitalia have the uncus broadly rounded, distally narrowly bilobed, laterally narrowly lobed and strongly decurved. The gnathos is rather broadly bottle-shaped, the tip narrower and with a few dorsal teeth. The juxta is fairly wide, finely spinulose. The vinculum is narrow. The valves are strongly curved on the costal margin; they are narrower than in the type-species and much more strongly asymmetrical; the sacculus is broad basally; the ventral margin is excavated and the apex is narrowly rounded. The penis is short, pointed and curved, with a prominent curved cornutus.

In the female genitalia the ovipositor has weak, membranous, finely setose lobes. The apophyses are straight and rather strong. The ostium is wide. The ductus bursae narrows from the ostium, then is expanded and spinulose, then is again narrowed. The bursa is small, oval and membranous.

TYPES: Holotype: ♂. Ebbetts Pass, Alpine County, California; 21 June 1962; J. Powell. CAS.

Allotype: ♀. Data as for holotype. CAS.

Paratypes: 21 specimens. Locality and date as for holotype; J. Powell and C. D. MacNeill. CAS; UCB; type no. 8,944, CNC.

REMARKS: The species is found in an arctic-alpine habitat far different from that frequented by the type-species. The male genitalia are not unlike those of *Noctueliopsis palmalis* and *N. atascaderalis*, and it is possible that the two species here placed in *Psammobotys* are really independent derivatives of *Noctueliopsis* and that the former genus should be split.

GENUS *Mimoschinia* Warren

Mimoschinia Warren, 1892, *Ann. Mag. Nat. Hist.*, (6) **9**: 174.
Type-species: *Botys thalialis* Walker, 1859, now considered a synonym of *Ennychia rufofascialis* Stephens, 1834. Original designation.

The moths are of moderate to small size, with fairly robust build and rather square forewings. The frons is prominent and is strongly domed above. The eyes are large and the ocelli prominent. The genae are naked. The labial palpi are obliquely porrect, fairly smoothly scaled, with the third segment exposed. The maxillary palpi are prominent but do not have an expanded terminal tuft of scales. The proboscis is well developed. The antennae are filiform, strongly ciliated. The body is robust. The legs are moderately strong; the outer tibial spurs are nearly as long as the inner. The praecinctorium is narrow and longitudinal, with a small distal tuft of scales. The wing-venation has no unusual features.

The male genitalia have the uncus slender, tapering and bilobed. The gnathos is triangular at the base, tapering gradually to a slender point. The tegumen is moderately broad but not humped. The juxta is bivalvate. The valves are broadly rounded, with a weak carina. The penis is strongly bent, with the basal part recurved. The female genitalia are distinctive.

The ovipositor is rather strongly sclerotized, with its dorsal extremity posteriorly directed. The apophyses are slender but well sclerotized and fairly long. The ductus bursae at the ostial end is slender, membranous and cylindrical with an incomplete, rather long, sclerotized collar; the distal part is broad and obliquely pleated; it is moderately sclerotized, with a broad twisted expansion at its junction with the narrow ostial end. The bursa proper is subconical, membranous, weakly pleated and denticulated.

The larvae are seed-feeders on various species of Malvaceae. See the remarks given below under *M. rufofascialis novalis*.

Only a single species is known, but it shows significant geographical variation.

Mimoschinia rufofascialis (Stephens)

PL. 9, FIGS. 47, 48; PL. 10, FIGS. 1–6 (McD. 5659).

Pyralis fascialis Haworth, 1803, *Lepidoptera Britannica*: 390, not Hübner, 1796.
Type-locality: "England."

NOTE—The junior homonym *M. fascialis* and its replacement name *M. rufofascialis* have the same holotype, which reputedly came from England, but which is actually a specimen of the West Indian subspecies of the present species.

Ennychia rufofascialis Stephens, 1834, *Illustrations of British Entomology. Haustellata*, **4**: 33.
Type-locality: Britain.

NOTE—See the note under *fascialis*, above.

Botys? thalialis Walker, 1859, *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum*, **18**: 582.
Type-locality: St. Domingo.

Anthophila? perviana Walker, 1865, *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum*, **33**: 804.
Type-locality: St. Domingo.

Pyralis gelidalis Walker, 1865, *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum*, **34**: 1229.
Type-locality: St. Domingo.

Emprepes novalis Grote, 1876, *Can. Ent.*, **8**: 156. Subsp.
Type-locality: Texas, Belfrage coll.

Emprepes nuchalis Grote, 1878, *Bull. U.S. Geol. Geog. Surv. Terr.*, **4**: 675. Subsp.
Type-locality: California.

Thelcteria costaemaculalis Snellen, 1887, *Tijds. voor Ent.*, **30**: 54, pl. 4, fig. 6.
Type-locality: Curaçao.

Eustrotia decorata Druce, 1898, *Biologia Centrali-Americana. Insecta. Lepidoptera-Heterocera*, **2**: 495, pl. 95, fig. 14. Subsp.
Type-locality: northern Sonora, Mexico.

The moth is of moderate to small size, with rather square forewings. The maculation is distinctive. The ground color of the forewings above is light yellowish, greenish or buff, sometimes heavily suffused with reddish brown, with an outwardly oblique antemedial and a weakly sinuous, erect postmedial band, both dark reddish brown and both tending to be more sharply defined on the edge facing the medial area than on the edge facing away from it. There is a triangular patch on the middle of the costa and a small apical patch of the same color.

The male genitalia are as described for the genus.

The nominate subspecies occurs in the Caribbean area but not so far as known in North America. However, it will not be surprising if it turns up in southern Florida. It averages smaller than most North American populations and has the ground color of the forewings above dull tan and the transverse bands dull brownish fuscous, not strongly contrasting. I recognize three subspecies in North America, but there is both individual and seasonal variation and the whole pattern of variation requires detailed study.

Mimoschinia rufofascialis novalis (Grote)

PL. 9, FIGS. 47, 48; PL. 10, FIGS. 1, 2 (McD. 5659a, in part).

Emprepes novalis Grote, 1876, *Can. Ent.*, **8**: 156.
Type-locality: Texas, Belfrage coll.

The moths are variable in size and color, but typically are greenish or grayish buff with moderately distinct reddish-brown bands. A dimorphic form has the bands darkened and expanded and the forewings largely suffused with dark reddish brown. Although this form intergrades to some degree with the pale form, the intermediates are less frequent than the extremes in most localities, suggesting that the dimorphism is probably at least partly under simple genetic control. There is considerable local variation. Specimens from the interior of British Columbia and from adjacent areas of the northern United States are relatively large. The length of the forewing varies from 7–12 mm.

The life history has been described by Heinrich (1921: 829) and Leech (1949: 25). The larva is a seed-feeder in various malvaceous plants, including Indian mallow (*Abutilon* species); false mallow (*Malvastrum* species); *Wissadula* species; mallow (*Sida* species); hollyhock (*Althea* species). The full-grown larva is white with a wine-red band on each segment or with the entire thorax wine-red. The crochets of the prolegs are in a circle broken outwardly; they are uniordinal. The pupa is formed in a thin cocoon in the seed pod or outside the plant.

This subspecies ranges in dry open areas from Medicine Hat, Alberta, to Vernon, British Columbia, and south to Texas and San Diego County, California, excluding the relatively restricted ranges of the two following subspecies.

Mimoschinia rufofascialis decorata (Druce)

PL. 10, FIGS. 3–5 (McD. 5659a, in part).

Eustrotia decorata Druce, 1898, *Biologia Centrali-Americana. Insecta. Lepidoptera-Heterocera*, **2**: 495, pl. 95, fig. 14.
Type-locality: northern Sonora, Mexico, Morrison.

The moth resembles the preceding subspecies in general but the pale form has the ground color very pale clear yellowish buff, with narrow, strongly contrasting, rufous bands. The dimorphic dark form has the ground color largely or completely suffused with rich silky reddish fuscous. The length of the forewing varies from 6–10 mm, but averages rather small.

This subspecies occurs in southern Arizona and New Mexico and adjacent areas of northern Mexico.

Mimoschinia rufofascialis nuchalis (Grote)

PL. 10, FIG. 6 (McD. 5659b).

Emprepes nuchalis Grote, 1878, *Bull. U.S. Geol. Geog. Surv. Terr.*, **4**: 675.
Type-locality: California, Henry Edwards coll.

This subspecies, characteristic of the San Francisco Bay region of California, is larger on the average than most populations of *M. r. novalis* (length of forewing 8.5–11 mm). The ground color is much darker and more suffused. Specimens with buff ground color are exceptional; most specimens are dark greenish gray. Some are almost wholly suffused with rufous. These are distinguished from the dark form of *M. r. decorata* by the larger size and somewhat less intense rufous coloring.

The subspecies occurs in a number of counties in the vicinity of San Francisco Bay.

GENUS *Jativa* Munroe

Jativa Munroe, 1961, *Can. Ent., Supplement* **24**: 42.
Type-species: *Orobena castanealis* Hulst, 1886. Monotypy and original designation.

The moth is of medium size and fairly robust build. The frons is prominent and domed. The eyes are large and the ocelli are well developed. The genae are naked. The labial palpi are fairly slender, obliquely upturned and smoothly scaled; the second segment is fairly long; the third segment is cylindrical, a little less oblique than the second and not hidden in its scaling. The maxillary palpi are prominent but not dilated with scales. The proboscis is well developed. The antennae are filiform. The praecinctorium ends in a transverse, fanlike tuft of scales. The wing-venation has no marked peculiarities.

The male genitalia are much like those of *Mimoschinia* but have the gnathos much shorter than the uncus and broadly triangular. The female genitalia differ markedly from those of *Mimoschinia*. The ovipositor is elongate, fluted laterally, its lobes reduced, obtusely pointed and clothed with minute setae. The intersegmental membrane anterior to the ovipositor is heavily covered with anteriorly directed spines. The apophyses are long, thick and straight. The posterior apophyses are expanded and compressed posteriorly. The ductus bursae is slender and membranous. The bursa is small, globular and unarmed.

Only one species is known. It occurs in the southwestern United States and in Mexico. The genus is close to *Mimoschinia* in general appearance and external structures, but the female genitalia are very different.

The early stages are unknown.

Jativa castanealis (Hulst)

PL. 9, FIG. 46 (McD. 5660).

Orobena castanealis Hulst, 1886, *Trans. Amer. Ent. Soc.*, **13**: 157.
Type-locality: Texas.

Thalpochares jativa Barnes, 1905, *Can. Ent.*, **37**: 213.
Type-locality: southern Arizona.

The moth is of moderate size (length of forewing 6.5–8.5 mm). In a general way it resembles *Mimoschinia rufofascialis*, but, with its broad reddish-brown basal and terminal forewing bands separated by a Y-shaped yellowish medial band, it cannot be confused with any other species.

The genitalia are as described for the genus.

The life history is unknown.

The species ranges from southwestern Texas through southern New Mexico to Yuma County, Arizona. It flies in April, May and early June.

GENUS *Pseudoschinia* Munroe

Pseudoschinia Munroe, 1961, *Can. Ent., Supplement* **24**: 43.
Type-species: *Eurycreon elautalis* Grote, 1881. Monotypy and original designation.

The moth is of moderately large size. The frons is prominent and rounded. The labial palpi are porrect, only slightly exceeding the frons; the second segment is weakly oblique; the third segment is porrect, short, blunt, not hidden in the scaling of the second. The maxillary palpi are prominent, ending in an expanded tuft of scales. The genae are naked. The eyes are large and the ocelli are prominent. The antennae are filiform. The body is robust. The legs are long and slender. The praecinctorium is small and slender, ending in a narrow, transverse, rounded tuft of scales. The forewings are broad and subtriangular, with the apex somewhat rounded. Veins R_3 and R_4 are short-stalked; otherwise the wing-venation is not remarkable.

The male genitalia have the uncus narrowly trapezoidal, bilobed. The gnathos is V-shaped, its median part somewhat fingerlike and dorsally finely denticulate. The tegumen is narrow and not humped. The juxta is bivalvate. The valves are broad, rounded and strongly fluted, with the ventral margin lobed near the middle. The penis is cylindrical and curved. The female genitalia have the ovipositor lobes moderately well developed, weakly setose. The posterior apophyses are T-shaped. The ductus bursae is slender and membranous, with a moderately long sclerotized collar. The bursa has a long trough-shaped sclerotization on one side.

The early stages are unknown.

Only the type-species is known.

The genus is closely similar to *Mimoschinia* but differs in the short stalking of R_3 and R_4 of the forewings, in the absence of a cornutus in the penis of the male and in the radically different structure of the female genitalia.

Pseudoschinia elautalis (Grote)
PL. 1, FIGS. 52–55 (McD. 5661).

Eurycreon elautalis Grote, 1881, *Papilio*, **1**: 168.
Type-locality: Tucson, Arizona.

Emprepes magnalis Hulst, 1886, *Trans. Amer. Ent. Soc.*, **13**: 147.
Type-locality: Arizona.

NOTE—The locality given is that of the lectotype designated by Klots (1942).

The moths are moderately large (length of forewing 10–13 mm). The maculation varies considerably in intensity but is consistent and characteristic in pattern. The brown basal area is bordered outwardly by an arcuate or oblique black line of somewhat irregular course and thickness. The medial area is pale buff with brown shades and a dark discocellular spot. There is a black sinuous postmedial line followed by a brown shade. There is a brown terminal shade bordered outwardly by a broken darker line. The fringe is pale. The hindwings are white, with a buff border of variable intensity, edged inwardly by a fuscous line.

The genitalia are as described for the genus.

The species is found in dry areas from western Texas and New Mexico across southern Arizona to the Mojave Desert of California and south into northern Mexico.

The moth cannot be confused with any other pyralid but might easily be mistaken for a noctuid of the *Schinia* group. The family characters of developed maxillary palpi, scaled base of proboscis, ventral abdominal ears and anastomosed Sc and R_s of hindwing will distinguish the present species immediately from these noctuids.

GENUS *Noctueliopsis* Munroe

Noctueliopsis Munroe, 1961, *Can. Ent., Supplement* **24**: 44.
Type-species: *Noctuelia puertalis* Barnes and McDunnough, 1912. Original designation.

The moths are of moderate to small size and medium to robust build. The frons is prominent and oblique, weakly rounded above and sloping downward and forward to the well-defined ventral margin. The labial palpi are porrect, with the second segment oblique and the third segment hidden in the conical scaling of the second. The maxillary palpi are prominent and have an expanded distal tuft of scales. The eyes are large and the ocelli are prominent. The genae are naked. The proboscis is well developed. The antennae are filiform or weakly compressed and are ciliated below. The praecinctorium is short in some species, longer and keel-like in others, but always ends in a transverse tuft of scales. Vein R_2 of the forewings is basally deflected and strongly approximated to R_{3+4} basally; otherwise the wing venation is normal.

The male genitalia have the uncus bilobed, oval to parallel-sided, with the sides downcurved and setose. The gnathos is slender; the medial part is rod-shaped. The valves are variable, usually constricted at the base with strongly curved costa and well-developed fluting. The penis is short, stout and curved, usually with a needlelike cornutus. The female genitalia have the ovipositor simple, with weakly setose, somewhat sclerotized lobes. The apophyses are slender. The bursa is unarmed or nearly so.

This genus contains a small number of species ranging through the southwestern states and into Mexico. There is considerable variation in the male genital characters, in the length of the palpi and in the shape of the praecinctorium, but I have been unable to divide the genus into clear-cut groups.

KEY TO NORTH AMERICAN SPECIES

1. Antemedial line or outer edge of basal area of forewing above inwardly oblique from costa to posterior margin 2
— Antemedial line or outer edge of basal area of forewing above erect or somewhat outwardly oblique in its general course, though often sinuous or irregular 6

2. Basal area of forewing above pink 3
— Basal area of forewing above olivaceous or brown 4

3. Outer edge of basal area of forewing above strongly oblique, more so than outer margin of wing ..... *aridalis* p. 184
— Outer edge of basal area of forewing above weakly oblique, less oblique than outer margin of wing ..... *pandoralis* p. 185

4. Labial palpus unusually long, exceeding frons by much more than diameter of eye; a robust species ranging from central and western California north to Oregon ..... *atascaderalis* p. 184

— Labial palpus of normal length, exceeding frons by less than diameter of eye; small, slight species from arid regions of the southwest 5

5. Antemedial line of forewing above strongly oblique, approximately parallel to outer margin; postmedial line strongly sinuous but the sinuations smooth and regular ..... *virula* p. 186

— Antemedial line of forewing above less oblique than outer margin; postmedial line with sinuations wavering or crenulated ..... *bububattalis* p. 185

6. Postmedial line of forewing above diffuse on posterior half of wing and interrupted by pale-buff rays ..... *radialis* p. 181

— Postmedial line of forewing above as well defined on posterior half of wing as on anterior half, either as a distinct fuscous line or as a sharp boundary between two different shades of ground color 7

7. Forewing rather broadly triangular, with apex subacute and narrowly rounded; termen distinctly oblique and only moderately convex; postmedial line of forewing strongly retracted towards posterior angle of cell 8

— Forewing narrower, with rounded apex, the termen strongly convex and little oblique; postmedial line of forewing above generally only weakly incurved behind cell, rarely retracted so as to approach posterior angle of cell ..... *puertalis* p. 183

8. Forewing above with ground color glossy; medial area generally grayish; antemedial and postmedial lines at most narrowly and weakly fuscous, often mainly visible as the dividing line between narrow pale medial zones and darker basal and postmedial areas; retraction of postmedial line ending in a simple curve opposite posterior angle of cell ..... *palmalis* p. 183

— Forewing above with ground color matt; medial area buff with brown shading; antemedial and postmedial lines generally distinctly blackish fuscous; retraction of postmedial line bilobed opposite posterior angle of cell ..... *brunnealis* this page

Noctueliopsis brunnealis Munroe, NEW SPECIES

PL. 9, FIGS. 10–12; PL. D, FIG. 1; PL. H, FIG. 7.

Noctueliopsis brunnealis Munroe.
Type-locality: Crane, Crane County, Texas.

DIAGNOSIS: This species has the forewings rather broadly triangular, as in *N. radialis* and *N. palmalis*, with narrowly rounded, subacute apex and distinctly oblique, moderately convex termen. The ground color of the forewing is matt brown, with the medial area somewhat paler than the basal and subterminal areas. The antemedial and postmedial lines and the discocellular lunule are distinct and blackish fuscous. The postmedial line is distinctive in shape: it is evenly developed throughout, not diffuse posteriorly as in *N. radialis*; it has a strong bilobed retraction behind the cell approaching its posterior angle. The hindwing above has distinct traces of a postmedial line.

DESCRIPTION: The frons and vertex are smoothly scaled, light buff, whitish between the eye and the antenna on each side. The labial palpi are light buff, broadly whitish at the base beneath. The maxillary palpi are light buff, tipped with whitish. The eyes and ocelli are large and dark fuscous. The basal scaling of the proboscis is light buff. The antennae

are light buff, filiform in both sexes, fasciculate beneath in the male, ciliate beneath in the female, smoothly scaled above in both sexes. The thorax and abdomen above are evenly light buff. The body beneath and legs are light buff.

The forewings are broadly subtriangular, with the costa almost straight except near apex; the apex is subacute, narrowly rounded; the termen is oblique, somewhat convex; the tornus is obtuse; the posterior margin is weakly convex near the base. The ground color above is light brown, the basal and subterminal areas somewhat darker and gray-suffused, the median area suffused with deeper and slightly pinkish brown in the middle. The antemedial line is narrow, blackish fuscous, weakly and irregularly sinuated from the costa at two-fifths from base to the posterior margin at one-third from base. There is a diffuse pale-buff zone immediately distad of the antemedial line and a similar zone immediately basad of the postmedial line. The discocellular lunule is a narrow, distinct, blackish-fuscous bar. The postmedial line is narrow, blackish fuscous and well defined throughout. It is irregularly sinuate from the costa at four-fifths from base to the posterior margin near the tornus. It has a fine but usually distinct dentation basad on M_1 and a bilobed retraction behind the posterior angle of the cell. The gray-tinted postmedial zone is of irregular width. There is a fine, dark-brown or fuscous terminal line. The fringe is buff or brown. The length of the forewing varies from 8–11 mm.

The hindwings are rounded. Their ground color above varies from buff to light brownish fuscous in different individuals. There are traces of a fuscous postmedial line parallel to and fairly close to the termen. There is narrow and weak terminal infuscation. The fringe is buff with a fuscous midline.

The wings beneath are silky buff. The forewings have the markings of the upperside weakly indicated. The hindwings have a weak, regularly curved, dark postmedial line.

The male genitalia have the uncus bilobed, with the sides setose and strongly decurved. The gnathos is nearly as long as the uncus; its median element is long and rodlike, distally somewhat expanded to a rounded tip. The juxta is deep and troughlike. The vinculum is ventrally rounded. The valves are unsymmetrically rounded, with the costa much more strongly convex than the ventral margin. The penis is curved and has a thick, curved cornutus, somewhat less than half the length of the aedoeagus. The female genitalia have the ovipositor lobes long, compressed and hardly setose; the crossbar of the posterior apophyses is triangularly flattened, the apophyses themselves are slender and straight. The anterior apophyses are thicker and a little longer, with a thornlike dorsal process in the middle, anterior to which is a weak sinuation. The ductus bursae is narrow, with a narrow sclerotized collar; immediately distad of this is the junction of the ductus seminalis. The bursa is saclike and membranous and has two weak depressed signa.

The early stages are unknown.

TYPES: Holotype: ♂. Crane, Crane County, Texas; 28 May 1950; E. C. Johnston. Type no. 11,957, CNC.

Allotype: ♀. Data and type number as for holotype. CNC.

Paratypes: 13 ♂♂, 23 ♀♀. Same data as for holotype (4 ♂♂, 8 ♀♀). Pecos, Reeves County, Texas; 18 May and 2 June 1950; E. C. Johnston (1 ♂, 1 ♀). Sheffield, Pecos County, Texas; 31 March 1967; A. and M. E. Blanchard (1 ♀). El Paso, Texas; 2 April 1927; J. O. Martin (1 ♂, 1 ♀). Mesquite, near Mesilla Park, New Mexico; 12 July 1917; Cornell University Lot 542,

Sub 96 (1 ♀). S[tate]Ag[ricultural] St[atio]n, New Mexico; Aug. 1923; Holland Collection (1 ♀). Frijoles Canyon, 6,050 ft, Bandelier National Monument, New Mexico; 19 July 1962; E. and I. Munroe; ultraviolet light (1 ♂). Portal, Cochise County, Arizona; 9 Aug. 1958; P. D. Hurd (1 ♀). 1 mile northeast of Portal, Cochise County, Arizona; 7 Sept. 1959; John M. Burns (1 ♀). 2 miles northeast of Douglas, Cochise County, Arizona; 5 Sept. 1959; D. D. Linsdale (1 ♀). Tucson, Arizona; O. Bryant (1 ♀). Madera Canyon, Santa Rita Mountains, Arizona; 18 Aug. 1946; J. A. Comstock and L. Martin (1 ♀). Wendover, Utah; 12 June 1933; J. T. Howell (1 ♂). Valley of Fire, Nevada; 28 May 1938; Grace H. and John L. Sperry (1 ♀). 9 miles west of Caliente, Nevada, 6,200 ft; 2 Sept. 1965; D. F. Hardwick (1 ♀). 8 miles south of Pioche, Nevada, 4,900 ft; 3 Sept. 1965; D. F. Hardwick (2 ♂♂). Barstow, San Bernardino County, California; 10 and 14 April 1936; Wm. R. Bauer (1 ♂, 1 ♀). Shavess Well, California; 1 April 1935; Grace H. and John L. Sperry (1 ♂). Vidal, California; 16 Sept. 1947; D. Weedmark; Collection of Grace H. and John L. Sperry (1 ♂). Morongo Valley, California; 12 May 1937; Grace H. and John L. Sperry (1 ♀). 29 Palms, San Bernardino County, California; 21 April 1950; E. C. Johnston (1 ♂). USNM; type lot no. 532, CM; UCB; CU; CAS; type no. 11,957, CNC.

In my *Synopsis* (Munroe, 1964) I confused this species with the smaller and more powdery *N. puertalis*, with which it has generally been mixed in collections. *N. radialis* is also confusingly similar, and there is at least one additional undescribed species of this complex in Mexico.

Noctueliopsis radialis Munroe, NEW SPECIES

PL. D, FIG. 2.

Noctueliopsis radialis Munroe.
Type-locality: Chihuahuan Desert near Nugent Mountain, Big Bend National Park, Texas.

DIAGNOSIS: The moth somewhat resembles *N. brunnealis* in external appearance, but has the labial palpi longer, exceeding the frons by about the length of the head. The basal area of the forewings is lighter brown than in *N. brunnealis*; the antemedial line is reddish brown, not blackish fuscous, and is arcuate and weakly oblique basad behind the cell. The disc is paler than in *N. brunnealis*; the postmedial line and subterminal dark-brown shade are weakened or obsolete on the posterior part of the wing. The male genitalia differ in important characters from those of *N. brunnealis*, notably in the short heavy gnathos, the differently shaped valve and the long, slender, straight penis. It is likely that a new genus will be required for this species, but in the absence of strong external diagnostic characters I refrain from erecting one at the present time.

DESCRIPTION: The frons is moderately domed and prominent. The frons and vertex are smoothly scaled, light brown. The labial palpi have the distal part porrect, exceeding the frons by about the length of the head. In color they are light brown, with the base beneath broadly and contrastingly white. The maxillary palpi are brown at the base, light buff at the tip. The proboscis is rather weak; its basal scaling is light brown. The eyes and ocelli are brown; the eyes are moderately large. The antennae of the male are filiform and strongly fasciculate, the cilia being longer than the diameter of the shaft. The ventral surface is

brown; the dorsal scaling is light buff. The thorax above is brown with whitish-buff stripes. The base of the abdomen is whitish buff; the rest has been removed in the holotype to prepare a genital slide. The thorax beneath is whitish buff. The legs are fuscous basally, with whitish-buff tarsi.

The forewings are rather broadly triangular; the costa is straight to near the apex, then curved; the apex is narrowly rounded, subacute; the termen is convex and oblique; the tornal angle is obtuse; the posterior margin is convex near the base. The general color of the forewing above is composed of shades of buff and brown. The basal area is fairly deep buff, distally with diffuse streaks of reddish brown leading into the reddish-brown antemedial line, which is diffuse basally but well defined distally. The antemedial line is weakly convex and slightly sinuous from the costa at two-fifths from base to the posterior margin at two-fifths from base. Its most distal point is at vein Cu, whence it is generally oblique basad to the posterior margin. Immediately distad of the antemedial line the medial area is fairly broadly light buff; towards the postmedial line it becomes somewhat darker and is irregularly clouded with reddish brown, leaving diffuse pale-buff rays on some of the veins. These pale rays tend to coalesce immediately basad of the postmedial line. The latter is fuscous and weak anteriorly; posteriorly it is obsolete. The anterior part is oblique basad from the costa near the apex to R_5; there it is obtusely angled and runs obliquely distad to the middle of cell M_1; thence it is oblique basad to Cu_2, where it fades out. There is a dark-brown subterminal shade adjacent to the postmedial line from costa to Cu_2. This shade is evenly curved except for an indentation of its distal margin in cell R_4. The terminal area is pale buff, with a reddish-brown spot in the cubital area. The fringe is buff basally, whitish buff distally. The length of the forewing is 10.5 mm.

The hindwings above are brownish fuscous, darker distad of the obscure, fuscous, regularly curved postmedial line. There is an inconspicuous buff streak behind Cu_2, interrupted by the postmedial line. The fringe is buff basally, with a conspicuous fuscous line basad of the middle, beyond which the distal half is whitish buff.

The wings beneath are buff, heavily streaked and clouded with dark fuscous, especially in the region immediately distad of the dark-fuscous, regularly curved postmedial line. The fringes are light buff, with traces of an interrupted fuscous line just basad of the middle.

The male genitalia are unusual in structure in a number of ways. The uncus is strongly bilobed, with the sides decurved and densely setose; it is somewhat wider subterminally than basally. The tegumen is high and narrow. The juxta is strongly sclerotized and U-shaped, with long, slender, sharp, dorsal processes, which nearly meet dorsad of the penis. The vinculum is deep and cup-shaped, with heavy, partly doubled sclerotization. The valves are short and deep, arising from a somewhat narrower base. The costa is broadly convex in its distal part, curving evenly into the convex distal margin. The latter has a shallow emargination bordering a conspicuous, triangular, postmedian zone of weak sclerotization. The ventral margin is narrowly sclerotized and the sclerotization extends around the narrowly rounded posteroventral angle, where it bears a slender thornlike process. The costa is supported by a strong sclerotization at the base; this diverges from the costa sub-basally and branches into a number of flutings on the distal part of the valve. There is also a median sclerotization, which distally becomes a conspicuous setose ridge. The female genitalia are unknown.

The life history is unknown.

TYPE: Holotype: ♂. Chihuahuan Desert near Nugent Mountain, Big Bend National Park, Texas; 10 April 1967; A. and M. E. Blanchard. AB.

This is one of several interesting discoveries submitted by Blanchard as this fascicle was in the final stages of preparation. Unfortunately it was too late to include it in the color plates, but it will be figured in color in fascicle 13.2.

Noctueliopsis puertalis (Barnes and McDunnough)
PL. 9, FIGS. 13–16; PL. D, FIG. 3; PL. H, FIG. 8 (McD. 5662).

Noctuelia puertalis Barnes and McDunnough, 1912, *Ent. News*, **23**: 220.
Type-locality: La Puerta Valley, California.

This species resembles *N. brunnealis* in a general way, but it is smaller (length of forewing 6–8 mm) and has narrower forewings, with the apex rounded and the termen more convex and a little less oblique. The maculation of the forewings is less contrasting in the present species: in particular the base and the subterminal zone are usually not much darker than the rest of the wing and the antemedial and postmedial lines and discocellular lunule are much weaker or even obsolete. The postmedial line is less strongly retracted behind the posterior angle of the cell and it rarely shows the bilobed shape that is normal in *N. brunnealis*. The hindwings are unicolorous gray and generally have no trace of the postmedial line on the upperside. The antennae of the male are short-ciliate and not fasciculate as in *N. brunnealis* and *N. radialis*.

The male genitalia are in general like those of *N. brunnealis*, but the valve is shorter and more symmetrically rounded, lacking the strong costal curvature and expansion of *N. brunnealis*. The female genitalia have considerably shorter and weaker apophyses than those of *N. brunnealis*.

The early stages are unknown.

The species ranges from southern California to southern New Mexico and south into Mexico, including Baja California.

There is a range of variation between small, powdery grayish specimens, such as those shown in plate 9, figures 13 and 16, and larger, smoother fulvous-tinted ones, as shown in figures 14 and 15. I can find no structural difference between these forms and they appear to be connected by intergrades. Though at first I thought the fulvous specimens might represent a distinct species, now I consider them only variants of *N. brunnealis*.

Noctueliopsis palmalis (Barnes and McDunnough)
PL. 9, FIGS. 17, 18 (McD. 5663).

Noctuelia palmalis Barnes and McDunnough, 1918, *Contrib. Nat. Hist. Lep. N. Am.*, **4**: 167, pl. 23, fig. 5.
Type-locality: Palm Springs, Riverside County, California.

This species bears a general resemblance to *N. brunnealis* and *N. puertalis*, but it has the ground color of the forewings above silkier and the antemedial and postmedial lines visible only as the boundaries between the darker basal and terminal and the paler medial areas. The postmedial line is retracted into a squarish loop in the cubital area, instead of being bidentate as in *N. brunnealis* or regularly curved as in *N. puertalis*. The ground color tends to be gray or

pinkish, but is occasionally brown as in *N. brunnealis* or even rather deeply infuscated. The species also resembles *N. atascaderalis*, but that species has the labial palpi long and porrect and has the antemedial line of the forewings above distinctly oblique basad. The forewing of *N. palmalis* varies in length from 6–8.5 mm.

The male genitalia differ considerably from those of *N. puertalis*. The uncus is shorter and wider, with curved sides. The valves are narrower, but each is strongly unsymmetrical, with expanded, curved costa. The penis is much shorter, with a slender needlelike cornutus. The female genitalia are not very different from those of *N. puertalis*, but lack the signa.

The early stages are unknown.

The species ranges from western Texas and New Mexico through southern Arizona to southern California.

Noctueliopsis atascaderalis (Munroe)

PL. 9, FIGS. 19, 20.

Noctuelia atascaderalis Munroe, 1951, *Can. Ent.*, **83**: 169, fig. 14, pl. 1, fig. 10.
Type-locality: Atascadero, San Luis Obispo County, California.

The moth resembles *N. palmalis* but has the antemedial line of the forewings above oblique basad, the antemedial and postmedial lines fuscous, bordered medially with pale buff, the medial area itself almost as dark as the basal and terminal areas and the hindwings dark. The labial palpi are much longer than in the preceding two species. The length of the forewing varies from 8–9.5 mm.

The male genitalia are not unlike those of *N. palmalis*, but the valves are shorter and wider and the penis is longer.

The early stages are unknown.

The moth is fairly common in California, ranging from Atascadero up through the San Joaquin and Sacramento Valleys and north to Eugene, Oregon.

Noctueliopsis aridalis (Barnes and Benjamin)

PL. 9, FIGS. 21–24 (McD. 5666).

Noctuelia aridalis Barnes and Benjamin, 1922, *Contrib. Nat. Hist. Lep. N. Am.*, **5**: 48.
Type-locality: Dixieland, Imperial County, California.

The moth is small (length of forewing 5.5–6.5 mm) and rather delicately built. The head and body are gray to buff with some pink markings. The forewings above are greenish gray with a strong pink basal area or antemedial line, the outer edge strongly oblique basad, with pink midcostal and mid-posterior-marginal spots and with a pink terminal band. *N. pandoralis* and *Mojavia achemonalis* are somewhat similarly marked, but both have the hindwings contrastingly dark, whereas they are pale in the present species. *N. pandoralis* has the outer edge of the basal area less strongly oblique and the medial area uniformly olivaceous; *M. achemonalis* has the forewings wider and the medial area yellowish, without a triangular pink marking on the posterior margin.

The male genitalia have the uncus bilobed, its outer margins moderately rounded, downcurved and setose. The tegumen is weakly humped. The gnathos has the median element slender, rodlike, slightly narrowed in the middle, rounded at the tip. The juxta is prolonged into a trough-shaped anellus, closely apposed to the penis. The valves are ovate,

weakly constricted basally, with a weak sclerotized ridge in the basal part. The penis is short and weakly curved. In the female genitalia the ovipositor lobes are produced and narrowed, triangular in shape. The apophyses are slender and straight. The bursa is small and membranous.

The early stages are unknown.

The species is abundant in the Imperial and Mojave deserts of California in March. It ranges to Arizona and southern Nevada.

Noctueliopsis pandoralis (Barnes and McDunnough)
PL. 9, FIG. 25 (McD. 5665).

Noctuelia pandoralis Barnes and McDunnough, 1914, *Contrib. Nat. Hist. Lep. N. Am.*, **2**(6): 244, pl. 2, fig. 13.
Type-locality: Deming, New Mexico.

The moth is of slight build and moderate size (length of forewing 7–8 mm). The body is olivaceous with pink markings. The forewings above are olivaceous with a pink antemedial band followed distally by a pale blue-gray band and with a pink terminal band preceded by pale blue-gray. The hindwings above are fuscous with a gray fringe. The labial palpi are very short, projecting little beyond the frons.

The early stages are unknown.

The species has been taken in the Organ Pipe Cactus National Monument in Arizona as well as in southern New Mexico. It has been collected in March, August and September. The Mexican *Noctueliopsis minimistrica* (Dyar), new combination, described in *Pyrausta*, is probably at most subspecifically distinct. It is darker in color and has deeper, brighter pink areas.

Noctueliopsis bububattalis (Hulst)
PL. 9, FIGS. 26–29 (McD. 5668).

Botis bububattalis Hulst, 1886, *Trans. Amer. Ent. Soc.*, **13**: 149.
Type-locality: Colorado.

Noctuelia tectalis Barnes and McDunnough, 1914, *Contrib. Nat. Hist. Lep. N. Am.*, **2**(6): 243, pl. 2, fig. 10.
Type-locality: Baboquivari Mountains, Arizona.

The moth is small and delicately built (length of forewing 5.5–7 mm). The head and body are grayish brown above, gray beneath. The forewings have the outer margin rather oblique. The general color is medium brown. The antemedial line is inwardly oblique, straight, light gray or buff, fairly clear-cut. The medial area may be pale or suffused with dark brown. There is a dark discocellular dot. The postmedial line is strongly sinuous, light gray or buff. There is a dark-brown terminal line. The fringe is buff. The hindwings are light fuscous.

The male genitalia have the uncus rather narrow, with straight, weakly converging, downcurved, setose sides and bilobed tip. The gnathos is slender, with a narrowly finger-shaped median element. The juxta joins a trough-shaped anellus. The valves are short, wide, rounded and strongly fluted. The penis is short, stout and curved, with a strong cornutus. The female genitalia have the ovipositor lobes short, subquadrate and hardly setose. The apophyses are of moderate length, straight and slender. The ductus bursae is slender, with a small sclerotized collar. The bursa is oval, membranous, minutely denticulated.

The early stages are unknown.

The species is of widespread but somewhat sporadic occurrence. It ranges from western Texas to Colorado, Utah, southern California and south into Mexico. In southern California it flies from March to May and in Arizona it has been collected in April.

Noctueliopsis virula (Barnes and McDunnough)

PL. 9, FIGS. 30–34 (McD. 5667).

Noctuelia virula Barnes and McDunnough, 1918, *Contrib. Nat. Hist. Lep. N. Am.*, **4**: 168, pl. 23, fig. 9.
Type-locality: Palm Springs, Riverside County, California.

The moth is small and delicate (length of forewing 5–6 mm). The head and body are grayish brown above, light gray beneath. The forewings have the outer margin oblique and are marked much as in *N. bububattalis*, but the coloring is grayer, the transverse lines are whitish, and the postmedial line is more strongly bent in its posterior part, forming an almost acute angle behind the discocellular mark. The hindwings are white, not fuscous as in *N. bububattalis*.

The male genitalia differ considerably from those of *N. bububattalis*. They have the uncus short and parallel-sided. The median element of the gnathos is fingerlike. The valve is narrow and nearly parallel-sided; its surface is weakly fluted. The penis is thick and short, tapers rapidly and has a strong cornutus. In the female genitalia the ovipositor lobes are subquadrate and sparsely setose. The apophyses are slender and straight. The ductus bursae has a narrow, weakly sclerotized collar. The bursa is membranous.

The early stages are unknown.

The species is common in desert areas of southern California.

GENUS *Mojavia* Munroe

Mojavia Munroe, 1961, *Can. Ent., Supplement* **24**: 50.
Type-species: *Noctuelia achemonalis* Barnes and McDunnough, 1914. Monotypy and original designation.

The moths are small and delicate, but broad-winged. The frons is produced and transversely wedge-shaped, very weakly domed above. The labial palpi are prominent and porrect, but do not much exceed the frons. The maxillary palpi are prominent and filiform. The proboscis is well developed. The eyes are large. The ocelli are well developed. The genae are narrow and unscaled. The antennae are filiform. The body and legs are slender. The praecinctorium is narrow, with a rounded tuft of scales at its tip. The forewings are rather broad; the costa is weakly excavated near the end of the cell. Vein R_2 is bent and approximated to R_{3+4} at its base.

The male genitalia have the uncus bilobed, with the sides downcurved, setose and nearly parallel. The tegumen is weakly humped. The gnathos has a slender and fingerlike median element. The vinculum is broad. The juxta is elongate. The valves are slender, with curved costa and central sclerotized ridge. The penis is short, cylindrical and weakly curved, with a slender cornutus.

The life history is unknown.

The single species is southwestern.

Mojavia achemonalis (Barnes and McDunnough)

PL. 9, FIGS. 35–37 (McD. 5669).

Noctuelia achemonalis Barnes and McDunnough, 1914, *Contrib. Nat. Hist. Lep. N. Am.*, **2**(6): 243, pl. 2, fig. 12.
Type-locality: Redington, Arizona.

NOTE—This is the locality of the lectotype selected in my *Synopsis* (Munroe, 1961, *Can. Ent., Supplement* **24**: 50).

Noctuelia achemonalis pulcharalis Barnes and Benjamin, 1924, *Proc. Ent. Soc. Washington*, **26**: 266.
Type-locality: New Mexico.

The moth is small (length of forewing 5–6 mm). The body is light yellowish buff. The forewings above are light yellowish buff, with base, termen and costa contrastingly bright pink. The fringe is fuscous. The hindwings are light fuscous. The name *pulcharalis* was proposed for a specimen from New Mexico in which the yellowish-buff area of the forewings is reduced to a postmedial bar. Such specimens occur sympatrically with normal ones.

The genitalia are as described for the genus.

The life history is unknown.

The species ranges from western Texas to Flagstaff and the Santa Rita Mountains in Arizona. It flies in August.

GENUS *Mojaviodes* Munroe, NEW GENUS

Gender: feminine.
Type-species: *Mojaviodes blanchardae* Munroe, NEW SPECIES.

DIAGNOSIS: The genus is similar in most characters to *Noctueliopsis*, but is immediately distinguishable by the absence of the proboscis, which is well developed in *Noctueliopsis*.

DESCRIPTION: The frons is prominent, domed and smoothly scaled. The vertex has rough, fairly short scaling. The labial palpi are porrect and slightly exceed the frons. They have short scaling and a short blunt third segment. The maxillary palpi are fairly prominent, porrect and distally somewhat dilated with scales; they reach the anterior margin of the frons. The eyes are large and the ocelli are well developed. The antennae of the male are filiform and rather strongly fasciculate. The body and legs are fairly slender. The praecinctorium is not very large. It has a transversely rounded distal tuft of scales.

The forewings are subtriangular, with the costa nearly straight, the apex narrowly rounded, the termen oblique, the tornus obtuse, and the posterior margin rather strongly convex. Vein R_1 is free. R_2 is basally approximated to R_{3+4}. R_3 and R_4 are stalked about halfway from the end of the cell to the apex of the wing. The cell is narrow and extends about three-fourths of the length of the wing. The discocellular vein is weakly curved. Veins R_5 and M_1 arise a little behind the anterior angle of the cell. Veins M_2, M_3 and Cu_1 arise at intervals around the posterior angle of the cell. Their basal parts are not curved and approximated. Cu_2 arises somewhat basad of the end of the cell. 3rd A forms a large loop with 2nd A.

The hindwings are rather narrow, with the termen rounded. Sc and R_s are anastomosed. M_1 arises from the anterior angle of the cell. The cell is more than half the length of the

wing. The discocellular is sharply right-angled in the middle. The anterior part is erect, the posterior part slightly convex and strongly oblique. M_2, M_3 and Cu_1 are spaced around the posterior angle. They are not curved and approximated in their basal parts. Cu_2 arises from the cell at three-fourths from the base.

The male genitalia have the uncus broadly rounded and bilobed, laterally setose. The gnathos has the central element rodlike and longer than the uncus. The juxta is troughlike. The vinculum is produced into a distinct saccus. The valves are short and broadly rounded; the costa and sacculus are narrowly inflated and the fluting is weak. The penis is curved and has a long slender cornutus running its whole length.

The female genitalia are unknown.

The early stages are unknown.

The single known species comes from southwestern Texas.

Mojaviodes blanchardae Munroe, NEW SPECIES

PL. D, FIG. 4.

Mojaviodes blanchardae Munroe.
Type-locality: Shafter, Presidio County, Texas.

DIAGNOSIS: The moth is easily distinguished from other species by the pale-buff forewings with narrow pink costal margin, broader pink terminal stripe, oblique pink medial stripe and white fringe.

DESCRIPTION: The moth is moderately small, the length of the forewing being about 7.5 mm. The frons is more strongly domed than in *Mojavia achemonalis*; it is smoothly scaled and light buff in color. The vertex is of the same color but somewhat more roughly scaled. The palpi are whitish buff. The eyes and ocelli are fuscous. The antennae are buff. The thorax above is light buff; the tegulae are contrastingly pink. The abdomen above is light grayish fuscous, with the posterior margins of the segments and the anal tuft grayish buff. The thorax beneath is whitish buff. The abdomen beneath and the legs are light buff.

The forewing is subtriangular, about 7.5 mm in length; the costa is straight, the apex narrowly rounded, the termen oblique and slightly convex, the tornus obtuse and the posterior margin curved near the base. The ground color above is creamy buff. The costa is narrowly pink. There is a pink medial stripe, running obliquely basad, parallel to the termen, from the costa a little beyond the middle to the posterior margin a little basad of the middle. There is a pink terminal band of moderate width, adjoined basally on the anterior half of the wing by a pink adterminal band. The fringe is whitish buff.

The hindwings above are gray, with the fringe slightly darker.

The wings beneath are gray, with the forewings somewhat darkened distally and with the hindwings slightly paler.

The genitalia are as described for the genus.

The early stages are unknown.

TYPE: Holotype: ♂. Shafter, Presidio County, Texas; 9 Sept. 1969; A. and M. E. Blanchard. AB.

The moth will be figured in fascicle 13.2.

GENUS *Heliothelopsis* Munroe

Heliothelopsis Munroe, 1961, *Can. Ent., Supplement* **24**: 52.
Type-species: *Aporodes arbutalis* Snellen, 1875. Original designation.

The moths are small but robust, with square-tipped forewings and dark coloration. The frons is rounded and slightly prominent. The labial palpi are obliquely upturned, closely and conically scaled, with the third segment long. The maxillary palpi are inconspicuous and are not distally dilated with scales. The eyes are large. The ocelli are well developed. The genae are naked. The proboscis is well developed. The antennae are filiform. The body and legs are robust. The praecinctorium is slender, with a rounded tuft of scales at the tip. The hindwings have the cell very short, but otherwise the wing venation is normal.

In the male genitalia the uncus is ovate, distally bilobed, laterally downcurved and setose. The gnathos is strong, Y-shaped, with pointed median element. The juxta is bivalvate, prolonged into an anellus. The valves are wide and fluted. The penis is slender and curved. The female genitalia have the ovipositor lobes triangular, almost naked and supported by bladelike sclerites. The apophyses are strong and straight. The ostium is narrow. The ductus bursae is slender and straight and has a small sclerotized collar. The bursa is globular and unarmed.

The genus contains a small number of southwestern and Caribbean species. They are all rare and poorly known.

The early stages are unknown.

KEY TO NORTH AMERICAN SPECIES

1. Hindwing above with disc contrastingly yellow ..... *arbutalis* this page
— Hindwing above uniformly blackish fuscous 2

2. Forewing above with a yellowish subapical mark on costa ..... *costipunctalis* p. 190
— Forewing above without such a mark *unicoloralis* p. 190

Heliothelopsis arbutalis (Snellen)
PL. 9, FIG. 43 (McD. 5670).

Aporodes arbutalis Snellen, 1875, *Tijds. voor Ent.*, **18**: 190, pl. 11, fig. 2.
Type-locality: New Granada [Colombia].

Panameria rhea Druce, 1894, *Ann. Mag. Nat. Hist.*, (6)**13**: 360.
Type-locality: Durango, Mexico.

The head and body are dark brownish fuscous, the legs paler. The forewings above are dark brownish fuscous, with disc and termen a little paler. The hindwings above are blackish fuscous with an orange-yellow patch on the disc. The length of the forewing varies from 5–7 mm.

The male genitalia have the gnathos rather long. The valves are narrow at the base, somewhat expanded distally and strongly fluted. The penis is relatively short. The female genitalia agree with the generic description.

The species ranges from the Baboquivari Mountains of Arizona south through Mexico and as far as Colombia. Only a few specimens are known.

Heliothelopsis costipunctalis (Barnes and McDunnough)
PL. 9, FIGS. 38, 39 (McD. 5671).

Heliothela costipunctalis Barnes and McDunnough, 1914, *Contrib. Nat. Hist. Lep. N. Am.*, **2**(6): 244, pl. 2, fig. 14.
Type-locality: Kerrville, Texas.

The moth is variable in size (length of forewing 4–7 mm). The body and head above are dark fuscous with a little gray scaling. The forewings above are dark brownish fuscous, with sparse light-gray scaling. There is a yellowish dot at the base, another behind the costa at one-fourth, and a yellow spot on the costa at two-thirds. The fringe is dark brownish fuscous. The hindwings above are dark fuscous. There is a pale-gray streak through cell Cu_1 from the base to two-thirds and another in the anal area. The fringe is dark fuscous basally, light gray distally.

The genitalia of the male have the uncus broad and rounded, with the sides decurved and moderately setose and with the tip distinctly notched. The lateral arms of the gnathos curve to a narrowly pointed V, nearly as long as the uncus. The juxta is bilobed. The vinculum is wide, with a short rounded saccus. The valves are broadly rounded, with small sacculus, strong central ridge and well-developed fluting. The penis is stout, slightly curved and cylindrical and has a tight group of about 30 small cornuti.

The female genitalia are unknown.

The life history is unknown.

The species is known to me from only three specimens, one of which is of doubtful identity. The holotype from Kerrville, Texas (plate 9, figure 38), is well matched by the abdomenless specimen from an unknown locality in Arizona, figured in my *Synopsis* (Munroe, 1961, fig. 68). A third specimen, from the Baboquivari Mountains of Arizona, collected in August by O. C. Poling (plate 9, figure 39), is substantially smaller and must be considered of doubtful identity. This specimen bears the note, "flies like *Sesia* 67."

Heliothelopsis unicoloralis (Barnes and McDunnough)
PL. 9, FIGS. 40–42 (McD. 5672).

Heliothela unicoloralis Barnes and McDunnough, 1914, *Contrib. Nat. Hist. Lep. N. Am.*, **2**(6): 244, pl. 2, fig. 15.

The moth is rather small (length of forewing 5–6 mm) and in general resembles the last species. However, it lacks the definite pale spots on the forewing that characterize *H. costipunctalis*. On the other hand it has sparse light bluish-gray dusting, tending to concentrate to form indications of an outwardly oblique pale antemedial line and of a subterminal line near and parallel to the outer margin. There are traces of pale radial streaks on the hindwings as in the last species.

The male genitalia are somewhat as in *H. arbutalis* but the gnathos is shorter, the vinculum is deeper ventrally, the valve has the sacculus developed into a separate lobe and is finely and weakly striated. The penis is relatively long and somewhat curved. The female genitalia are unknown.

The life history is unknown.

The moth is known from the Cobabi and Baboquivari Mountains, Arizona but no doubt occurs elsewhere in the southern part of the state. It flies in August and September. It is rare in collections.

GENUS *Chlorobapta* Barnes and McDunnough

Chlorobapta Barnes and McDunnough, 1914, *Contrib. Nat. Hist. Lep. N. Am.*, 2(6): 245.
Type-species: *Chlorobapta rufistrigalis* Barnes and McDunnough, 1914.
Monotypy and original designation.

The moth is small and delicate, with rather broad wings. The frons is rounded and smoothly scaled. The vertex is elevated but smoothly scaled. The eyes are slightly reduced but are not surrounded by a scaleless zone. The genae are scaled. The ocelli are well developed. The mouthparts are remarkably reduced. The labial palpi are three-segmented but are very short and decumbent, shorter than the smaller diameter of the eyes and hardly exceeding the lower edge of the frons. The maxillary palpi are distinct and scaled but very small. The proboscis is aborted. The antennae are short and filiform. The body is slender. The praecinctorium is short and ends in a transverse rounded tuft of scales. The legs are slender and have the outer spurs somewhat shorter than the inner ones. The forewings are broadly triangular; the costa is weakly convex near the rather acute apex. The termen is somewhat oblique and gently curved. Its fringe is very long. The posterior margin is rather strongly curved but it has no definite scale-tuft. The cell is very long, more than three-fourths as long as the wing. The subcostal space is very wide. R_1 arises near the end of the cell; R_2 is basally well separated from it, arising close to R_{3+4}. R_5 and M_1 arise behind the anterior angle of the cell. M_2 arises from the posterior angle of the cell. M_3 and Cu_1 are about equally spaced basad of M_2 and Cu_2 arises a little farther basad of Cu_1. The anal space is broad and the anal loop is very large and complete. In the hindwings the cell is large, more than two-thirds as long as the wing. Sc and R_s are strongly anastomosed. M_1 is not stalked with R_s. The discocellular is angled near the middle and then strongly oblique distad. The posterior angle of the cell is truncate and M_2, M_3 and Cu_1 arise at unequal intervals from the truncate part, the median branches being closer together. Cu_2 arises from somewhat basad of the posterior angle. There are three anal veins.

The male genitalia have the uncus broadly subtriangular, distally narrowly rounded and weakly bilobed, laterally decurved and setose. The gnathos is strongly sclerotized, broadly Y-shaped, with the median element short, wide and distally pointed, the lateral arms long and thick. The tegumen is large and strongly domed. The juxta is fairly long and is trough-shaped. The vinculum is narrow, without a distinct saccus. The valves are short and narrow, rounded but hardly expanded distally; the costal margin is weakly concave, the ventral margin weakly sinuated. The costa is supported by a strong sclerotized bar, which diverges from the costa slightly towards the middle of the valve and gradually fades out postmedially. There is distinct but not very strong radial fluting. The sacculus is large and triangular. The penis is short and slightly sinuate. It lacks cornuti. The female genitalia have the ovipositor lobes somewhat elongate, with sparse, short setae. The posterior apophyses are narrow but fairly strong; their crossbar is weakly expanded. The anterior apophyses are bent and triangularly thickened in the middle. The ductus bursae is slender and membranous, with a small sclerotized collar. The bursa is small and membranous.

There is only one known species. The reduced palpi distinguish this from other known genera. The configuration of the genitalia indicates that the genus is really related to *Frechinia* and its allies.

The early stages are unknown.

Chlorobapta rufistrigalis Barnes and McDunnough

PL. 9, FIGS. 44, 45 (McD. 5678).

Chlorobapta rufistrigalis Barnes and McDunnough, 1914, *Contrib. Nat. Hist. Lep. N. Am.*, 2(6): 245, pl. 2, fig. 17.
Type-locality: Pyramid Lake, Nevada.

The body above is pale grayish buff. The forewings above are greenish buff with fine gray dusting in and behind the cell and along the termen and with an erect rufous streak before the termen. The hindwings above are white. Beneath, the forewings are suffused with dark grayish fuscous, except for the fringe, which is white. The hindwings beneath are white. The length of the forewing varies from 7–8 mm.

The genitalia are described under the generic heading.

The life history is unknown.

This species is rare in collections. My statement (Munroe, 1961: 54) that the species was known only from the type pair was incorrect. The Barnes Collection duplicates contained three additional specimens from Olancha, Inyo County, California, and E. C. Johnston collected a specimen at Oak Creek, Kern County, California, in 1937. All the known specimens were collected in June.

The species should not be confused with any other. Both the markings and the short palpi are distinctive.

GENUS *Glaucodontia* Munroe, NEW GENUS

Gender: feminine.
Type-species: *Glaucodontia pyraustoides* Munroe, NEW SPECIES.

DIAGNOSIS: The moths are somewhat like species of *Frechinia* in maculation, but are larger and more slenderly built. The combination of rounded frons and smoothly and conically scaled, porrect labial palpi distinguish them from other North American Odontiinae.

DESCRIPTION: The frons is rounded and smoothly scaled. The vertex is short, with rough, erect scaling, forming a ridge over the ocellus on each side. The labial palpi are porrect and conically scaled; they exceed the frons by a little less than the length of the head and have the third segment concealed in the scaling of the second. The maxillary palpi are prominent, with rather thick, distally tapering scaling. The proboscis is rudimentary. The eyes are large. The ocelli are well developed. The antennae of the male are filiform, ventrally with uniform ciliations longer than the diameter of the antennal shaft, dorsally smoothly scaled. The body is slender. The legs are moderately slender. The praecinctorium is short, with a rounded tuft of scales distally.

The forewings are rather broadly triangular, with the costa straight to near the apex, then curved. The apex is acute. The termen is oblique and only very weakly convex. The tornus is obtuse. The posterior margin is somewhat convex and has a distinct scale-tooth near the base. The cell is narrow, about three-fifths as long as the wing. R_1 and R_2 are free; the latter is not approximated basally to R_{3+4}, which arises from the anterior angle of the cell. The stalk of R_3 and R_4 is considerably longer than the free parts of those veins. R_5 and M_1 arise just behind the anterior angle of the cell; R_5 is not basally approximated to R_{3+4}. The discocellular vein is oblique distad and nearly straight. M_2, M_3 and Cu_1 arise near the

posterior angle of the cell. Their basal parts are not curved and approximated. Cu_2 arises far basad of the posterior angle of the cell. The anal space is wide. 3rd A forms a large closed loop with 2nd A.

The hindwings are moderately wide, with rounded apex, termen and anal angle. Sc and R_s are anastomosed for some distance. M_1 arises from the anterior angle of the cell. The cell is a little over half the length of the wing. The discocellular vein is sharply but obtusely angled; the anterior part is straight and erect; the posterior part is oblique distad and somewhat convex outward. The posterior angle is rather blunt and veins M_2, M_3 and Cu_1 are rather widely spaced around it. The basal parts of these veins are not approximated. Cu_2 arises from the cell at about three-fifths from the base.

The male genitalia have the uncus fairly wide, with somewhat rounded and tapering, weakly decurved and setose sides and rather strongly bilobed tip. The gnathos has wide, broadly V-shaped basal arms and a rather wide, blunt, distally rounded median element that is much shorter than the uncus. The juxta is short and bilobed. The valves are short, fairly wide and rather unsymmetrically rounded, with well-developed radial fluting. The penis is short and cylindrical, with two fairly large cornuti, one of them margined with fine spines. The female genitalia are unknown.

The early stages are unknown.

Only one species of the genus is known.

Glaucodontia pyraustoides Munroe, NEW SPECIES

PL. D, FIG. 5.

Glaucodontia pyraustoides Munroe.
Type-locality: Richfield, Utah.

DIAGNOSIS: The gray wings with triangular brown markings on the median area of the forewings are reminiscent of species of *Frechinia* but the present species is larger and more delicately built and is unlikely to be taken for a *Frechinia*. It is more likely to be mixed with species of the *Pyrausta napaealis* group, but the virtual absence of the proboscis as well as the very different genital structure will distinguish the present species easily.

DESCRIPTION: The frons and vertex are light brown. The palpi are brownish fuscous laterally, whitish buff dorsally and at the base of the labial palpi beneath. The eyes and ocelli are brownish fuscous. The antennae are fuscous beneath, with gray scaling dorsally. The thorax and abdomen above are dull gray. The body beneath is light brownish gray. The legs have fuscous coxae and femora and light-buff tibiae and tarsi.

The forewings above are light gray with sparse fuscous dusting. The basal area is tinted with buff. There are faint traces of a fuscous antemedial line, oblique distad from the costa at one-fifth from base to the anal fold, there right-angled and acute basad to the posterior margin at one-fourth from base. There are two irregular, somewhat arrowhead-shaped, brown or brownish-fuscous patches in the medial area, one extending from the costa across the distal part of the cell, the other in the area between the posterior margin of the cell and 2nd A. There is a black dot at the anterior angle of the cell and another at the posterior angle. There is a diffuse, slightly bluish-gray postmedial shade, nearly parallel to the termen and separated by a narrow pale zone from a terminal shade of similar width and color. The fringe is whitish buff.

The hindwings above are light gray, weakly infuscated distally and with traces of a postmedial marking at Cu_2. The fringe is whitish buff.

The forewings beneath are dark gray, with fuscous costal and terminal areas and postmedial band. The fringe is whitish buff.

The hindwings beneath are light gray, with a darker postmedial line. The fringe is whitish buff.

The forewing length is 11 mm.

The male genitalia are described under the generic heading. The female genitalia are unknown.

The early stages are unknown.

TYPES: Holotype: ♂. Richfield, Utah; 28 May 1930; light trap; "554"; male genitalia slide, 8 Oct. 1931, C. H. USNM.

Paratype: 1 ♂. Beaver Canyon, Utah; genitalia slide No. 1649 DK. Type no. 11,959, CNC.

The holotype has the labial palpi broken, but otherwise is in better condition than the paratype.

The moth will be figured in color in fascicle 13.2.

SUBFAMILY **Glaphyriinae** Forbes

Type-genus: *Glaphyria* Hübner, [1823].

Homophysidae Lederer, 1863, *Wiener Ent. Monat.*, **7**: 454.
Type-genus: *Homophysa* Guenée, 1854.

Glaphyriinae Forbes, 1923, *Cornell University Agric. Experiment Station Memoir*, **68**: 536.

NOTE—Under Article 23(d)(i) of the *International Code of Zoological Nomenclature* (Second Edition, 1964), Homophysidae as the older family-group name would take precedence over Glaphyriinae. However, Forbes when he proposed Glaphyriinae cited Homophysidae in synonymy and he evidently made the change because he considered *Homophysa* Guenée a junior synonym of *Glaphyria* Hübner. He cited this synonymy explicitly in his treatment of *Glaphyria*. So far as I know, all subsequent authors who have discussed the group have adopted Forbes' usage. The name Glaphyriinae has "won general acceptance" in the sense of Article 40(a) of the *Code* and under that article is to be maintained with effective date 1863. Under Recommendation 40A it may be cited as "Glaphyriinae Forbes, 1923 (1863)".

This subfamily consists of mostly rather small and broad-winged moths of slender to fairly stout build. The antennae are rather short, somewhat thickened in the male and ventrally pilose or ciliated, dorsally scaled. The scaling is smooth in some species, whereas in others alternate scale-rows are raised. The labial palpi are usually fairly short, with the scaling of the three segments well demarcated. The first segment is long; often the three segments diminish progressively in length. The maxillary palpi are present but they vary in size and in the configuration of their scaling. The proboscis is usually well developed but sometimes it is reduced or absent. The eyes are large. The ocelli are usually present, but in some species they are reduced or lost. True chaetosemata are lacking, but their position is occupied by a

pair of prominent tufts of radiating scales behind the dorsolateral angles of the eyes. The praecinctorium is prominent and is usually simple.

The forewings have all veins except 1st A present. R_2 may be free, stalked with R_1 or stalked with R_{3+4}. 3rd A is short and free. The frenulum-hook is well developed in the male. The hindwings have Sc and R_s anastomosed. M_1 is free or short-stalked with R_s. The base of Cu is usually pectinate; rarely the pectination is limited to a zone behind Cu. Basally the pectinations are setalike, but toward the middle of the wing they are spatulate scales, sometimes long and slender, but in such genera as *Lipocosma* and *Dicymolomia* the scales are broad and prominent, curling upward away from the wing surface. Similar raised scales are usually found in the region of 2nd A.

In the male genitalia the uncus is usually well developed, slender and acuminate. Occasionally it is modified in shape or reduced. The gnathos is absent. The juxta is often hypertrophied and bifid or bizarrely armed. The vinculum is normal; there are no specialized scalelike structures associated with the vinculum and juxta as there are in Odontiinae and Schoenobiinae. The valves differ considerably in different genera and species. Often they are fan-shaped, arising from a narrow base at the ventral edge of a high teguminal arch. Some species have prominent costal or subcostal processes. The penis is usually short and cylindrical and generally has a strong and often complex armature of cornuti.

The female genitalia are usually short, with large, padlike, setose ovipositor lobes and moderately developed apophyses. The ductus bursae is generally short and often has complex sclerotization, differing greatly from one species to another. The bursa is short, globular and unsymmetrical, except in *Scybalistodes*, where it is greatly elongated in some species. In most species it has a dense and complex armature of spines, sclerotized ridges or signa. Often the basal region of the ductus seminalis is enlarged into a prominent diverticulum.

The early stages are known for a number of the species, but diagnostic characters of the subfamily or its component genera have not been worked out. The life histories are diverse: the larva of *Hellula* is a leaf webber on cabbage, *Brassica oleracea* L., and other Cruciferae; that of *Dicymolomia julianalis* lives parasitically on psychid caterpillars and apparently also in cat-tail heads (*Typha* species); that of *D. opuntialis* has been reared from prickly pear cacti (*Opuntia* species); those of *Chalcoela* species live in the nests of vespid wasps and that of *Lipososma adelalis* is a case-maker living on lichens.

The group is a fairly small one, about 35 genera and under 100 species being known. However, many species undoubtedly remain to be discovered, especially in tropical America. The subfamily is almost exclusively American, only the genus *Hellula* extending to the Old World.

KEY TO NORTH AMERICAN GENERA

1. Forewing about three times as long as wide; its pattern consisting of a contrasting, pale, curved longitudinal stripe from base to termen across the middle of the wing and a similar stripe along the posterior margin, both standing out sharply against the dark olivaceous ground color ..... *Upiga* p. 202

— Forewing less than twice as long as wide; its pattern not as described above 2

2. Forewing with veins R_1 and R_2 stalked 3

— Forewing with veins R_1 and R_2 arising separately from the cell or, rarely, with R_2 stalked with R_{3+4} 6

3. Maxillary palpus large, extending considerably beyond base of third segment of labial palpus; antemedial line forming an oblique white stripe across most of width of forewing near middle ..... *Abegesta* p. 220

— Maxillary palpus moderately developed, extending at most slightly beyond base of third segment of labial palpus; antemedial line not forming an oblique white stripe across most of width of forewing near middle 4

4. Labial palpus with second segment moderately scaled anteroventrally, the scaling not extending anteriorly beyond the third segment; in the male genitalia the valve with at most small costal processes; the juxta with long, spinose, dorsolateral processes . *Glaphyria* p. 222

— Labial palpus with second segment very broadly scaled anteroventrally, the scaling extending anteriorly beyond the third segment (in reasonably fresh specimens); in the male genitalia the valve armed with strong costal or basal processes; the juxta usually without long, spinose, dorsolateral processes 5

5. Male genitalia with valve bearing strong costal or apical process or processes from a heavy costal sclerotization; penis stout, with strong cornuti; female genitalia with ductus bursae and at least part of bursa sclerotized or bearing sclerotized armature ..... *Aethiophysa* p. 229

— Male genitalia with costa of valve unarmed and not strongly sclerotized, but with a prominent, curved, spinelike process from mesal surface of base of valve; penis slender and unarmed; female genitalia with ductus bursae and bursa membranous and unarmed *Xanthophysa* p. 232

6. Hindwing with a series of black and metallic spots along termen in cells M_2 to Cu_2 7

— Hindwing without a series of black and metallic spots along termen 8

7. Proboscis vestigial; ocelli absent .... *Chalcoela* p. 248

— Proboscis normal; ocelli present .. *Dicymolomia* p. 243

8. Anal area of hindwing with raised scales broadly spatulate, concentrated in definite patches 9

— Anal area of hindwing with raised scales usually slender and finely spatulate, almost hairlike; broadly spatulate scales, if present, not concentrated in definite patches or tufts 10

9. Forewing with vein R_2 stalked with R_{3+4}; male genitalia with valve spinose; female genitalia with ductus bursae helical, bursa densely spinose .... *Lipocosmodes* p. 242

— Forewing with vein R_2 arising from cell separately from R_{3+4}; male genitalia with valve unarmed; female genitalia with ductus bursae sclerotized and fluted, bursa membranous and only very finely spinulose ..... *Lipocosma* p. 235

10. Labial palpus porrect, only weakly ascending, exceeding frons anteriorly by nearly the length of the head; scaling of second segment produced into an angular tuft below third segment ..... *Stegea* p. 211

— Labial palpus upturned or obliquely ascending, not extending forward beyond frons to nearly the length of the head 11

11. Labial palpus strongly upturned; third segment acuminate and longer than second 12

— Labial palpus obliquely ascending; third segment cylindrical or blunt, no longer than the second 13

12. Third segment of labial palpus erect, unmodified; wings gray or fuscous with contrasting white reniform spot on forewing ..... *Nephrogramma* p. 208

— Third segment of labial palpus of male recurved over frons and bearing a long plume of slender scales; wings brown, with narrow fuscous transverse lines (female unknown) ..... *Plumegesta* p. 233

13. Visible part of third segment of labial palpus shorter than fully scaled second segment; forewing above with oblique bluish or fuscous reniform spot at end of cell ..... *Hellula* this page

— Visible part of third segment of labial palpus cylindrical, about as long as second segment, though not nearly as broadly scaled; forewing above with discocellular marking 8-shaped or obscure 14

14. Maxillary palpus minute, ending considerably short of end of second segment of labial palpus, but triangularly dilated with scales; female genitalia with bursa strongly spinulose and with vermiform diverticulum at opening of ductus seminalis; forewing above with discocellular marking 8-shaped *Scybalistodes* p. 204

— Maxillary palpus somewhat longer, nearly reaching end of second segment of labial palpus, its scaling acuminate, not triangularly dilated; female genitalia with ductus bursae sclerotized, bursa rugose but not spined; forewing above with discocellular marking obscure ..... *Paregesta* p. 203

GENUS *Hellula* Guenée

Hellula Guenée, 1854, *Species Général des Lépidoptères*, **8**: 415.
Type-species: *Phalaena undalis* Fabricius, 1781. Original designation.

NOTE—*Opinion* 536 of the International Commission on Zoological Nomenclature, issued in 1959, placed *Hellula* on the *Official List of Generic Names in Zoology* and suppressed under the Plenary Powers the name *Oebia* Hübner, [1825], and its emendation *Oeobia* Hübner, [1825], which have been used by some authors as senior synonyms of *Hellula*.

Phyratocosma Meyrick, 1936, *Veröff. Kolonial-Mus. Bremen*, **1**: 323, NEW SYNONYMY.
Type-species: *Phyratocosma trypheropa* Meyrick, 1936, now considered a synonym of *Hellula phidilealis* (Walker), 1859. Monotypy.

The moths are of small to moderate size, with fairly broad wings, pale color and robust build. The bluish or fuscous reniform spot of the forewing above is characteristic. The frons is rounded or somewhat flattened. The labial palpus is obliquely ascending, with the segments well demarcated and diminishing in length from the base. The maxillary palpi are short and not expanded. The proboscis, eyes and ocelli are well developed. The antennae are filiform, finely pilose, slightly thickened in the male. The praecinctorium is basally compressed, ending distally in a flattened transverse scale-tuft. The wing venation is normal, with R_1 and R_2 arising separately from the anterior margin of the cell. The cubito-anal area of the hindwings is clothed with long, slender, hardly spatulate scales.

On genital characters the genus divides sharply into two distinct groups. One, represented in our fauna by *H. rogatalis*, has the uncus of the male genitalia quadrate and the valve entire; in this group the penis is armed with three large cornuti; the female has a short ductus bursae with a small sclerotized collar and a narrow, unspined, though partly sclerotized, bursa. The second group, which includes the remaining species known from North

America, has in the male genitalia a narrow, knife-shaped uncus; the valve has a triangular weakly sclerotized zone in the middle of the distal margin and the penis is slender and armed with small cornuti. In the female the ductus bursae has a rather long ribbonlike sclerotization and the bursa is wide and purse-shaped, with a prominent diverticulum at the opening of the ductus seminalis; the proximal half of the bursa, including the diverticulum, is sclerotized, ridged and spined. *H. rogatalis* is related to the Old World species *H. undalis* (Fabricius) and *H. hydralis* Guenée.

The second group is exclusively American. The four North American species differ considerably in external appearance but are strikingly similar in genital structure.

The larvae feed on Cruciferae and some other plants, webbing the leaves and boring into the thicker parts, such as stems, buds and midribs. They are grayish yellow, with longitudinal purplish dorsal and paired dorsolateral and lateral bands. Some of the species are of considerable economic importance in tropical and warm-temperate regions.

KEY TO NORTH AMERICAN SPECIES

1. Length of forewing over 11 mm; southern California ..... *subbasalis* p. 202
— Length of forewing under 11 mm 2

2. Forewing above pale buff, smoothly marked, with little mottling; transverse lines and reniform spot inconspicuous; basal area evenly somewhat darker fulvous-buff ..... *aqualis* p. 201
— Forewing above somewhat mottled; basal area mottled if darker than rest of wing and reniform spot usually conspicuous 3

3. Forewing with termen evenly curved and somewhat oblique throughout ... *rogatalis* this page
— Forewing with termen rather strongly curved in middle, anterior part nearly erect 4

4. Forewing above with a distinct blackish-fuscous patch immediately distad of reniform spot; a fuscous subapical patch on costa just distad of postmedial line ..... *kempae* p. 200
— Forewing above without such fuscous patches ..... *phidilealis* p. 200

Hellula rogatalis (Hulst) (Cabbage Webworm*)

PL. 10, FIGS. 7–11 (McD. 5423).

Botis rogatalis Hulst, 1886, *Trans. Amer. Ent. Soc.*, **13**: 149.
Type-locality: Texas.

Hellula undalis, of authors, in part, not Fabricius.

The moth has the forewings with oblique, somewhat rounded termen and narrowly rounded apex. The color is somewhat variegated, in dark individuals olivaceous fuscous on a buff ground, in pale individuals yellowish buff on a whitish-buff ground. The dark variegation is concentrated in fairly wide transverse basal, antemedial, medial and subterminal zones, the last fragmented. The complete dark medial zone is characteristic of this species in our fauna. The antemedial and postmedial lines are well defined though not conspicuous. They appear as pale lines with weak darker edging on both sides. The postmedial line is strongly

sinuated but not dentate. The reniform spot is fairly broadly kidney-shaped, and is dark fuscous throughout with some bluish dusting medially. The hindwings are whitish to light fuscous, darker terminally. The length of the forewing varies from 7–9 mm.

The male genitalia have the uncus distally truncate and dorsally carinate. The valve is broadly rounded distally, with its terminal margin entire and the costa narrowly inflated but without an apical prominence. The anellus is a narrow, sclerotized ring. The penis has three stout cornuti. In the female genitalia the bursa is narrow and has the basal part narrowly and smoothly sclerotized, giving off distal and lateral membranous pouches.

The life history and economic importance have been discussed by Chittenden and Marsh (1912), who wrongly supposed the insect to be the same as the Old World *H. undalis* (Fabricius) and to have been introduced into the southern United States in the latter part of the nineteenth century. The full-grown larva is a little over half an inch long and is subcylindrical, tapering toward the ends. It is grayish yellow or yellowish gray, with five purplish longitudinal stripes—a wide dorsolateral one on each side and narrower mid-dorsal and lateral ones. There are interrupted ventrolateral, lateroventral and midventral lines as well. The head is black and shining, with a distinct whitish area along the adfrontal suture, extending to the vertex. The thoracic shield is purplish gray, shining, and variably marked with brown. There are irregular brown lateral markings on the second thoracic segment. The setae are yellow or light brown and arise from small shining tubercles. The anal shield is marked with purplish spots. The eggs are somewhat flattened, often with a distinct nipple at one end. They are light gray and iridescent, with a reticulated surface. They are laid in small masses and turn pinkish as they mature, hatching after about three days at temperatures of 80 to 84°F. The young larvae are pale yellowish gray with the head and prothoracic shield dusky in color. The pupa is formed in a compact cocoon composed of webbed grains of earth, made by the larvae after burrowing in the ground. Structural characters of the larva are figured by Peterson (1948: 210, figs. L50, O-Q). Capps (1963: 22) said that the larva can be distinguished from that of *H. phidilealis* by the dark, not mottled, head and by having seta O_3 of the head anterior, not posterior, to a line joining setae L_1 and O_2. The larva is a significant pest of cabbage, *Brassica oleracea* L., mustard (*Brassica* species), radish, *Raphanus sativus* L., and other Cruciferae and also attacks beet, *Beta vulgaris* L., purslane (*Portulaca* species) and other Amaranthaceae and Portulacaceae. Chittenden and Marsh list several tachinid and hymenopterous parasites of this species.

The species is abundant from North Carolina to Florida and westward through Texas to southern California. It ranges north at least to Kentucky and Arkansas, and Nova Scotia.

The Old World *H. undalis* (Fabricius) is hardly distinguishable in external characters from *H. rogatalis* and the two species were confused until Capps (1953) pointed out the differences. The genitalia of both sexes are strikingly different. In the male the valve of *H. undalis* has a toothlike subapical process on the costa and the penis has differently shaped cornuti. In the female the sclerotization of the ductus bursae is differently shaped in the two species. Capps (1953) gives good figures of these differences and Zimmerman (1958) figures the genitalia and external appearance of *H. undalis*. Although *H. undalis* has not yet been detected in North America, it occurs in Hawaii as well as throughout the warmer parts of Europe, Asia and Africa. Collectors should continue to examine their material critically and to dissect occasional specimens as otherwise an introduction of *H. undalis* could easily be overlooked.

Hellula phidilealis (Walker)
PL. 10, FIGS. 12, 13 (McD. 5424).

Leucochroma? phidilealis Walker, 1859, *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum*, **19**: 972.
Type-locality: Venezuela.

Phyratocosma trypheropa Meyrick, 1936, *Veröff. Kolonial-Mus. Bremen*, **1**: 323, pl. 13. NEW SYNONYMY and NEW COMBINATION with *Hellula*.
Type-locality: Venezuela.

The moth is about the same size as *H. rogatalis* but is paler, with whitish rather than yellowish or buff ground color on the forewings. There are dark bars along the costa but no dark median band across the forewing just basad of the reniform spot. The latter is more slender and oblique than in *H. rogatalis* and has stronger and definitely iridescent bluish scaling. The wings are squarer in appearance than in *H. rogatalis* because of the bent termen of the forewing with its apical portion erect. The length of the forewing varies from 5–7 mm.

The life history is similar to that of *H. rogatalis*, though because of confusion of the species not all records can be taken at face value. The species is a pest of Cruciferae and Amaranthaceae in Puerto Rico and other parts of the New World tropics. It is likely to cause sporadic damage in the southern part of our territory.

The species is widely distributed in Central and South America and the West Indies. It has recently been recorded from the Leeward Islands of Hawaii (Butler and Usinger, 1963). I have seen authentic North American material from Florida, Texas and Arizona. Kimball (1965) records the species from as far north as Cassadaga and Weeki Wachee Springs, whence it ranges southward through the Keys to the Dry Tortugas.

Forbes (1923) considered this species confusingly similar to *H. rogatalis* and thought the two might interbreed, but in fact they are abundantly distinct, and *H. phidilealis* is much closer in structure to the other American species of the genus than to *H. rogatalis*. Amsel (1957, pl. CI, fig. 3) figured the type of *Phyratocosma trypheropa*, but he did not identify it with the present species, of which he probably had no determined material at the time he wrote.

Hellula kempae Munroe, NEW SPECIES
PL. 10, FIGS. 14, 15; PL. D, FIG. 6; PL. H, FIG. 9.

Hellula kempae Munroe.
Type-locality: Key Largo, Monroe County, Florida.

DIAGNOSIS: The moth is similar in general appearance to *H. phidilealis*, but is smaller (length of forewing 5–6 mm) and is more strongly marked. There is a definite fuscous patch distad of the reniform spot of the forewings in the bend of the postmedial line and a less conspicuous patch of fuscous scaling basad of the middle of the antemedial line.

DESCRIPTION: The head and body are whitish gray with buff markings. The eyes and ocelli are fuscous. The antennae are buff and finely pilose below, whitish-scaled above, somewhat thickened and compressed in the male, filiform in the female. The forewings are square-tipped as in *H. phidilealis*. The ground color above is whitish buff. There is a yellowish-buff sub-basal costal patch and a yellowish-buff fascia basad of the antemedial line. The antemedial line is fine, buff or fuscous, excurved in the cell and shallowly retracted behind it,

then erect to the posterior margin. It is separated from the antemedial buff fascia by a narrow zone of ground color. The fascia has considerable fuscous scaling in the bend of the antemedial line. The reniform spot is narrow, lunular, grayish fuscous and is preceded and followed by fuscous scaling, the latter often extensive. It is connected to the costa by a buff fascia. The postmedial line is olivaceous buff, widened at the costa, then narrowly linear. It is erect or slightly oblique distad from costa to M_1, then excurved around the end of the cell, shallowly retracted behind it and erect to the posterior margin. It is separated by a narrow zone of ground color from a wedge-shaped olivaceous-buff subapical patch on the costa. There is irregular olivaceous-buff preterminal scaling, separated from the broken blackish terminal line by a silvery-white zone. The fringe is yellowish buff basally, whitish buff distally. The hindwings above are white with very weak gray postmedial line and subterminal band. The fringe is white. The forewings beneath are grayish fuscous. There are traces of a pale-buff antemedial line, following the same course as above. The reniform spot is lunular and dark fuscous. Anterior to it is a rectangular pale-buff patch on the costa, its outer part traversed by the fuscous postmedial line, which is hardly visible posteriorly, though faintly edged distally with pale buff. On the terminal part of the wing there are pale-buff streaks between the veins, ending in the segments of the interrupted black terminal line. The fringe is whitish buff with yellowish-buff antemedian and postmedian lines. The hindwings beneath are grayish buff, weakly infuscated terminally. They have a fuscous discocellular spot and a rather evenly curved, fuscous, outwardly buff-bordered postmedial line. The terminal line and fringe are as on the forewings.

The male genitalia are much as in *H. phidilealis* but have the valve narrower, with narrower and shorter dorsal lobe and longer ventral lobe with longer terminal spine. The cornuti are more slender than in *H. phidilealis*. The female genitalia resemble those of *H. phidilealis*. They have a long, ribbonlike sclerite in the ductus bursae. The proximal two-thirds of the bursa is sclerotized, longitudinally fluted and densely set with spines. The distal third is membranous. The ductus seminalis is longer and thinner than in *H. phidilealis* and has two long rows of spines which are somewhat more regular than in *H. phidilealis*.

The life history is unknown.

TYPES: Holotype: ♂. Key Largo, Monroe County, Florida; 16 March 1967; Mrs. Spencer Kemp. Type no. 11,780, CNC.

Allotype: ♀. Same locality, collector and type number; 7 June 1967. CNC.

Paratypes: Same locality and collector as for holotype and allotype; various dates from November to June (20 specimens). Pine Key, Florida; 1–7 June [year not recorded]; *ex* Sweadner collection (1 ♂). Vero Beach, Florida; April 1941; J. R. Malloch. Everglade, Florida; 8–15 April; Barnes Collection. CPK; type no. 11,780, CNC; type lot no. 533, CM; USNM.

Hellula aqualis Barnes and McDunnough

PL. 10, FIGS. 16–19 (McD. 5425).

Hellula aqualis Barnes and McDunnough, 1914, *Contrib. Nat. Hist. Lep. N. Am.*, **2**(6): 228, pl. 1, fig. 6.

Type-locality: Santa Catalina Mountains, Arizona.

NOTE—The locality cited is that of the lectotype, hereby designated, the specimen in the USNM labelled, "Hellula aqualis B. & McD. ♂ Type".

This species is larger and broader-winged than *H. phidilealis* and *H. kempae* and is squarer-winged than *H. rogatalis*, which has nearly the same wing-length. It is distinguishable from all these species by the pale yellowish-buff markings of the forewings on a whitish-buff ground, and in particular by the very even, complete, yellowish-buff fascia of the distal part of the basal area, which contrasts sharply with the whitish-buff medial area. The reniform spot is slender, lunular and inconspicuous. The hindwings are pale whitish buff, without markings. The length of the forewing ranges from 7–10 mm.

The male genitalia are almost as in *H. kempae*, but the spine of the ventral lobe of the valve is relatively shorter and the cornuti are more massive. The female genitalia are similar to those of *H. phidilealis*, but the sclerotized part of the bursa has the spines fewer and more strongly concentrated towards the sides.

The early stages are unknown.

The species is apparently fairly common in the Big Bend region of western Texas and in the adjacent parts of New Mexico and thence ranges westward to the Santa Rita and Santa Catalina mountains of Arizona and north to east-central Nevada (Lund, White Pine County) and to Inyo County, California. It flies from May to September.

Hellula subbasalis (Dyar), NEW COMBINATION
PL. 10, FIG. 20 (McD. 5384).

Lamprosema subbasalis Dyar, 1923, *Ins. Insc. Mens.*, **11**: 26.
Type-locality: California.

This species closely resembles *H. aqualis* but is substantially larger (length of forewing 12–13 mm) and more heavily marked. The basal area is shaded with brown rather than yellowish buff. The antemedial and postmedial lines are distinct, pale and bordered on both sides by narrow brown lines. The reniform spot is lunular and fuscous and is preceded by a brown shade. There is a fairly strong brown subterminal line. The hindwings are whitish buff with black terminal dots, white fringe and in some specimens with weak terminal infuscation.

The male genitalia are much like those of *H. aqualis* but differ somewhat in their proportions. The uncus is relatively narrower and the valve is deeper, with wider dorsal lobe and with the spine of the right ventral lobe not reaching the tip of the lobe. The penis has the basal caecum relatively longer. These differences may prove to be inconstant in series. The female genitalia resemble those of *H. phidilealis*, but have the ductus bursae shorter and wider, the ductus seminalis armed with fewer, larger spines and the median zone of spines of the bursa narrow but complete.

The early stages are unknown.

This species is so far known only from the San Diego region of southern California. It is rare in collections: I have seen only three specimens in addition to the holotype. It has no close similarity to the pyraustine genus *Lamprosema*, in which Dyar described it, following Hampson's "wastebasket" concept of this nominal genus.

GENUS *Upiga* Capps

Upiga Capps, 1964, *Bull. So. California Acad. Sci.*, **63**: 35.
Type-species: *Eromene virescens* Hulst, 1900. Monotypy and original designation.

The moths have the frons smooth, flat and oblique, not prominent. The labial palpi are porrect or slightly upturned, and are long, with the third segment short and hidden in the scaling of the second. The maxillary palpi are well developed and are triangularly dilated with scales distally. The eyes, ocelli and proboscis are well developed. The chaetosema is absent but its position is marked by a tuft of scales. The antennae are simple, pilose, somewhat thickened in the male. The body is robust, and the praecinctorium is transversely compressed distally. The forewings are long and narrow, about three times as long as wide. Vein R_1 arises a little beyond the middle of the anterior margin of the cell, R_2 from near the end of the cell and R_{3+4} from the anterior angle of the cell. The discocellular vein is incurved. M_2 and M_3 are curved and approximated basally. 3rd A ends near the middle of the posterior margin. The base of the posterior margin is rather strongly lobed. The hindwings are narrow, with the apex rounded. The cell is less than half as long as the wing. Sc and R_s are anastomosed for some distance. M_1 is free. The discocellular is angled towards the base at its middle. M_2, M_3 and Cu_1 arise from the posterior angle of the cell, Cu_2 from a little basad of it. None of these veins are approximated in their basal parts. There are three anal veins.

The male genitalia have the uncus tapering, distally beaklike. The gnathos is present as a narrow bridge. The juxta is shield-shaped and dorsally shallowly bilobed. The vinculum has broad sides and a triangular ventral part. The valves are distally expanded and rounded and have two small triangular processes in the costal region. The penis is cylindrical, with minute cornuti. The female genitalia are somewhat like those of *Hellula*, with unusually short-setose ovipositor lobes and moderate apophyses, with the ductus bursae narrow and the basal part of the bursa sclerotized.

The larva of the only known species lives in fruits of the cactus *Lophocereus schottii* Engelm. It resembles larvae of the genus *Dicymolomia*, but has uniordinal instead of biordinal or triordinal crochets.

Upiga virescens (Hulst)

PL. 10, FIG. 21 (McD. 5953).

Eromene virescens Hulst, 1900, *Jour. New York Ent. Soc.*, **8**: 225.
Type-locality: Arizona.

The moth has greenish-gray forewings with curved, tapering white stripes from base to apex across the middle of the wing and along the posterior margin. The hindwings are whitish buff, lightly infuscated towards the termen. The length of the forewing varies from 8–9 mm.

The species is known in our territory from southernmost Arizona. It occurs in Mexico in Sonora and is not uncommon in Baja California, where H. F. Howden collected several specimens at a locality 80 miles south of Mexicali and also near San Felipe.

GENUS *Paregesta* Munroe

Paregesta Munroe, 1964, *Can. Ent.*, **96**: 1282.
Type-species: *Paregesta californiensis* Munroe, 1964. Monotypy and original designation.

The moths have the frons weakly flattened. The labial palpi are upturned and of moderate

length; the first and second segments have triangularly projecting scales in front; the third is cylindrical and of moderate length. The maxillary palpi are small, with a small scale-tuft. The proboscis is well developed. The eyes are large. The ocelli are well developed. The antennae are annulated; they are weakly thickened in the male, slender in the female. The body is of moderate proportions. The legs are moderately slender, with the outer tibial spurs as long as the inner. The praecinctorium is simple. The forewings are fairly wide, with sharp apex and rounded termen and tornus. Vein R_2 is free but approximated to R_{3+4}. The wing venation has no very remarkable features.

The male genitalia have the uncus narrowly triangular, expanded and open beneath at the base. The tegumen is domed. The juxta is large, discoidal and entire. The vinculum is narrow. The valves are narrow and curved dorsad; the costa bears two prominent setae. The penis is short and stout and is armed with a variety of cornuti and spinules. The female genitalia have the ovipositor of moderate size, long-setose, with fairly long apophyses. The ductus bursae is short and contorted, with sclerotized flutings and spinules, which extend onto the bursa. The latter is globular, with its distal part membranous.

The life history is unknown.

The one known species occurs in the coastal region of southern California.

Paregesta californiensis Munroe

PL. 10, FIGS. 22, 23; PL. D, FIG. 7; PL. H, FIG. 10.

Paregesta californiensis Munroe, 1964, *Can. Ent.*, **96**: 1282, figs. 13, 48, 78.
Type-locality: Rancho La Sierra, near Arlington, Riverside County, California.

The head, body and wings of the moth are light grayish brown; the head, thorax and forewings above are finely dusted with darker brown. The antemedial and postmedial lines of the forewings above are inconspicuous, double, dark brown. The antemedial line is straight and oblique basad from near the middle of the cell. The postmedial line is strongly excurved around the cell, then weakly sinuated to the posterior margin. There is an interrupted dark terminal line, preceded by an inconspicuous row of subterminal dark-brown spots. The fringe is brown. The hindwings are paler and almost unmarked.

The genitalia are characterized in the generic description.

The life history is unknown.

The species was described from San Diego, but ranges northward along the Californian coast at least as far as Morro Bay.

GENUS *Scybalistodes* Munroe

Scybalistodes Munroe, 1964, *Can. Ent.*, **96**: 1270.
Type-species: *Glaphyria periculosalis* Dyar, 1908. Original designation.

The moths are brown, with broad, somewhat angular forewings, with distinct dark antemedial and postmedial lines and 8-shaped reniform spot. The frons is rounded. The vertex is roughly scaled. The labial palpi are obliquely ascending, with the first segment broadly scaled, the second more slender, the third long, slender and acuminate. The maxillary palpi are minute. The proboscis is well developed. The eyes are large. The ocelli are present. The antennae are filiform, somewhat thickened and compressed in the male. The body is slender. The legs are long and slender, with the outer tibial spurs shorter than the inner.

The praecinctorium is simple. The forewings are broad, with the apex acute and the termen weakly sinuated. The cell is more than half the length of the wing. Veins R_1 and R_2 arise separately well before the apex of the cell. R_2 is approximated basally to R_{3+4}. The free parts of R_3 and R_4 are about as long as their stalk. R_5 and M_1 arise behind the angle of the cell. The discocellular vein is weakly curved and oblique. M_2 and M_3 arise from the posterior angle of the cell, Cu_1 from a little basad of it. These three veins are weakly approximated basally. Cu_2 arises from the cell at about two-thirds. The hindwings are broadly rounded, with the apex a little produced and the termen weakly incurved behind it. Sc and R_s are anastomosed. M_1 arises from the apex of the cell. The cell is about half the length of the wing. The discocellular vein is oblique, weakly curved. M_2 and M_3 arise from the posterior angle of the cell and are weakly approximated basally. Cu_1 arises a little basad of the posterior angle and is not basally approximated to M_3. Cu_2 arises from the cell at three-fifths. There are three anal veins.

The male genitalia have the uncus reduced, differing in shape in the different species. The juxta is large and varies in form. The vinculum has the basal part expanded. The valves have the costa strongly sclerotized and variously armed. The penis is large, with a rounded base and a heavily armed, sometimes very long vesica. The female genitalia have the ovipositor and ostium normal. The bursa is unsymmetrical, variously armed and has a strong, sometimes elongate and coiled diverticulum at the opening of the ductus seminalis.

The early stages are unknown.

The genus has a number of species in the southwestern U.S.A. and Mexico. They are mostly very similar in external appearance and material should be examined critically, because additional species may well be found in our territory.

KEY TO NORTH AMERICAN SPECIES

1. Forewing with termen strongly curved, almost angulate, at middle 2
— Forewing with termen nearly evenly curved 3

2. Forewing above with cell and terminal areas brown, at least in part, contrasting with the pale-buff discal and basal areas; penis with a few large cornuti; diverticulum of bursa compactly coiled, finely spinulose; California ..... *periculosalis* this page
— Forewing above with ground color almost uniformly light brown; penis with a long coiled band of very numerous spinelike cornuti; diverticulum of bursa very long, loosely coiled, with very numerous small spines; Arizona ..... *vermiculalis* p. 206

3. Forewing above pale buff, weakly marked; hindwing above whitish .... *regularis* p. 206
— Forewing above fuscous, fairly strongly marked; hindwing above with distal part fuscous ..... *fortis* p. 207

Scybalistodes periculosalis (Dyar)

PL. 10, FIGS. 25, 26; PL. D, FIG. 8; PL. J, FIG. 1 (McD. 5334).

Glaphyria periculosalis Dyar, 1908, *Proc. Ent. Soc. Washington*, **10**: 58.
Type-locality: San Diego, California.

The moth has the typical markings of the genus. The termen of the forewings is subangulate at the middle. The ground color of the forewings above is light grayish buff, variegated

with darker brown, the latter concentrated especially in the cell in the space between the antemedial line and the reniform spot and in the terminal space in the zone immediately beyond the postmedial line. The antemedial and postmedial lines and the reniform spot of the forewings above are fine, fuscous and well defined.

The male genitalia have the uncus rounded, the vinculum deep and triangular, the valves distally with two fingerlike processes and the penis fairly long, tapering and armed with a small number of large curved cornuti. The female genitalia have the ductus bursae and bursa fairly short, with relatively weak armature. The diverticulum of the ductus is conspicuous, tightly spiralled and very minutely spinulose.

The early stages are unknown.

The species is not uncommon in southern California.

Scybalistodes vermiculalis Munroe

PL. 10, FIGS. 30, 31, 33–38; PL. D, FIG. 9; PL. J, FIG. 2.

Scybalistodes vermiculalis Munroe, 1964, *Can. Ent.*, **96**: 1272, figs. 8, 41, 70.
Type-locality: Baboquivari Mountains, Arizona.

This species is similar in general appearance to *S. periculosalis*, but in general is more tan-colored, and the ground color of the forewings above is much more uniform, without the light and dark variegation of *S. periculosalis*. There is some variation in size and in the depth of the tan ground color. In general larger and paler specimens seem to be found in spring and smaller and darker ones in late summer. The fuscous markings vary in intensity but tend to be a little weaker than in the previous species.

The male genitalia have the uncus small, rounded and naked. The juxta is trifid dorsally. The vinculum is large and triangular ventrally. The costal strengthening of the valve is tripartite. The penis is rather long and basally somewhat bulbous. The vesica is long, coiled and bears a long band of very numerous small spinelike cornuti. The female genitalia have the ductus bursae elongate, and the bursa and its diverticulum armed with very numerous small spines; the diverticulum is long and loosely coiled.

The early stages are unknown.

The species is fairly common at moderate elevations in southern Arizona.

Scybalistodes regularis Munroe

PL. 10, FIGS. 28, 29, 32, 39; PL. D, FIG. 10; PL. J, FIG. 3.

Scybalistodes regularis Munroe, 1964, *Can. Ent.*, **96**: 1274, figs. 9, 71.
Type-locality: Wickenburg, Arizona.

The moth is closely similar in general appearance to *S. vermiculalis*. Like it, the present species is variable in color, the types being light buff, but subsequently examined specimens varying to a fairly dark brown. The transverse lines of the forewings above are narrow but sharply defined. The antemedial line is right-angled on the anal fold, with the apex of the angle distad, not obtusely angled as in *S. vermiculalis*; the same line is obtusely angled on 2nd A and thence erect to the posterior margin, not oblique basad from the anal fold to the posterior margin and only weakly sinuate in this region as in *S. fortis*. The termen of the forewings is almost evenly curved, with hardly a suggestion of a stronger curvature in the median area. The length of the forewing is about 8 mm.

The male genitalia have the uncus short, slender and sharp. The costal margin of the valves is strongly sinuated and the sclerotized part ends in a curved process. The penis is much shorter and thicker than in *S. vermiculalis* and it has a few large cornuti grading into a moderate series of smaller ones. The female genitalia have the ovipositor lobes short, high and densely setose. The posterior apophyses are short and weak. The anterior apophyses are about twice as long and somewhat stronger. The ductus bursae is complex: it has a large, folded, trough-shaped sclerite, joined to a pair of shallow sclerotized pouches and opposite to a short hornlike diverticulum. The base of the bursa is sclerotized; the corpus bursae is small and spinulose and extends into a thick, moderately long, coiled, spinulose diverticulum. which is considerably longer than the rest of the bursa, though not as long and thin as in *S. vermiculalis* or *S. fortis*.

The early stages are unknown.

The moth is known only from southern Arizona, where it has been collected at Wickenburg, at Madera Canyon in the Santa Rita Mountains and in the Baboquivari Mountains. The known specimens have all been collected in May.

Scybalistodes fortis Munroe, NEW SPECIES

PL. 10, FIG. 27; PL. J, FIG. 4.

Scybalistodes fortis Munroe.
Type-locality: Fish Creek, Tonto National Forest, Arizona.

DIAGNOSIS: This species resembles *S. regularis* in the evenly curved termen of the forewings but is considerably larger and is fuscous in color, not pale buff. It has the antemedial and postmedial lines and the reniform spot of the forewings well defined.

DESCRIPTION: The frons is brownish fuscous with white anterior and lateral margins. The vertex is brownish fuscous, roughly scaled. The labial palpi are brownish fuscous, with the bases and tips of the first and second segments white. The maxillary palpi are buff. The basal scaling of the proboscis is grayish buff. The eyes and ocelli are fuscous. The antennae are buff, with alternate gray and brown rows of scales dorsally. The body above is brownish fuscous, with the basal segment of the abdomen contrastingly pale buff. The body beneath and legs are pale buff. The forewings have the termen nearly evenly curved. The ground color above is brownish fuscous, with the basal area a little paler. The antemedial line is distinct, narrow, brownish fuscous preceded by white, oblique distad from the costa at one-third to R, there acutely angled and oblique basad to the middle of the cell, there obtusely angled and oblique distad to the anal fold, there right-angled and oblique basad to the posterior margin at one-third. The reniform spot is 8-shaped, fuscous, filled with pale buff. The postmedial line is like the antemedial but with the fuscous element basad of the pale-buff one. It is broadly excurved around the end of the cell, then dentate to the posterior margin. There is a broken fuscous subterminal line. The fringe is fuscous with darker middle and terminal lines. The hindwings are light gray costally and basally, brownish fuscous distally, with a light-gray streak in the anal area. The postmedial line is whitish buff, basally fuscous-bordered. There is a fuscous subterminal line followed by a buff terminal line. The basal part of the fringe is buff, followed by a fuscous median line, a whitish distal zone and a fuscous terminal line. The forewings beneath are buff, paler distad of the postmedial line. The reniform spot is a

double fuscous bar. The postmedial line is strong, fuscous basally and whitish buff distally; it follows the same course as on the upperside. There is a dark-brown terminal line. The fringe is buff, with weak fuscous middle and terminal lines. The hindwings beneath are whitish gray, buff costally and apically. There is a fuscous discocellular spot. The postmedial line is fuscous, curved and somewhat dentate. There is a weak, broken, fuscous terminal line. The fringe is buff. The length of the forewing is 9 mm.

The male genitalia are unknown. The female genitalia are closely similar to those of *S. vermiculalis*, but the spining of the bursa proper is coarser and more regular and the diverticulum appears to be relatively shorter and thicker.

The early stages are unknown.

TYPES: Holotype: ♀. Fish Creek, Tonto National Forest, Arizona; 9–10 May 1918; J. Ch. Bradley. CU.

Paratypes: 3 ♀♀. Same data as for holotype. CU; type no. 11,782, CNC.

GENUS *Nephrogramma* Munroe

Nephrogramma Munroe, 1964, *Can. Ent.*, **96**: 1284.
Type-species: *Homophysa reniculalis* Zeller, 1872. Monotypy and original designation.

The moths are gray or grayish fuscous, with a contrasting whitish reniform spot on each forewing; this spot is kidney-shaped, anvil-shaped, or divided in the middle. There is also a pale quadrate spot behind the reniform in the anal fold. The frons is rounded. The labial palpi are upturned and have the third segment long and acuminate. The maxillary palpi are small and inconspicuous. The proboscis is well developed. The antennae of the male are weakly compressed and have a slight flexure at one-third from the base. The antennae of the female are filiform. The eyes are large. The ocelli are present. The body is short but not stout. The legs are slender; the outer spurs of the midtibia are half the length of the inner ones, those of the hindtibia about the same length as the inner ones.

The forewings are short and broad, with the apex sharp, the termen rounded and the posterior margin slightly expanded. Veins R_1 and R_2 arise separately from the cell before its end. R_{3+4} arises from the anterior angle of the cell; R_3 and R_4 separate about halfway to the apex. R_5 arises from the anterior angle of the cell but is not approximated in its basal part to R_{3+4}. M_1 arises well behind the anterior angle of the cell. The discocellular is somewhat curved. M_2 and M_3 arise from the posterior angle of the cell. Their basal portions are weakly approximated. Cu_1 arises somewhat basad of the posterior angle of the cell; its basal portion is not approximated to that of M_3. Cu_2 arises from the cell at three-fourths from the base. The hindwings have the apex sharp; the termen is weakly excavated behind the apex, then broadly rounded; the anal angle is narrowly rounded. Sc and R_s are anastomosed. M_1 is free. The cell is less than half the length of the wing. The discocellular is moderately oblique posteriorly. M_2, M_3 and Cu_1 arise from the posterior angle of the cell. Their basal parts are approximated. Cu_2 arises from the cell at four-fifths from the base.

The male genitalia have the uncus soft and triangular. A pair of long, sinuated, weakly diverging, rodlike processes extends posterad from the tegumen over the uncus. The juxta is strongly U-shaped. The valves are long, narrow, curved somewhat dorsad, with the costa

bearing a peglike or spinelike seta near the middle. The penis is short, with a striated sclerite on the vesica and also an elongated group of several rows of short, strong, spinelike cornuti.

The female genitalia have the ovipositor lobes short and high, with the posterior surfaces weakly setose. The apophyses are short and slender, the posterior ones more so than the anterior. The seventh sternite is entire. The ductus bursae is short, with the ostial portion membranous, the distal portion sclerotized and expanding slightly towards the bursa. The latter is membranous except for a sclerotized zone adjoining the ductus bursae, but has nearly the whole surface covered with strong spinules, varying somewhat in size and spacing from one part of the bursa to another. In shape the bursa is irregularly elongate, with a tapering recurved diverticulum extending posterad from its distal end.

The early stages are unknown.

The two known species are North American. The pattern of the wings and the structure of the female genitalia suggest a close relationship to *Scybalistodes* and *Paregesta.*

KEY TO NORTH AMERICAN SPECIES

1. Wings above grayish fuscous; reniform spot of forewing usually undivided, its posterior lobe larger than its anterior lobe; Illinois to Texas and eastward ..... *reniculalis* this page

— Wings above light gray; reniform spot of forewing above usually divided into two, the posterior spot or lobe not much larger than the anterior one ... *separata* p. 210

Nephrogramma reniculalis (Zeller)

PL. II, FIGS. 1–3; PL. E, FIG. 1; PL. J, FIG. 5 (McD. 5336).

Homophysa reniculalis Zeller, 1872, *Verh. K.-K. Zool.-Bot. Ges. Wien,* **22**: 326. Type-locality: Texas.

The moth is moderately small (length of forewing 5.5–8 mm, smaller in Texas than northward) and has the ground color above grayish fuscous, of varying intensity. The palest specimens are about of the same tone as the darkest specimens of *N. separata.* The antemedial line of the forewings is hardly visible in most specimens but when evident it is scalloped and weakly convex distad. The reniform spot is large, lunular and contrastingly pale, with the posterior lobe distinctly larger than the anterior one. It is usually entire and only rarely divided into two separate spots. The postmedial line is inconspicuous, except for the oblique pale element of the costal part, which appears as a distinct contrasting streak. Both dark and pale elements of the rest of the line are weak. The hindwings are colored much like the forewings and have an inconspicuous pale postmedial line.

The male genitalia have the uncus relatively narrow. The processes of the tegumen are relatively short and thick. The costa of the valve beyond the peglike seta is weakly curved and not strongly sclerotized. The band of cornuti is more than half as long as the aedoeagus and about twice as long as the fluted sclerite of the vesica. The female genitalia have the bursa more amply rounded and with more numerous spines than in *N. separata.* The sclerite adjacent to the ductus bursae is larger in the present species.

The early stages are unknown.

The species ranges from central Illinois south to North Carolina (Tryon) and southern and south-central Texas (Brownsville; Zavalla County).

Nephrogramma separata Munroe, NEW SPECIES

PL. 11, FIGS. 4, 5; PL. E, FIG. 2; PL. J, FIG. 6.

Nephrogramma separata Munroe.
Type-locality: Baboquivari Mountains, Pima County, Arizona.

DIAGNOSIS: The moth is closely similar in external characters to *N. reniculalis*. The ground color is paler gray in the present species. Both pale and dark elements of the transverse lines are therefore more clearly recognizable, and antemedial and postmedial lines of both forewings and hindwings are generally distinct, though not conspicuous. The reniform spot of the forewings is less strongly developed in the present species than in *N. reniculalis*; it is usually divided into separate anterior and posterior spots and the posterior element is little if any larger than the anterior one.

The male genitalia have the uncus wider than in *N. reniculalis*. The processes of the tegumen are longer in the present species. The distal part of the costa of the valves is more heavily sclerotized and more strongly curved. The band of cornuti is less than half as long as the aedoeagus and is about the same length as the ridged sclerite of the vesica. The female genitalia have the bursa narrower, with fewer spines and a smaller sclerite adjacent to the ductus bursae than in *N. reniculalis*.

DESCRIPTION: The frons is light gray, the vertex light buffy gray. The labial palpi are slender, with the first two segments buffy gray, the third segment whitish gray. The minute maxillary palpi and the basal scaling of the proboscis are whitish gray. The eyes and ocelli are fuscous. The antennae are buffy gray. The thorax above is buffy gray. The abdomen above is slightly darker gray, with the posterior margins of the segments paler.

The forewings above have the ground color very light buffy gray, with the tips of the scales darker gray, giving an irrorated effect under the microscope. The general impression to the naked eye is rather light gray. There is a weak, dentate, whitish-gray sub-basal line. The antemedial line is whitish gray, bordered distally with fuscous. It is outwardly oblique from the costa at one-third from base, right-angled at Sc, oblique basad to R, there right-angled, convexly arcuate to a basally pointed angle on 2nd A, and again convexly arcuate to the posterior margin at one-third from base. There is no orbicular spot. The reniform is white, narrow and medially constricted or more usually divided, with the anterior part little if any narrower than the posterior part. There is a quadrate white spot behind the reniform on the anal fold. The postmedial line consists of a weak whitish-gray element preceded by a likewise weak fuscous element. The line is strongly oblique distad from the costa at three-fourths from the base and is broadly and convexly arcuate around the end of the cell. It is retracted in an acute angle on the anal fold, then again arcuate and finally oblique basad to the posterior margin at two-thirds. There is a broken fuscous terminal line. The fringe is light fuscous.

The hindwings above have the ground color like that of the forewings, but with the costal and anal margins paler. There are traces of a pale antemedial line and a whitish discal spot. The postmedial line is whitish and finely dentate. It is obsolete anteriorly, arcuate in the middle, angled on the anal fold and again arcuate to the posterior margin near the anal angle. There is a white spot on the anal fold basad of the angulation of the postmedial line. There is a continuous dark fuscous terminal line. The fringe is grayish fuscous.

The length of the forewing ranges from 6–9 mm.

The genital characters are sufficiently indicated in the diagnosis.

The early stages are unknown.

The species is apparently common and fairly widely distributed in southern Arizona. It has in the past been taken for a form or local race of *N. reniculalis*, but the differences in genitalia seem of specific value.

TYPES: Holotype: ♂. Baboquivari Mountains, Pima County, Arizona; 1–15 Sept. 1923; O. C. Poling. USNM.

Allotype: ♀. Same data as for holotype. USNM.

Paratypes: 26 ♂♂, 24 ♀♀. Same data as for holotype (10 ♂♂, 20 ♀♀). Paradise, Cochise County, Arizona; July, Aug.; Barnes Collection (4 ♂♂, 1 ♀). Redington, Arizona; Barnes Collection (5 ♂♂). Santa Catalina Mountains, Arizona; 24–31 July, Aug.; Barnes Collection (2 ♂♂, 3 ♀♀). Arizona; July, Aug.; O. C. Poling; Barnes Collection (3 ♂♂). Madera Canyon, Santa Rita Mountains, Arizona; 22, 23 Aug. 1946; J. A. Comstock and Lloyd M. Martin (2 ♂♂). USNM; type no. 11,960, CNC; LACM.

GENUS *Stegea* Munroe

Egesta Ragonot, 1891, *Ann. Soc. Ent. France*, (6) **10**: 458, preoccupied by *Egesta* Conrad, 1845.
Type-species: *Homophysa eripalis* Grote, 1878. Designated by Munroe, 1964, *Can. Ent.*, **96**: 1278.

Stegea Munroe, 1964, *Can. Ent.*, **96**: 1278.
Type-species: *Homophysa eripalis* Grote, 1878. Original designation.

NOTE—As *Stegea* was proposed as a replacement name for the preoccupied *Egesta* Ragonot, the two nominal genera necessarily have the same type-species.

The moths are small and broad-winged. They are brown, gray or fuscous, with inconspicuous maculation. The frons is flat and oblique. The labial palpi are obliquely upturned, with the second segment tufted in front and the third segment cylindrical. The maxillary palpi are fairly prominent but are not dilated with scales distally. The eyes are large. The ocelli are well developed. The antennae are somewhat compressed in the male, filiform in the female. The forewings are wide, with curved costa, somewhat acute apex, evenly curved termen, obtuse tornus and with posterior margin most strongly curved near the base. Vein R_1 arises before the end of the cell. R_2 is free. R_3 and R_4 are stalked. R_5 arises from the anterior angle of the cell. M_1 arises behind the anterior angle. The discocellular is oblique. M_2, M_3 and Cu_1 are spaced around the posterior angle of the cell and are not basally approximated. Cu_2 arises from the cell at two-thirds. The hindwings have the apex angulate, the termen strongly rounded and the anal angle obtuse. There are some broad, raised scales in the anal area in addition to fine, spatulate ones. Sc and R_s are anastomosed. M_1 arises from the cell. The discocellular is curved, moderately oblique posteriorly. M_2, M_3 and Cu_1 arise from the posterior angle of the cell and are strongly approximated basally. Cu_2 arises from the cell at two-thirds. There are three anal veins.

In the male genitalia the uncus is narrow and pointed, with thin flanges at the sides basally. The tegumen is narrow. The juxta is H-shaped, with the dorsal arms longer than

the ventral. The vinculum is deep, narrowly bilobed. The valves are simple, with strengthened costa, bearing triangular mesally pointed projections apically and usually sub-basally. The penis is slender and bent beyond the base, with a variable number and arrangement of cornuti. The female genitalia have the ovipositor broad, with the lobes short-setose and not prominent. The apophyses are slender; the posterior apophysis is very short. The ductus bursae has a collar near the ostium and an irregular sclerotization extending toward the bursa. The bursa is short, with an anterior diverticulum, membranous and wrinkled and with a large rounded caecum, bearing inwardly directed spines.

The early stages are unknown.

The genus has several known species, ranging through most of North America from southern Canada southward, and through the West Indies and Central America to Colombia.

KEY TO NORTH AMERICAN SPECIES

1. Wings above with ground color dark grayish fuscous; eastern U.S.A. and southernmost Ontario, west to Iowa and south-central Texas 2
— Wings above with ground color ochreous, brown or light gray; Iowa to western Texas and west 5

2. Forewing above with antemedial and postmedial lines narrow, pale gray, inconspicuous but well defined, about equally distinct 3
— Forewing above with postmedial line more distinct than antemedial line, the latter indicated chiefly by a contrast between the darker basal and the lighter medial areas; southern Texas 4

3. Length of forewing 6–8 mm; antemedial line of forewing convex distad in cell; Ontario to Iowa, Georgia and Texas ..... *eripalis* p. 217
— Length of forewing about 5 mm; antemedial line of forewing with a sharp, distally pointed angle in cell; southern Texas ..... *sola* p. 213

4. Postmedial line of forewing above with dark element stronger than succeeding light-gray element; hindwing above with anal angle perceptibly darkened; pale postmedial line strongest in this area ..... *mexicana* p. 213
— Postmedial line of forewing above with light-gray element distinct and much stronger than preceding dark element; hindwing above with anal angle at most weakly and diffusely darkened; pale postmedial line weakened only near the costa ..... *simplicialis* p. 214

5. Forewing above with postmedial line considerably more distinct than antemedial line; ground color of forewing brown or ochreous brown; southern California and southern Arizona 6
— Forewing above with postmedial and antemedial lines fine, whitish gray, about equally distinct, though both often inconspicuous; ground color of forewing tan, ochreous or gray; widely distributed in the western U.S.A. and southwestern Canada ... *salutalis* p. 218

6. Forewing above rich brown, area basad of postmedial line gradually darkening to the line and usually distinctly paler than the area beyond the postmedial line; postmedial line light buff, not unusually close to termen; southern California ..... *powelli* p. 216
— Forewing above uniformly ochreous brown, area basad of postmedial line not darker than area distad of it; postmedial line fine, light gray and unusually close to termen; southern Arizona ..... *minutalis* p. 215

Stegea mexicana Munroe

PL. 11, FIGS. 24, 25, 27, 28; PL. E, FIG. 3; PL. J, FIG. 7.

Stegea mexicana Munroe, 1964, *Can. Ent.*, **96**: 1279, figs. 11, 45, 75.
Type-locality: Jicaltepec, Veracruz, Mexico.

The moth is small (length of forewing 5–5.5 mm) and is dark fuscous in color, with the basal part of the hindwings somewhat paler. The antemedial line of the forewings is obsolete or nearly so, but the base is somewhat darker than the rest of the wing. The postmedial line has the dark element stronger than the pale-gray element that borders the dark element distally. The hindwings have the termen somewhat sinuate; the anal angle is darkened; the light-gray postmedial line is strongest in the anal area.

The male genitalia have the dorsal arms of the juxta bent mesad dorsally; the ventral arms are short; there are no accessory spines. The valves have the costa tubularly inflated, the margin slightly sinuate and the apex pointed, but there are no distinct costal processes. The penis has a distal spine attached to the end of the aedoeagus and about ten cornuti, the basal two somewhat separated from the rest. The female genitalia have the ovipositor lobes high, short and very weakly setose. The posterior apophyses are slender and somewhat longer than the height of the ovipositor lobes. The anterior apophyses are a little thicker but about the same length. The ostial chamber is rather large and cuplike. It leads to a short ductus bursae, with a wide, ribbonlike, fluted sclerite in its wall. The bursa is mostly rather coarsely spinulose, but the fundus is spineless and the rather wide diverticulum leading to the ductus seminalis is likewise unarmed.

The early stages are unknown.

The species ranges from Veracruz, Mexico, northward to Brownsville and Corpus Christi, Texas.

It closely resembles in general appearance *S. sola*, *S. simplicialis* and *S. eripalis*, all of which occur in the same general region. However, not only should the external characters pointed out in the key be sufficient to differentiate the species but the genitalia are very distinctive and doubtful identifications can easily be confirmed by dissection.

Stegea sola Munroe, NEW SPECIES

PL. J, FIG. 8.

Stegea sola Munroe.
Type-locality: Brownsville, Texas.

DIAGNOSIS: The moth is darker than *S. mexicana* and *S. simplicialis*, which occur in the same region, and has the antemedial line of the forewings narrow, light gray and about as distinct as the postmedial line, whereas those two species have the antemedial line less distinct. It most closely resembles *S. eripalis*, but that species is larger and has the antemedial line of the forewings above curved or elbowed in the cell, not acutely angled as in the present species.

The female genitalia have the posterior apophyses shorter than the height of the ovipositor lobes and considerably shorter than the anterior apophyses. The ostial chamber is narrow, not wide and cup-shaped as in *S. mexicana*; the sclerotization of the ductus bursae is twisted and strongly fluted; the diverticulum leading to the ductus seminalis is curved and stoutly tubular.

DESCRIPTION: The frons is flat and oblique, smoothly scaled, light fuscous, with distinct pale-buff lateral lines. The vertex is light fuscous, with rough, erect scaling. The labial palpi are fuscous; the ends of the segments are narrowly tipped with white. The maxillary palpi are fuscous, tipped with white. The basal scaling of the proboscis is light fuscous. The eyes and ocelli are dark fuscous. The antennae are light fuscous, the short-pilose ventral surface and the scaled dorsal surface being of almost the same color. The thorax above is fuscous. A slide preparation was made of the abdomen before I examined it and there is no record of the original color. The thorax beneath is light buff. The legs are light buff, banded with white.

The forewings above are dark brownish fuscous. The antemedial line is fine, distinct but inconspicuous, whitish gray in color. It is straight and strongly oblique distad from the costa just basad of its middle to the middle of the cell; there it is acutely angled and runs obliquely basad to an obtuse angle on Cu; thence it is weakly oblique distad to the anal fold, again obtusely angled, weakly oblique basad to 2nd A, there weakly angled and very slightly oblique basad to the posterior margin at two-fifths from the base. There is a small whitish-gray discocellular dot. The postmedial line is like the antemedial in thickness, shade and definition. It is oblique distad from the costa at three-fourths from the base and is weakly bent at R_3; thence it is a little less strongly oblique and curves broadly around the cell to a very weakly retracted obtuse angle on Cu_2; thence it is almost erect to the posterior margin near the tornus. The fringe is fuscous.

The hindwings above are gray anteriorly, dark fuscous posteriorly, with dark-fuscous fringe. There is no distinct maculation.

The forewings beneath are as above, but paler, without any trace of the antemedial line.

The hindwings beneath are light gray, with a broken fuscous terminal line. The fringe is light gray.

The length of the forewing is about 5 mm.

The male genitalia are unknown. The main characters of the female genitalia are given in the diagnosis.

The early stages are unknown.

TYPE: Holotype: ♀. Brownsville, Texas; 22 March 1928; F. H. Benjamin; at light; genitalia slide 50 HWC. USNM.

The moth will be figured in color in fascicle 13.2.

Stegea simplicialis (Kearfott), NEW COMBINATION

PL. 11, FIG. 23; PL. E, FIG. 4; PL. J, FIG. 9 (McD. 5337).

Symphysa simplicialis Kearfott, 1907, *Can. Ent.*, **39**: 4.
Type-locality: Brownsville, Texas.

NOTE—The locality cited is that of the lectotype, hereby designated, a male in the USNM, bearing labels as follows: "Brownsville, Texas. June", "Symphysa simplicialis Kearfott n. sp. near 4635 n. & 4165" and "♂ Genitalia Slide 8 Oct. 1941 H.W.C. # 49". It is one of two syntypes; the other, from Arizona, was in the Kansas Academy of Sciences and almost certainly is not conspecific.

The moth is closely similar in size and general appearance to *S. mexicana*. It differs from that species in having the postmedial line of the forewings narrow, distinct and whitish gray, rather close to the termen, with the dark element weakly developed. The hindwings are more

uniformly gray than in *S. mexicana* and have the termen evenly rounded, not sinuated; the anal angle is not as markedly infuscated as in *S. mexicana* and the postmedial line is closer to the termen and is weak but of about even intensity from the anal to the subcostal areas. *S. simplicialis* resembles *S. mexicana* and differs from *S. sola* and *S. eripalis* in having the basal area of the forewings above darkened and in having the antemedial line indistinct or absent.

The genitalia resemble those of *S. minutalis* and *S. powelli*, in spite of the different external appearance of these two species. The costa of the valves is thickened and tubular; it is strongly curved dorsad distally and has an angular subapical projection, following which the margin is concavely curved to an acute apical projection. The ventral part of the valves is expanded and rounded distally. The juxta has slender dorsal arms and large, oval, earlike, ventrolateral processes. The penis is about eight times as long as wide and is weakly sinuated. It is armed with three large distal cornuti and a band of several slightly smaller ones placed close to the large ones.

The female genitalia have the ostial chamber small, with the sides concave and converging. The ductus bursae is sclerotized and fluted and opens onto a distinct lobe on the left side of the bursa; the sclerotization of the ductus extends a short distance onto the bursa. The anterior part of the bursa is finely spinulose; posteriorly on the right side a diverticulum leads to the ductus seminalis.

The early stages are unknown.

The species is known only from southern Texas, where it has been collected at Brownsville and San Benito in March, April, June and August.

Stegea minutalis (Walter) NEW COMBINATION

PL. II, FIG. 16; PL. E, FIG. 5; PL. J, FIG. 10 (McD. 5339).

Egesta minutalis Walter, 1928, *Proc. Ent. Soc. Washington*, **30**: 140.
Type-locality: Tempe, Arizona.

The moth is small (length of forewing about 6 mm) and obscurely marked. The costa and termen of the forewings are convexly curved. The ground color of the forewings above is pinkish tan, with the base slightly darker. The antemedial line is obsolete. There is a faint darker discocellular spot. The postmedial line is fine, very faint and whitish buff; it is excurved around the cell very near to the termen, then is weakly sinuated roughly parallel to the termen as far as the posterior margin. There is a broken fuscous terminal line and the fringe is purplish fuscous basally, white with traces of fuscous terminally. The hindwings above anteriorly are pale gray, posteriorly they are colored and marked like the forewings. The underside is gray with weak markings.

The male genitalia have the juxta like that of *S. simplicialis*, but with smaller, more slender, ventrolateral processes. The costa of each valve is evenly concave, without a subapical process, but with an acute apical process as in *S. simplicialis*. The penis is slightly curved, about seven times as long as wide and has three strong spinelike cornuti. The female genitalia are almost exactly as in *S. simplicialis*.

The species is known from only a very few specimens, all collected in Arizona in July and August. The localities are: Tempe; Peppersauce Canyon; Tucson; and the Baboquivari Mountains. The holotype is fragmentary, consisting of four badly rubbed wings glued onto a card. Fortunately it has been possible to match the wing pattern exactly and I think there

is no doubt as to the identification. The species is probably most likely to be confused with *S. eripalis*, which is much commoner and more widespread, but that species is larger and has a distinct antemedial line on the forewings above; also Arizona specimens are generally gray and not buff. The genitalia are diagnostic in both sexes.

Stegea powelli Munroe, NEW SPECIES

PL. 10, FIG. 24; PL. E, FIG. 6; PL. K, FIG. 1.

Stegea powelli Munroe.
Type-locality: East San Diego, San Diego County, California.

DIAGNOSIS: This species is similar in size and general appearance to *Paregesta californiensis*, which occurs in the same general area, but it differs from that species in the warmer, rust-brown color of the forewings above, with the area of the wing beyond the postmedial line definitely paler than the disc. The absence of the antemedial line differentiates the present species from both *P. californiensis* and *Stegea salutalis*. The male genitalia are most like those of *S. simplicialis*. The subapical process of the valve is longer in *S. powelli* and is curved distad; the dorsal processes of the juxta are shorter; and the cornuti are smaller and do not fall into two distinct groups. The female genitalia are not unlike those of *S. simplicialis*, but the ostial chamber is larger; the extension of the sclerotization of the ductus bursae onto the bursa is greater and the bursa is less strongly spinulose.

DESCRIPTION: The frons is rather roughly scaled, mixed light and dark brown medially, white at the sides. The vertex has slender, erect, mixed brown and white scaling. The labial palpi are mixed brown and fuscous, narrowly white at the base beneath and at the end of the second segment. The maxillary palpi are short and filiform, brown. The proboscis is large and conspicuous, with the basal scaling brown. The eyes and ocelli are large and fuscous. The antennae of the female are slender, grayish, with light-gray scaling dorsally and fine ciliations ventrally. The thorax above is rust-brown, the ends of the scales darker than the bases. The abdomen above is light buff. The body beneath and legs are light buff. The forewings are broad, with the costa curved, the apex acute, the termen curved, more strongly toward the obtuse tornus, and with the posterior margin curved, especially near the base. The ground color above is rust brown, paler beyond the postmedial line. The antemedial line is inconspicuous in the holotype, absent in some paratypes. It is slender, whitish, remote from the base, broadly arcuate and coarsely dentate. The postmedial line is pale whitish buff, with traces of dark-brown basal and distal borders. It is broadly excurved around the end of the cell, then obliquely curved to the posterior margin. There is a narrow fuscous terminal line. The basal half of the fringe is fuscous; the distal half is light buff, with a distinct fuscous line. The hindwings above are light grayish buff, with the anal area broadly rust brown, with traces of a pale-buff postmedial line. There are a few broad raised scales in the anal area. The fringe is much as on the forewings. The wings beneath are pale buff, with weak but complete whitish-buff, brown-margined postmedial lines on both forewings and hindwings. The fringes are as above but less strongly marked. The length of the forewing is about 7 mm.

The genitalia are characterized in the diagnosis.

The early stages are unknown.

TYPES: Holotype: ♀. East San Diego, San Diego County, California; 10 July 1960; J. A. Powell; at light; genitalia slide 4052 MS. UCB.

Allotype: ♂. La Jolla, San Diego County, California; 10 July 1963; J. A. Powell; black light. UCB.

Paratypes: 8 ♂♂, 10 ♀♀. La Jolla, San Diego County, California; 17 June 1963; J. A. Powell; black light (2 ♀♀). San Diego, California; June, July, Aug. (8 ♂♂, 8 ♀♀). UCB; USNM; type no. 11,961, CNC.

I take pleasure in naming this species for Jerry A. Powell, collector of the holotype and of many other interesting Pyralidae.

Stegea eripalis (Grote)

PL. 11, FIGS. 6, 26; PL. E, FIG. 7; PL. K, FIG. 2 (McD. 5338, in part).

Homophysa eripalis Grote, 1878, *Can. Ent.*, **10**: 29.
Type-locality: Texas, Belfrage coll. No. 394, 7 June.

The moth is of moderate size (length of forewing 6–8 mm). The color is predominantly dark gray or grayish fuscous. The costa of the forewings is weakly arched and the termen is convex. The antemedial and postmedial lines of the forewings above are fine but distinct. They are light gray in color. The antemedial line is rounded or at most obtusely angled in the cell, not acutely angled as in *S. sola* and many specimens of *S. salutalis*. The postmedial line is considerably removed from the termen. The fringe is light gray distally, darker basally. The hindwings are light gray anteriorly, grayish fuscous posteriorly. The postmedial line is light gray, sinuated, fine and distinct. The fringe is as on the forewings. The wings beneath are lighter gray than above, especially in the distal part.

In the male genitalia the valves are broad, with a rather slender costal sclerotization, bearing a sub-basal triangular prominence and a sharp apical one. The juxta has flattened, distally rounded dorsal processes and rather small oval ventrolateral ones. The penis has a hooked process arising from one side of the aedoeagus and a single straight spinelike cornutus. In addition there is a pair of shorter spines on the supporting membrane dorsad of the penis. In the female genitalia the ovipositor lobes are high, short and very weakly setose. The posterior apophyses are short and weak. The anterior apophyses are about twice as long and somewhat thicker. The ostial chamber is about twice as wide as long; in outline it is subrectangular with rounded sides and corners; the sides extend considerably beyond the narrower ductus bursae. The walls of the ostial chamber are strongly sclerotized. The ductus bursae proper arises from a deep emargination in the ventral wall of the ostial chamber; the ductus is short, sclerotized and fluted. The bursa is sac-shaped, with the posterior part weakly fluted and with a wide band of dense, rather coarse spinulation around the middle. A wide simple diverticulum leads to the ductus seminalis.

The life history is hardly known. The dwarfed specimen shown in plate 11, figure 26 was reared from a case among papers, but its natural habitat and food have not been recorded.

The species is fairly common over a wide eastern range, from southern Ontario (Simcoe, Normandale, etc.) to Georgia, Mississippi and Texas in the south and Iowa and Kansas in the west. At Sioux City, Iowa, and probably elsewhere in the middle west, the present

species occurs sympatrically with *S. salutalis*. The moth flies in July and August in the north, but its season is more extended in the south.

Stegea salutalis (Hulst)

PL. 11, FIGS. 7–15, 17–22, 29, 30; PL. E, FIG. 8; PL. K, FIG. 3 (McD. 5338a).

Botis salutalis Hulst, 1886, *Trans. Amer. Ent. Soc.*, **13**: 150.
Type-locality: Oregon.

Symphysa ochralis Haimbach, 1908, *Ent. News*, **19**: 263. Subsp.
Type-locality: Denver, Colorado.

The moth is generally similar to *S. eripalis* and has been considered a subspecies of it by most recent authors. In my paper on Glaphyriinae (Munroe, 1964: 1278) I noted that it was distinct, but did not give the diagnostic characters. The moth is externally recognizable by its paler and often brownish color. In Arizona, New Mexico and western Texas, where the moths are usually gray, the size is smaller and the antemedial line is usually acutely angled in the cell of the forewing. The genitalia are different in both sexes. In *S. salutalis* the subbasal and apical costal processes of the valves of the male are much larger and more prominent than in *S. eripalis* and the costal margin is strongly curved between them. The penis of *S. salutalis* has a hooked process from the aedoeagus as in *S. eripalis*, but it has two long straight cornuti and one short one, instead of one straight cornutus as in *S. eripalis* and there are three or more pairs of short spines in the supporting membrane dorsad of the penis instead of a single longer pair as in *S. eripalis*. In the female the ostial chamber is simple, rectangular and no wider than the base of the ductus bursae, which arises from its anterior end in the normal way and not from an emargination in its ventral wall. The spinulose area of the bursa is generally somewhat weaker than in *S. eripalis*.

The early stages are unknown.

The species ranges widely through the western half of the U.S.A. and into southwestern Canada and northern Mexico. There is considerable geographically correlated variation in external appearance and genital structure. I recognize four subspecies, but the details of the pattern of variation should be studied more thoroughly. It is possible that more than one species will ultimately be recognized in the rather heterogeneous assemblage that I have united under this name.

Stegea salutalis ochralis (Haimbach), NEW STATUS

PL. 11, FIG. 20; PL. E, FIG. 8; PL. K, FIG. 3 (McD. 5338a, in part).

Symphysa ochralis Haimbach, 1908, *Ent. News*, **19**: 263.
Type-locality: Denver, Colorado.

I group under this name the populations ranging from Sioux City, Iowa, and Scott City, Kansas, west through Colorado, Utah and Nevada and south into northern Arizona. The moths are large and pale ochreous, with the transverse lines of the forewings weakly defined. The length of the forewing is usually between 8 and 9 mm, though dwarfed specimens may be smaller. In the male genitalia the costal prominences are strong and relatively close together, so that the curve between them is stronger than the nominate subspecies. The spines in the dorsal supporting membrane of the penis are very strong, with up to six pairs

being present; some may have doubled points. The female genitalia are like those of the other subspecies.

Stegea salutalis grisealis Munroe, NEW SUBSPECIES
PL. 11, FIGS. 17–19, 21, 22, 30.

Stegea salutalis grisealis Munroe.
Type-locality: Limpia Canyon, Jeff Davis County, Texas.

The moths are similar in structure to the preceding subspecies, but they are smaller, the length of the forewing ranging from 6–8 mm, with the average about 7 mm. The forewings are gray, with only faint ochreous tints. The antemedial and postmedial lines are distinct; the antemedial line is sharply angled in the cell and the postmedial line is rather narrowly curved beyond it. The hindwings have the postmedial line distinct on the posterior half of the wing.

The subspecies ranges with comparatively little variation from western Texas through southern New Mexico and Arizona to the deserts of southeastern California.

TYPES: Holotype: ♂. Limpia Canyon, Jeff Davis County, Texas; 20 May 1950; E. C. Johnston; genitalia slide 3577 MS. Type no. 11,962, CNC.

Allotype: ♀. Data as for holotype. CNC.

Paratypes: 18 ♂♂, 24 ♀♀. Data as for holotype (2 ♂♂). Fort Davis, Texas; 29 May 1959; M. R. MacKay (1 ♀). Artesia, Eddy County, New Mexico; 13 May 1950; E. C. Johnston (2 ♂♂). Santa Catalina Mountains, Arizona (1 ♀). Phoenix, Arizona; Aug.; Kunze (1 ♀). Arizona; Morrison (1 ♀). Arizona; collection C. V. Riley (1 ♀). Redington, Arizona (3 ♂♂, 3 ♀♀). Paradise, Cochise County, Arizona; 8–15 May (1 ♀). Maricopa County, Arizona; July (1 ♀). Baboquivari Mountains, Pima County, Arizona; April, May, Sept. and no date; O. C. Poling, Grace H. and John L. Sperry and no stated collector (9 ♂♂, 9 ♀♀). Sells P. O., Indian Oasis, Pima County, Arizona; 1–10 May 1923; O. C. Poling (1 ♂, 2 ♀♀). Planet Mine, Bill Williams River, Yuma County, Arizona; 24–31 May; Barnes Collection (1 ♀). Blythe, Riverside County, California; 23 April 1950; E. C. Johnston (1 ♀). Needles, San Bernardino County, California; 24 April 1950; E. C. Johnston (1 ♂, 1 ♀). Type no. 11,962, CNC; USNM.

A few specimens from the vicinity of Flagstaff, Arizona, appear transitional to *S. s. ochralis* and are excluded from the type series.

Stegea salutalis salutalis (Hulst)
PL. 11, FIGS. 7–11, ?29 (McD. 5338a, in part).

Botis salutalis Hulst, 1886, *Trans. Amer. Ent. Soc.*, **13**: 150.
Type-locality: Oregon.

The moth is of moderate size (length of forewing 7–8 mm). The wings are light tan, sometimes with a somewhat pinkish tint, narrowly darker towards the termen. The transverse lines of the forewings are whitish, narrow and distinct, but not conspicuous. There is a small dark dot on the discocellulars. The genitalia generally resemble those of *S. s. ochralis*, but the

triangular processes are shorter and farther apart and the costal margin is less strongly curved between them. The spines in the supporting membrane of the penis are smaller than in *S. s. ochralis* and there are usually only three pairs.

This subspecies ranges from southern British Columbia, including southeastern Vancouver Island, south through Idaho, Washington and Oregon to California. The moth flies in June and July.

Stegea salutalis riparialis Munroe, NEW SUBSPECIES
PL. 11, FIGS. 12–15.

Stegea salutalis riparialis Munroe.
Type-locality: Riverside, California.

The moths are similar to the nominate subspecies but are paler and pinker. On the forewings the transverse lines are weaker and the termen is usually not darkened. The hindwings are relatively paler and contrast with the forewings. The genitalia are like those of the nominate subspecies. Summer specimens are large, with a forewing length from 8–9 mm. Late August and September specimens are smaller, more ochreous, and even less distinctly marked, the length of the forewing varying from 7–8 mm.

TYPES: Holotype: ♂. Riverside, California; 15 June 1940; R. Buckwalter. Type no. 11,963, CNC.

Allotype: ♀. Riverside, California; 18 May 1936; Grace H. and John L. Sperry. Type no. 11,963, CNC.

Paratypes: 11 ♂♂, 32 ♀♀. Riverside, California; April, June and July; R. Buckwalter, Grace H. and John L. Sperry (1 ♂, 4 ♀♀). Hawthorne, California; 5–13 June 1937; E. C. Johnston (4 ♀♀). Camp Ozena, Upper Cuyama, Ventura County, California; June and July; C. W. Kirkwood (5 ♂♂). Bishop, California; 14 June 1937; E. C. Johnston (1 ♀). Loma Linda, San Bernardino County, California; June and July; Barnes Collection (2 ♂♂, 18 ♀♀). Camp Baldy, San Bernardino County, California; 16–23 July; Barnes Collection (2 ♂♂, 1 ♀). Tally's, San Diego, California; G. H. Field (1 ♂). Claremont, California; Metz, Baker (3 ♀♀). Los Angeles County, California; Coquillet (1 ♀). Type no. 11,963, CNC; USNM.

A considerable series from Loma Linda, San Bernardino County, California, taken in late August and September, is excluded from the type series. These specimens are smaller than summer ones and probably represent a seasonal form.

GENUS *Abegesta* Munroe

Abegesta Munroe, 1964, *Can. Ent.*, **96**: 1268.
Type-species: *Orobena reluctalis* Hulst, 1886. Original designation.

The moths are easily recognized by their orange or brown forewings with a wide, oblique, white band traversing most of the width of the forewings basad of the middle. The frons is rounded. The labial palpi are obliquely upturned; the segments decrease in size from the base and are well marked off; the first and second are broadly scaled in front, the third is cylindrical. The maxillary palpi are long and prominent; they are weakly dilated with scales distally. The proboscis is well developed. The eyes are large. The ocelli are present.

The antennae are filiform, with alternate scale-rows raised. The body is compact. The legs are fairly robust. The praecinctorium is short and transverse.

The forewings are broadly triangular; the apex is acute; the termen is somewhat convex and oblique; the posterior margin is angled near the base. Veins R_1 and R_2 are stalked. R_3 and R_4 are stalked about halfway from the anterior angle of the cell to the apex of the wing. R_5 arises from the anterior angle of the cell. M_1 arises a little behind R_5. The discocellular vein is weakly curved. M_2 and M_3 arise a short distance apart at the posterior angle of the cell; their basal parts are not or hardly curved and approximated. Cu_1 arises well basad of the posterior angle of the cell. Cu_2 arises from the cell at two-thirds from base.

The hindwings are rounded. Sc and R_s are briefly anastomosed. M_1 arises from the anterior angle of the cell. The cell is about half as long as the wing. The discocellular vein is curved, with the posterior part moderately oblique. Veins M_2 and M_3 arise from the posterior angle of the cell; their basal parts are curved and approximated. Cu_1 arises a little basad of the posterior angle of the cell; its basal part is not curved and approximated to M_3. Cu_2 arises from the cell at three-fourths from base. The cubitus and the base of the anal area are thickly clothed with slightly spatulate hairlike scales.

The male genitalia have the uncus rodlike, hooked at the tip. The juxta is U-shaped, each arm bearing a long, pointed, sawtoothed, bladelike process. The valves have a costal bar bearing short basal and distal prominences; the tip of the valve is rounded; the sacculus is reinforced by a tapering sclerotized bar. The penis is short and cylindrical; the vesica is spinulose and bears one irregularly serrate, toothlike cornutus and three short, spinelike, straight ones. The female genitalia have the ovipositor high and narrow; the lobes have numerous setae of varying lengths. The apophyses are fairly well developed. The seventh sternite is sclerotized and recurved dorsad posteriorly. The ductus bursae is short and wide, with a troughlike sclerotization. The bursa is short and pouch-shaped, unsymmetrical, membranous, finely scobinated and has a proximal diverticulum, joined to the ductus bursae by a depressed, rugose, spinulose, sclerotized band.

The early stages are unknown.

This compact genus ranges from the southwestern United States southward into Mexico and Central America. Three species are recognized from our territory.

KEY TO NORTH AMERICAN SPECIES

1. Forewing above brown ..... *remellalis* p. 222
— Forewing above orange-yellow 2

2. Length of forewing 8.5–10 mm; ground color light yellow; tip of fringe white ..... *concha* p. 222
— Length of forewing 7.5–8.5 mm; ground color orange yellow; tip of fringe orange or buff ..... *reluctalis* this page

Abegesta reluctalis (Hulst)

PL. 11, FIGS. 31–35 (McD. 5329, in part).

Orobena reluctalis Hulst, 1886, *Trans. Amer. Ent. Soc.*, **13**: 156.
Type-locality: Arizona.

NOTE—The species was described from two male and three female syntypes. Klots, 1942, *Bull. Amer. Museum Nat. Hist.*, **79**: 421, designated a male lectotype.

The moth is of moderately small size (length of forewing 7.5–8.5 mm). The ground color is orange-yellow; the antemedial line has the posterior widened part relatively narrow and straight, strongly contrasting with the ground color. The fringe of the forewing is brown at the base, then white, with the extreme distal margin orange or buff.

The genitalia are as described for the genus.

The early stages are unknown.

The species occurs in Texas, Arizona and New Mexico and ranges far south into Mexico.

Abegesta remellalis (Druce)

PL. 11, FIGS. 36–39 (McD. 5329, in part).

Homophysa remellalis Druce, 1899, *Biologia Centrali-Americana. Insecta. Lepidoptera-Heterocera*, **3**: 556, pl. 100, fig. 24.
Type-locality: Presidio de Mazatlan, Mexico.

The moth is similar in general appearance to *A. reluctalis* but is darker in color, the ground color of the forewings being deep golden brown rather than orange-yellow. Otherwise there seems to be no significant difference between the two forms where they occur sympatrically in Arizona and Mexico, and it is not unlikely that McDunnough (1939) was right in treating them as forms rather than species. On the other hand, brown forms from southern California that have been identified as *A. remellalis* are larger than the typical form and appear to have the bands of the forewings differently shaped. The relationships deserve further study and it is possible that the Californian population should be named. However, I am reluctant to propose an additional name in the present unsatisfactory state of knowledge.

The early stages of this species or form are unknown.

Forms referable to *A. remellalis* occur in Mexico, in Arizona as far north as the Flagstaff region, and in southern California.

Abegesta concha Munroe

PL. 11, FIG. 40.

Abegesta concha Munroe, 1964, *Can. Ent.*, **96**: 1270, figs. 39, 69.
Type-locality: Concho, Arizona.

The moth is similar in appearance to *A. reluctalis* but is larger (length of forewing 8.5–10 mm), has the build more robust, the forewings somewhat more rounded and the ground color lighter, brighter yellow. The white costal markings in the apical half of the wing are stronger than in *A. reluctalis*, the distal half of the fringe is wholly white, not tipped with orange or buff.

The male genitalia are unknown. The female genitalia have the seventh sternite heavier and more broadly underturned than in *A. reluctalis*; the troughlike sclerotization of the ductus bursae is larger and stronger; the sclerotized band between the ductus bursae and diverticulum is much narrower and weaker.

The species occurs in Arizona and possibly in southern California.

The early stages are unknown.

GENUS *Glaphyria* Hübner

Glaphyria Hübner, [1823]. *Zuträge zur Sammlung Exotischer Schmettlinge* [sic], **2**: 29.
Type-species: *Glaphyria sesquistrialis* Hübner, 1823. Monotypy.

Homophysa Guenée, 1854, *Species Général des Lépidoptères*, **8**: 364.
Type-species: *Homophysa glaphyralis* Guenée, 1854. Designated by Hampson, 1898, *Proc. Zool. Soc. London*, 1898: 607.

The moths are variable in appearance. They are of small to medium size and have relatively broad wings; the forewings have the apices square or rounded. The forewings are yellowish, buff or grayish, with fine pale transverse lines and in some species with a prominent dark medial patch. The frons is flat and oblique. The labial palpi are somewhat obliquely upturned, with the first and second segments moderately tufted with scales in front, the third segment slender and cylindrical. The maxillary palpi are of moderate length and are not distally dilated with scales. The eyes are large. The ocelli are present. The proboscis is well developed, scaled at the base. The antennae are somewhat compressed in the female, filiform in the male. The body is slender; the abdomen is not very long. The legs are normal. The praecinctorium is weakly bilobed. The forewings have the subcostal-radial area broad; veins R_1 and R_2 are stalked, as are R_3 and R_4. R_5 and M_1 arise behind the anterior angle of the cell. M_2, M_3 and Cu_1 arise near the posterior angle. Their bases are weakly separated and their basal parts are not or only weakly approximated. The hindwings have Sc and R_s anastomosed. M_1 is not stalked with R_s. The discocellular is curved, with its posterior part oblique. M_2, M_3 and Cu_1 arise near the posterior angle of the cell; their basal parts are curved and approximated. Cu_2 arises somewhat basad of the posterior angle of the cell. The raised scales of the cubital and anal regions are slender and spatulate.

The male genitalia have the uncus slender, distally pointed and finely hooked ventrad. The juxta is deeply U-shaped, with the dorsal ends of the arms spinose. The valve is fan-shaped, with the costa tubular, ending in a short sharp process beyond the middle. The penis is cylindrical and is armed with cornuti. The female genitalia are somewhat variable in their characters. They have the ductus bursae strengthened by a fluted sclerite. The bursa is pouchlike, with a diverticulum on the right side posteriorly leading to the ductus seminalis, and with fluting and spining that differs in the different species.

The early stages are unknown.

The North American species vary considerably in appearance and genital structure. It is not impossible that further study will show that the genus should be divided. The genus extends into the Neotropics, where there are a number of additional species.

KEY TO NORTH AMERICAN SPECIES

1. Forewing above creamy, yellowish or buff; markings obsolescent or the strongest markings pale antemedial and postmedial lines; if unmarked then creamy or yellowish white 2
— Forewing above with fuscous areas or patches; rarely unicolorous buff 3

2. Forewing above buff; pale transverse lines fairly strong ..... *sesquistrialis* p. 225
— Forewing above white with yellowish or creamy areas; pale transverse lines very weakly contrasting ..... *glaphyralis* p. 224

3. Forewing above with weak variegated pattern and with a cluster of imperfectly separated fuscous spots in the subterminal and adterminal areas of the wing over the median and cubital veins ..... *basiflavalis* p. 225
— Forewing above with a broad fuscous or purplish-fuscous area based on the middle of the posterior margin,

generally occupying the greater part of the wing, either diffusing to or contrasting with paler basal, costal and terminal zones; rarely the wing uniformly buff with no dark patch or only traces of one 4

4. Forewing above with basal area more or less obviously whitish buff; three black dots or spots at termen behind apex ..... *peremptalis* p. 226

— Basal, costal and terminal areas of forewing orange, yellow or buff; discal area often dark, either diffusely or contrastingly; postapical subterminal black spots lacking 5

5. Forewing with base, costa and termen bright orange-yellow, contrasting with the blackish-fuscous disc; penis of male with three large cornuti ..... *cappsi* p. 227

— Forewing with base, costa and termen sometimes orange-yellow and contrasting with the dark disc, though usually not as bright as in *G. cappsi*; these areas often dull buff and diffusing into the darker disc or the wings uniformly dull buff; cornuti consisting of two isolated moderately small cornuti and 5 to 15 smaller ones in a row ..... *fulminalis* p. 227

Glaphyria glaphyralis (Guenée)

PL. 11, FIGS. 43–45 (McD. 5325).

Homophysa glaphyralis Guenée, 1854, *Species Général des Lépidoptères*, **8**: 366.
Type-locality: North America.

Scopula stipatalis Walker, 1865, *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum*, **34**: 1460.
Type-locality: North America.

Lipocosma albolineata Grote and Robinson, 1867, *Trans. Amer. Ent. Soc.*, **1**: 28, pl. 2, fig. 22.
Type-locality: Pennsylvania.

The moth has the wings broadly rounded. The length of the forewing varies from 7–8 mm. The wings are white above, with yellow suffusion in the subterminal area and with an inconspicuous yellow postmedial line on forewings and hindwings. Many specimens also have a yellow antemedial line on the forewings; even when present this is weaker than the postmedial line.

The male genitalia are large for the size of the moth. The uncus is short, slender and distally hooked. The juxta has a pair of dorsal processes bearing a row of fine but strong spines. The valves are delicate, fanlike, with a costal thickening that ends a little beyond the middle of the costa in a short sharp process. The penis is large and thick, with three large but short clawlike cornuti. The female genitalia have the ovipositor lobes short, high and strongly setose. The apophyses are fine, the posterior ones considerably shorter than the anterior ones. The ostium is flanked by oblique, narrowly triangular sclerites. The ductus bursae is fairly long, sclerotized and fluted and enters the bursa at the left posterior corner. The bursa is irregular in shape and is armed with longitudinal flanges and with two prominent patches of spinules posteriorly near the opening of the ductus seminalis.

The early stages are unknown.

The species ranges from the Niagara Peninsula of Ontario south through the eastern U.S.A. to southern Florida and Mississippi. Southern specimens tend to be smaller and more intense in color than northern ones, but there is no structural difference. The moths fly in June and early July in the northern part of the range. In the south the season is more extended.

Glaphyria sesquistrialis Hübner

PL. 11, FIGS. 41, 42 (McD. 5326).

Glaphyria sesquistrialis Hübner, 1823, *Zuträge zur Sammlung Exotischer Schmettlinge* [sic], **2**: 29, pl. [64], figs. 369–370 [1819–1821].
Type-locality: Pennsylvania.

NOTE—*Zebronia? dimotalis* Walker, described from Honduras, has customarily been listed as a synonym of this species, but actually it belongs to the genus *Aethiophysa* (NEW COMBINATION). It should be deleted from the North American list.

The moth is about the same size as *G. glaphyralis* (length of forewing 7–8.5 mm) but the forewing is somewhat narrower, with the costa nearly straight and the apex right-angled. The forewings above are uniformly light tan, with the antemedial and postmedial lines about equally distinct; both are whitish, narrowly bordered on the two sides with brown. The antemedial line is sinuated, its general course erect; the postmedial line is bowed distad and in its posterior part weakly dentate. There is a row of dark terminal dots at the vein-ends. The fringe is brown. The hindwings are whitish, generally suffused with tan in the terminal space. There is an indistinct dark postmedial line and a stronger dark terminal line.

The male genitalia are somewhat similar to those of *G. glaphyralis* but they have a few coarse spines instead of numerous fine ones on the dorsal processes of the juxta and there are two long and three short cornuti in the penis instead of three clawlike ones. The female genitalia are closely similar to those of *G. glaphyralis*, but the sclerotized ridges of the bursa are coarser and more extensive in the present species.

The early stages are unknown.

The species is fairly common from Ottawa, Ontario, south to the Florida Keys and Brownsville, Texas, and westward to Kansas. In the north the moth flies in July and August. In Florida it has been taken from February to October and at Brownsville, Texas, from March to October.

Glaphyria basiflavalis Barnes and McDunnough

PL. 11, FIGS. 46, 47 (McD. 5332).

Glaphyria basiflavalis Barnes and McDunnough, 1913, *Contrib. Nat. Hist. Lep. N. Am.*, **2**(4): 172, pl. 4, fig. 12.
Type-locality: Everglade, Florida.

NOTE—The species was described from six syntypes. The locality cited is that of the lectotype, hereby designated, a male in the USNM bearing the label "*Glaphyria basiflavalis* B. & McD. Type ♂."

This is a small species (length of forewing about 5 mm). The forewing above is variegated with whitish gray or whitish buff and shades of gray, ferrugineous and fuscous. There is a prominent whitish longitudinal patch in the basal area and there are oblique whitish subapical streaks on the costa. There are prominent fuscous spots beyond the cell and near the termen just before the middle. The hindwings are gray, paler towards the costa and with paler fringe.

The male genitalia are not unlike those of *G. sesquistrialis* but the penis is armed with one long and one short cornutus.

The early stages are unknown.

The species is fairly common in Florida and southern Texas and will perhaps prove to be widely distributed in the Gulf States.

Glaphyria peremptalis (Grote)

PL. 11, FIG. 52; PL. 12, FIG. 3; PL. F, FIG. 1; PL. K, FIG. 4 (McD. 5531).

Homophysa peremptalis Grote, 1878, *Can. Ent.*, **10**: 28.
Type-locality: Amherst, Massachusetts.

This is a fairly small moth (length of forewing about 7 mm). The wings are fairly broad and rounded, though the forewing is perhaps a little squarer than in *G. fulminalis*. The forewing is grayish fuscous to brownish fuscous above, with the base narrowly pale gray and the costal and terminal areas somewhat paler fuscous in some specimens at least. The antemedial line is fine and whitish. It is acutely angled in the cell, the apex of the angle being directed distad; there is a right angle in the opposite direction on the anal fold and a narrow, distally convex bend on 2nd A; behind this the line is sinuated to the posterior margin. The postmedial line is similar in thickness and color. It is strongly excurved around the cell from the costa to 2nd A, then weakly angulate to the posterior margin. The type has three prominent black adterminal spots in the apical half of the wing, each preceded by a white spot, and a similar black spot preceded by white on 2nd A. The fringe is fuscous.

The hindwings above are light gray; much of the posterodistal part of the wing is occupied by a triangular area of fuscous shading, on which a section of the whitish postmedial line is visible. There is a fuscous adterminal line and a weaker fuscous terminal line. The fringe is partly whitish, partly fuscous, matching the adjacent areas of the wing.

The forewings beneath are dull ochreous, with the disc broadly suffused with fuscous. The hindwings beneath are light gray.

The male genitalia have the uncus relatively short and wide, though distally hooked. The valves are wide, with straight costal thickening reaching the apex of the valve and bearing short, sharp sub-basal, subapical and apical processes. The dorsal processes of the juxta each have a single sharp apical spine. The penis is stout and has two thick spinelike cornuti situated close to a distal row of six cornuti of almost the same size and thickness as the first two. The female genitalia have the ovipositor lobes high and narrow, strongly setose. The posterior apophyses are very fine and less than half the length of the slightly thicker anterior apophyses. The ductus bursae is of moderate length but rather wide; it is completely sclerotized, with fluting on the ventral side and a smooth bulge on the left dorsal side. The bursa is saclike, with round dorsal and ventral areas of coarse spines. The ductus seminalis arises from a sclerotized and fluted diverticulum at the right posterior corner.

The early stages are unknown.

The species ranges from Massachusetts to western Pennsylvania, Missouri, Arkansas and Texas.

The absence of orange areas in the distal part of the wing distinguishes this species from *G. fulminalis* and *G. cappsi*. The cornuti and costal sclerotization of the valve in the male genitalia and the ductus bursae and bursa in the female are also different from those species.

Glaphyria fulminalis (Lederer)

PL. 11, FIGS. 53, 54; PL. 12, FIG. 2; PL. E, FIG. 9; PL. K, FIG. 5 (McD. 5330).

Homophysa fulminalis Lederer, 1863, *Wiener Ent. Monat.*, **7**: 455, 483, pl. 18, fig. 13.
Type-locality: North America.

The size and general appearance are much as in *Lipocosma polingi*, but the base, costa and termen of the forewings are yellow, not whitish buff, the dark discal area is darker, more uniform and more strongly contrasting, and the transverse lines are narrower and more distinctly pale and contrasting. The hindwings have the dark area somewhat narrower and more uniform. The species is even more closely similar to *G. cappsi*, but that species has the base, costa and termen of the forewings bright orange and even more strongly contrasting and has the posterior part of the postmedial line very strongly oblique basad and meeting the posterior margin at an angle of about 25 degrees or less instead of 45 degrees or more, as in the present species. Florida specimens of *G. fulminalis* often have the dark discal area of the forewings reduced in intensity and extent or even lacking entirely, so that the wing is uniformly yellowish buff, but there seems to be no structural difference from normally marked individuals.

The male genitalia have the uncus longer and thinner than in *G. peremptalis*. The penis is more slender and has one slender, straight, basal cornutus about as long as the diameter of the penis, one shorter subapical one, and a row of from six to 15 straight apical ones, about the same length as the subapical one. The apical cornuti are more numerous in southern than in northern specimens, but I have been unable to find any other difference. The valves are broadly rounded; the costa is thickened and sclerotized for about three-quarters of its length and has a sharp sub-basal projection and another at the distal end of the sclerotized zone. The female genitalia have the ovipositor lobes high, narrow and strongly setose. The apophyses are short and slender. The ductus bursae is three or four times as long as the bursa and is fluted, sclerotized and coiled. The bursa is saclike and densely spinulose and has the ductus seminalis arising from a small diverticulum beside the junction of the ductus bursae with the bursa.

The early stages are unknown.

The species ranges from Connecticut to southern Florida and westward to Illinois and Texas. There is some variation, as noted above. It was described from four syntypes in the Vienna Museum and the Felder Collection. Lederer's figure shows the characteristic shape of the postmedial line of the forewings very well. I select as lectotype a specimen in the Vienna Museum which, although without abdomen, has this character clearly visible.

Glaphyria cappsi Munroe, NEW SPECIES

PL. 11, FIG. 55; PL. 12, FIG. 1; PL. E, FIG. 10; PL. K, FIG. 6.

Glaphyria cappsi Munroe.
Type-locality: Fort Myers, Florida.

DIAGNOSIS: This species is similar in size and general appearance to strongly marked specimens of *G. fulminalis*. The basal, costal and terminal areas of the forewing are bright orange rather than yellowish buff and contrast more strongly with the purplish-fuscous disc. The postmedial line has its posterior portion very strongly oblique basad, meeting the posterior margin at an angle of 25 degrees or less. The male genitalia have two long slender cornuti in the penis; each is more than half as long as the aedoeagus. The female genitalia have the ductus bursae less than twice as long as the bursa and not significantly coiled.

DESCRIPTION: The frons is orange, with white lateral lines. The vertex is orange. The labial palpi are orange, with the segments tipped with white. The maxillary palpi are orange, tipped with white. The basal scaling of the proboscis is orange. The eyes and ocelli are brown; the ocelli are minute. The antennae are buff above and below. The thorax above is orange. The abdomen above is orange, with the posterior margins of the segments white. The body beneath and the legs are whitish buff.

The forewings have the costa convex, the apex narrowly rounded, the termen rounded and somewhat oblique, the tornus obtuse and the posterior margin rather strongly rounded subbasally. The base, costa and termen are bright orange; the rest of the wing is contrastingly purplish fuscous. The antemedial line is fine, white and distinct. It is distally oblique from the costa at one-third from base, obtusely angled on R_s, right-angled in the cell, thence oblique basad to Cu, there strongly bent and oblique distad to an acute angulation on the anal fold; thence oblique basad for some distance and then S-shaped to the posterior margin at two-fifths. The postmedial line resembles the antemedial in color, thickness and sharpness. It is broadly curved distad around the cell and shallowly retracted to a right angle on the anal fold, thence extending in a convex curve to 2nd A, then strongly oblique distad, meeting the posterior margin at an angle of 25 degrees or less at a point close to the end of the antemedial line. There are inconspicuous white adterminal dots on veins R_4, R_5, M_1 and on the anal fold. The fringe is orange of the same shade as the terminal area.

The hindwings above have the base and the anterior half whitish buff. The posterior part is weakly suffused with fuscous except basally and terminally; the fuscous area is interrupted by a broad longitudinal buff stripe in the anal area. There is a white postmedial line on the fuscous area. The posterior part of the terminal area is orange and there is a black bar along the termen at the anal fold. The fringe is orange.

The forewings beneath are orange, with the fuscous area of the upperside indistinctly repeated.

The hindwings beneath are orange, with the basal area paler.

The length of the forewing ranges from 5.5–7 mm.

The male genitalia have the uncus relatively short, with the tip finely hooked. The juxta is deeply U-shaped, with sharp-tipped dorsal arms. The valve is broadly rounded, with a costal sclerotized thickening bearing sub-basal and distal pointed prominences and ending before the apex of the valve. The penis is about eight times as long as its maximum width and tapers somewhat distally. It has two nearly straight cornuti, each more than half as long as the aedoeagus. The female genitalia have the ovipositor lobes high, narrow and fairly strongly setose. The posterior apophyses are slender and less than half as long as the slightly thicker anterior apophyses. The ductus bursae is sclerotized, is fluted in its distal part, and is less than twice as long as the bursa. The latter is oval and densely spinulose; it has a stout, conical diverticulum arising from the anterior right corner and leading to the ductus seminalis.

The early stages are unknown.

TYPES: Holotype: ♂. Fort Myers, Florida; 1–7 April; Barnes Collection; genitalia slide HWC 66. USNM.

Allotype: ♀. St. Petersburg, Florida; "4.8.15"; R. Ludwig; Barnes Collection; genitalia slide HWC 70. USNM.

Paratypes: 5 ♀♀. St. Petersburg, Florida; March, July; Barnes Collection (2 ♀♀). Orlando, Florida; 11 April 1930; at light (1 ♀). Oneco, Manatee County, Florida; 21 March 1955; J. G. Franclemont (1 ♀). Jackson, Hinds County, Mississippi; 8 Sept. 1962; Bryant Mather, no. 5330 (1 ♀). USNM; JGF; BM; type no. 11,964, CNC.

GENUS *Aethiophysa* Munroe

Aethiophysa Munroe, 1964, *Can. Ent.*, **96**: 1263.
Type-species: *Homophysa lentiflualis* Zeller, 1872. Original designation.

The moths are of medium to small size, with brown or yellow, square-tipped or acute-tipped forewings and with the pattern consisting of antemedial and postmedial lines or with the wings almost unmarked. The frons is flat and oblique. The labial palpi are obliquely upturned, the first and second segments with compressed bushy scaling extending far out in front of the third, in contrast to the only slightly tufted first and second segments in *Glaphyria*; the third segment is cylindrical, distinct and of moderate length. The maxillary palpi are well developed but not distally dilated with scales; they reach beyond the base of the third segment of the labial palpi. The proboscis is well developed and scaled at the base. The eyes are large and the ocelli are well developed. The antennae are weakly prismatic in the male, filiform in the female. The body is fairly robust. The praecinctorium is compressed. The legs are robust, with long tibial spurs.

The wings are broad. The forewings have the costa nearly straight; the apex is square or acute; the termen varies in shape. Veins R_1 and R_2 are stalked and arise from the cell near its anterior angle. R_{3+4} arises from the anterior angle of the cell and is shorter than the free part of R_3 or R_4. R_5 arises from the anterior angle of the cell, M_1 from somewhat behind it. The discocellular vein is weakly oblique and slightly curved. Veins M_2 and M_3 arise from the posterior angle of the cell; their basal parts are curved and approximated. Cu_1 arises well basad of the posterior angle and is not approximated to M_3. Cu_2 arises from the cell not far past the middle.

The hindwings have Sc and R_s briefly anastomosed. M_1 arises from the anterior angle of the cell. The cell is less than half as long as the wing. The discocellular vein is curved; its posterior part is oblique. M_2 and M_3 arise from the posterior angle of the cell; their basal parts are strongly approximated. Cu_1 arises just basad of the posterior angle of the cell, but its basal part is not strongly approximated to M_3. Cu_2 arises from the cell at two-thirds. Cu is pectinate at the base. There are long, slender, weakly spatulate, hairlike scales on both Cu and the anal area.

The male genitalia have the uncus slender with a minute decurved hook at the tip. The gnathos is represented by a slender bridge. The juxta has broad lateral plates, strengthened by rodlike arms. The penis is stout and cylindrical, with strong cornuti. The valves are fanlike, with a prominent costal thickening, ending in a free spine and often with one or more additional spines along its length. The female genitalia have the ovipositor lobes high, short, narrow and strongly setose. The apophyses are slender and of moderate length. The ductus bursae is fairly long, sclerotized and fluted. The bursa has variable armature but is always unsymmetrical, with a proximolateral diverticulum leading to the ductus seminalis.

The early stages are unknown, but the streaked pattern of such species as *A. lentiflualis* suggests an association with grasses or reeds.

The genus ranges from the eastern and central parts of the U.S.A. south into the Neotropics, where it has a number of species. Four species are known from our fauna.

KEY TO NORTH AMERICAN SPECIES

1. Forewing above yellow with brown termen; length of forewing under 7 mm ..... *delicata* this page
— Forewing above tan or light brown; length of forewing over 7 mm 2

2. Forewing with distinct, contrasting, dark-brown antemedial and postmedial lines and discocellular bar; apex of forewing slightly falcate ..... *dualis* p. 231
— Forewing with at most very weak brown antemedial and postmedial lines and discocellular bar; apex of forewing not falcate 3

3. Larger and more robust; valve of male with a prominent free costal spine arising before the middle; penis with five straight cornuti ..... *consimilis* p. 232
— Smaller and less robust; valve of male without a prominent free costal spine before the middle, but with a short axial rod from the base; penis with two curved cornuti ..... *lentiflualis* p. 231

Aethiophysa delicata Munroe

PL. 12, FIG. 4.

Aethiophysa delicata Munroe, 1964, *Can. Ent.*, **96**: 1266, figs. 4, 36, 68.
Type-locality: Weeki Wachee Springs, Hernando County, Florida.

This little moth (length of forewing about 6 mm) has yellow forewings with the termen narrowly rusty brown and the fringe darker brown. Just basad of the brown terminal zone is a narrow and inconspicuous adterminal row of pearly white spots. The hindwings are white, with a fine brown terminal line and pale-buff fringes. It is most likely to be confused with *Xanthophysa psychialis*, which is much more common and widely distributed. That species is larger and broader-winged and lacks the rusty-brown terminal band of the forewing, though it has an interrupted dark-brown terminal line. Usually but not always the forewing of *X. psychialis* has definite transverse antemedial and postmedial lines. The pyraustine species *Loxostege plana* (Grote) and *L. roseiterminalis* Barnes and McDunnough are also superficially similar, but they have porrect labial palpi and a conical frons, and the termen of their forewings is pink, not brown.

The male genitalia have the uncus narrow and hoodlike. The valves are distally rounded; the costa is very broadly thickened and sclerotized, the sclerotized zone ending in a thornlike process near the middle of the apical margin of the valve. The penis has a longitudinal row of several strong, oblique, spinelike cornuti. The female genitalia have the ovipositor lobes high and narrow, with numerous short setae. The apophyses are of moderate length but very slender. The ductus bursae is slender at the ostial end but widens gradually towards the bursa; it is contorted and fluted and is more strongly sclerotized towards the bursa. The bursa is contorted and sclerotized basally and has fine spines distally.

The early stages are unknown.

The species is so far known only from the Florida Keys. The genitalia will easily distinguish it from other species of similar appearance.

Aethiophysa dualis (Barnes and McDunnough), NEW COMBINATION
PL. 11, FIGS. 48–50 (McD. 5333).

Glaphyria dualis Barnes and McDunnough, 1914, *Contrib. Nat. Hist. Lep. N. Am.*, 2(6): 225, pl. 1, fig. 1.
Type-locality: San Benito, Texas.

NOTE—The locality is that of the lectotype, hereby designated, a male in the USNM, labelled, "*Homophysa dualis* B. & McD. Type ♂" and "Genitalia Slide 7 Oct. 1941 H.W.C. ♂ 36".

The species differs from others of the genus in its dull-brown forewings with acute apex and distinct, dark-brown antemedial and postmedial lines and discocellular bar. *Glaphyria sesquistrialis* is somewhat similar in general appearance, but is yellower brown, with the forewings less acute-tipped, and with a definite white element in the transverse lines, the antemedial line being bisinuate and not right-angled as in *A. dualis*.

The male genitalia have the uncus slender and distally hooked. The gnathos is represented by a narrow bridge. The juxta is bifid but also has a bifurcate median process extending posterodorsad under the penis. The valves are broad and fanlike, with a relatively weak costal sclerotization with a pointed tip. The penis has six strong spinelike cornuti. I have not seen the female genitalia.

The species is known only from the Brownsville-San Benito region of southern Texas, but no doubt its true range is wider. It belongs to a group of neotropical species all of which are closely similar in appearance.

Aethiophysa lentiflualis (Zeller)
PL. 12, FIGS. 5–7; PL. F, FIG. 2; PL. K, FIG. 7 (McD. 5327, in part).

Homophysa lentiflualis Zeller, 1872, *Verh. K.-K. Zool.-Bot. Ges. Wien*, **22**: 525.
Type-locality: Texas.

The forewings above are yellowish tan, with a smooth and rather shiny texture. The antemedial and postmedial lines are inconspicuous, whitish buff, bordered with brown. The antemedial line is sinuated and almost erect, the postmedial is excurved around the cell. The fringe is dark brown basally, white distally. The hindwings are pale buff basally, shading to yellowish tan distally. Some specimens have an incomplete dark-brown postmedial line in the median part of the wing. The fringe is similar to that of the forewings. The length of the forewing is about 8 mm.

The male genitalia have the uncus narrow and distally finely hooked. The juxta is broadly bilobed. The valves are fanlike, with a narrow costal thickening ending in a free point and also with a prominent pointed process extending from the base of the valve towards its middle. The penis has two large clawlike cornuti towards its distal end, one about twice the size of the other, and a group of numerous minute short spinules towards its base. The female genitalia have the apophyses long and slender, the anterior and posterior ones of about equal length. The ostium is flanked by a pair of sclerotized pouches. The ductus bursae is short, sclerotized and fluted and has a small pouchlike expansion on its left side distad of the middle. The bursa is saclike and densely spinulose; a conical unspined diverticulum on the right side near the proximal end leads to the ductus seminalis.

The early stages are unknown.

The species is fairly common from southern Ontario and Michigan to Florida and Texas.

Aethiophysa consimilis Munroe

PL. 12, FIGS. 8, 9; PL. F, FIG. 3; PL. K, FIG. 8.

Aethiophysa consimilis Munroe, 1964. *Can. Ent.*, **96**: 1264, figs. 6, 65.
Type-locality: Norris Dam, Tennessee.

This species closely resembles the last in external appearance, but is somewhat larger and more robust and has the antemedial and postmedial lines set somewhat closer together in most specimens, though this character is unreliable.

The male genitalia are very distinctive. They have the valves wider than in *A. lentiflualis* and with a stronger costal thickening. This bears a long free spine basad of the middle and two or more short ones distally. The spine that arises from the base of the valve is longer and more slender than in *A. lentiflualis*. The penis has seven large spinelike cornuti and a very weak patch of fine spinules. The female genitalia have the ovipositor lobes high, narrow and sparsely setose. The apophyses are strong and both anterior and posterior apophyses have rhomboidal expansions. The ostium is wide; the ostial chamber is short and wide and has a pair of lateral sclerotized pouches. The ostial chamber leads directly into the short, wide, sclerotized, fluted ductus bursae, which has a bulbous expansion on the left side. The bursa is large and rounded. It is densely spinulose except on the two sides proximally.

The early stages are unknown.

The species is known to range from Tennessee to Arkansas and Mississippi.

GENUS *Xanthophysa* Munroe

Xanthophysa Munroe, 1964, *Can. Ent.*, **96**: 1268.
Type-species: *Botis psychialis* Hulst, 1886. Monotypy and original designation.

This genus contains a single species which has yellow forewings with dark fringes and usually with weak whitish transverse antemedial and postmedial lines. The frons is weakly flattened, somewhat roughly scaled. The labial palpi are obliquely upturned; the second segment has a prominent triangular tuft of scales in front, extending beyond the end of the cylindrical third segment. The maxillary palpi are prominent, though not distally dilated with scales; they extend beyond the end of the second segment of the labial palpi. The proboscis is well developed and basally scaled. The eyes are large. The ocelli are present. The antennae are weakly prismatic in the male, filiform in the female. The body is fairly robust. The praecinctorium is simple. The legs are fairly short and robust.

The forewings are broadly triangular; the costa is weakly convex; the apex is sharp; the termen is convex; the posterior margin is nearly straight. Veins R_1 and R_2 are stalked. R_3 and R_4 are stalked for about half their length from the cell. R_5 arises from the anterior angle of the cell. M_1 arises from somewhat behind the anterior angle. The discocellular is curved, with its posterior part oblique distad. M_2 and M_3 arise from the posterior part of the cell; their basal parts are not approximated. Cu_1 arises from distinctly basad of the posterior angle. Cu_2 arises from the cell at three-fifths from its base. The hindwings are broadly rounded. Sc and R_s are briefly anastomosed. M_1 is free. The discocellular is curved, with its posterior part oblique. The cell is a little less than half the length of the wing. M_2, M_3 and Cu_1 arise from the posterior angle of the cell. Cu_2 arises from the cell at three-fourths from the base. The spatulate scales of the cubital and anal regions are slender and almost hairlike.

The male genitalia have the uncus decurved and compressed, with broad, semicircular, dorsolateral flanges on the basal half. The gnathos is a narrow sclerotized band. The juxta is large and bifid; each arm bears dorsally an outwardly directed, thornlike process. The valve has the costa excavated, with a long, curved spinelike process arising from its base. The penis is slender and unarmed. The female genitalia have the ovipositor lobes high, narrow and densely setose. The apophyses are slender and of about equal length. The seventh sternite is greatly reduced, the ostium opening far forward between the recurved margins of the tergite. The ductus bursae is short and membranous. The bursa is globular and membranous.

Xanthophysa psychialis (Hulst)
PL. 12, FIGS. 10–12 (McD. 5328).

Botis psychialis Hulst, 1886, *Trans. Amer. Ent. Soc.*, **13**: 149.
Type-locality: Texas.

NOTE—The locality given is that of the lectotype, a female in the AMNH selected by Klots, 1942, *Bull. Amer. Museum Nat. Hist.*, 79: 421. The species was described from two female syntypes, from Georgia and Texas, respectively. As Rindge, 1955, *Bull. Amer. Museum Nat. Hist.*, 106: 169, points out, there is a second female labelled "Texas Type" in the Hulst Collection, now also in the AMNH. Hulst was notoriously inaccurate in citing the details of his type material, and I see no reason to question Klots' lectotype designation.

The moth has yellow forewings ranging in length from 5.5–7.5 mm. The fringe is dark brown with a paler midline and there is a broken fuscous terminal line, often preceded by a row of white dots. Most specimens have whitish, weakly fuscous-bordered antemedial and postmedial lines, the former irregularly erect, the latter excurved around the cell and shallowly retracted on the anal fold. These lines are sometimes obsolete. The hindwings are light buff, darker towards the termen and usually with traces of a fuscous postmedial line. The fringe is as on the forewings.

The genitalia are described under the generic heading, above.

The life history is unknown.

The species is a common one and ranges from eastern Canada to Florida and Texas.

GENUS *Plumegesta* Munroe, NEW GENUS

Gender: feminine.
Type-species: *Plumegesta largalis* Munroe, 1971.

The moths have the frons rounded and smoothly scaled. The vertex is short, with rough, erect scaling. The labial palpi are upturned and in the male are recurved over the frons and vertex and are covered with long scales forming a plumose vestiture. The maxillary palpi are short and inconspicuous. The proboscis is well developed and is scaled at the base. The eyes are large. The ocelli are well developed. The antennae of the male are prismatic, flattened and slightly bent basally; the expanded ventral surface is densely short-ciliate, the dorsal surface is scaled. The body is fairly slender. The praecinctorium has a transversely rounded scale-tuft distally. The legs and spurs are fairly long and slender.

The forewings are subtriangular, with the costa straight to near the apex; the apex is square; the termen is weakly convex, increasingly oblique posteriorly. The tornus is obtuse. The posterior margin is weakly convex. Veins R_1 and R_2 are separate; R_1 arises well before

the anterior angle of the cell and R_2 near the angle. R_{3+4} arises from the anterior angle of the cell and is about as long as the free parts of R_3 and R_4. R_5 arises from the anterior angle of the cell; its basal part is curved and weakly approximated to R_{3+4}. M_1 arises a little behind the anterior angle of the cell. The discocellular is short and almost straight. M_2 and M_3 arise from the posterior angle of the cell. Their basal parts are weakly curved and approximated. Cu_1 arises distinctly basad of the posterior angle of the cell and Cu_2 arises from the cell at about three-fourths from the base. 2nd A is strong and straight. 3rd A is short and free.

The hindwings are broadly rounded. Sc and R_s are anastomosed for a considerable distance. M_1 is free and arises from the anterior angle of the cell. The cell is about half as long as the wing. The discocellular is strongly curved; its posterior part is strongly oblique. M_2 and M_3 arise from the posterior angle of the cell. Their basal parts are curved and strongly approximated. Cu_1 arises just basad of the posterior angle of the cell; its basal part is not approximated to M_3. Cu_2 arises a short distance basad of Cu_1. The spatulate scales of the cubital and anal regions are fine and almost hairlike.

The male genitalia have the uncus distally greatly expanded and bilobed, with groups of specialized setae dorsally. The tegumen is short and the gnathos is represented by a simple bridge. The juxta is broadly bilobed. The vinculum is rhomboidally expanded in the midventral line. The valves are somewhat contorted basally and have specialized setae along the base of the sacculus on the mesal surface and an expansible pencil of hairlike scales on the outer surface near the base. The costal margin is convex and tubularly thickened. The penis is short and cylindrical; the vesica is armed with a small hooked cornutus and a dense array of short conical spinules. The female genitalia are unknown.

The plumose labial palpi, the remarkable uncus and the basally contorted valve distinguish this from all other known glaphyriine genera, but the general habitus suggests that the genus is correctly placed in this subfamily.

The early stages are unknown.

Only the type-species is known.

Plumegesta largalis Munroe, NEW SPECIES

PL. 12, FIG. 13; PL. F, FIG. 4.

Plumegesta largalis Munroe.
Type-locality: Key Largo, Monroe County, Florida.

DIAGNOSIS: The moth is of medium-small size (length of forewing 7–8 mm). The wings are tan in color. The forewings have an erect dark-brown antemedial line, a similarly colored, curved postmedial line, placed rather far out on the wing, and a dark-brown terminal line and fringe. The hindwings are tan, basally somewhat paler, with a partial dark-brown postmedial line in the middle of the wing and with a dark-brown terminal line and fringe on the anterior part. The general appearance is like that of certain West Indian species of *Glaphyria*, but the structural characters are distinctive.

DESCRIPTION: The head, body, antennae and legs are tan, the dorsum of the abdomen and the underparts somewhat paler than the dorsum of the head and thorax. The eyes and ocelli are dark fuscous.

The forewings above are tan. The antemedial line is dark brown, weakly oblique basad and weakly convex distad from the costa at one-third to the posterior margin at one-third,

fainter anteriorly and posteriorly than in the middle of the wing. The postmedial line is dark brown, thicker anteriorly than posteriorly. It is strongly excurved around the cell from the costa at three-fourths from base to an obtuse angulation on 2nd A. Thence it parallels the termen to the posterior margin at three-fourths from base. The fringe and a narrow terminal line are dark brown.

The hindwings above are tan like the forewings, though somewhat paler basally and costally. The postmedial line is dark brown and curved and is present only in the middle of the wing. The fringe and terminal line are dark brown, as on the forewings, from the apex to behind the middle of the wing. Thence to the anal angle they are tan.

The underside is paler than the upperside and lacks the antemedial line. Otherwise it is marked like the upperside.

The genitalia are described under the generic heading.

The early stages are unknown.

TYPES: Holotype: ♂. Key Largo, Monroe County, Florida; 1 May 1967; Mrs. Spencer Kemp; genitalia slide 4015 EGM. Type no. 11,965, CNC.

Paratype: 1 ♂. Same locality and collector as for holotype; 23 June 1967; genitalia slide 4014 EGM. CPK.

GENUS *Lipocosma* Lederer

Lipocosma Lederer, 1863, *Wiener Ent. Monat.*, **7**: 448.
Type-species: *Leucinodes sicalis* Walker, 1859. Monotypy.

Lipocosmopsis Munroe, 1964, *Can. Ent.*, **96**: 1294. NEW SYNONYMY.
Type-species: *Lipocosma intermedialis* Barnes and McDunnough, 1912. Monotypy and original designation.

NOTE—This genus was based on a misidentified type-species, as the material I had really was of *L. septa*, which I then wrongly thought was the same as *L. intermedialis*. Since the diagnostic characters of *Lipocosmopsis* occur in one but not the other of these very closely related species, I no longer consider them of generic value.

This genus consists of small moths with a variegated pattern that contains substantial areas of white, whitish gray or whitish buff. The frons is rounded and smoothly scaled; the vertex has rough erect scaling. The labial palpi are upturned and have the first two segments roughly scaled, the third long, smoothly scaled and pointed. The maxillary palpi are variable in length. The eyes are large. The ocelli are well developed. The antennae are compressed and thickened in the male, filiform in the female. The body is fairly robust. The praecinctorium ends in a transverse fan of scales. The legs are fairly slender and have long tibial spurs.

The forewings are short and broad, with the costa convex, the apex square or rounded, the termen convex, the tornus rounded or obtuse and the posterior margin somewhat curved. Veins R_1 and R_2 are separate and arise near the anterior angle of the cell. R_2 is basally approximated to R_{3+4}, which arises from the anterior angle of the cell. R_5 arises at the anterior angle and is basally curved and weakly approximated to R_{3+4}. M_1 arises a little behind the anterior angle of the cell. The discocellular is short and concave distad. M_2 and M_3 arise from the posterior angle of the cell; their basal parts are sometimes approximated. Cu_1

arises a little basad of the posterior angle of the cell and Cu_2 somewhat basad of Cu_1. 2nd A is strong. 3rd A is short and free.

The hindwings are rounded and have the termen rounded or very weakly sinuated. Sc and R_s are anastomosed for a considerable distance. M_1 is free and arises from the anterior angle of the cell. The cell is about half the length of the wing. The discocellular is curved, with its posterior part oblique. M_2 and M_3 arise from the posterior angle of the cell; their basal parts are somewhat curved and approximated. Cu_1 arises from the posterior angle of the cell, its basal part is sometimes approximated to that of M_3. Cu_2 arises somewhat basad of the posterior angle. The spatulate scales of the cubital and anal regions are grouped in fairly definite medial and subterminal tufts; some are broad throughout and simply curled upward, others are racket-shaped, with slender stalks and broad tips.

The male genitalia have the uncus slender and sparsely setose. The juxta is bifid. The valves are simple and are expanded and rounded distally. The costa has a narrow thickening which usually has a short projection or a peglike seta at its distal end. The penis is short and its vesica is variously armed with fine spinules or cornuti. The female genitalia have the ovipositor lobes high, narrow and densely setose. The apophyses are fairly long and slender. The ductus bursae is short and unsymmetrical, with various sclerotization. The bursa is saclike, with sclerotized ridges and spinules and with a proximal diverticulum on the right side leading to the ductus seminalis.

The larvae so far as known make cases of lichen and perhaps other materials. These are dorsoventrally flattened and have an oval middle part with slightly expanded anterior and posterior ends. Those of *L. adelalis* were found in numbers on white lichens on oak bark by Kearfott (1903). The flattened cases closely match the colonies of lichen on which they are found. The larvae of *L. septa* also make cases and it is likely that the life histories of other species are similar. The adults generally have a pale, confused, potentially lichen-matching maculation.

The seven known North American species have collectively a broad range through the eastern and southern parts of the continent. The genus is well represented in the American tropics, where many species probably remain to be discovered.

KEY TO NORTH AMERICAN SPECIES

1. Forewing above grayish fuscous, with the base, costa and termen narrowly whitish gray ..... *polingi* p. 241

— Forewing above with contrasting pale basal area, or largely pale, or with the medial area diffusely darker than the basal area; in the last case the basal area broad and its boundary with the medial area sinuate or dentate 2

2. Forewing above with a distinct, inwardly oblique, reddish-brown patch or bar from the cell to the posterior margin just distad of the pale basal area; ground color of wings largely whitish ..... *septa* p. 239

— Forewing above with at most faint indications of such a marking, and in that case with the basal area distinctly paler than the rest of the wing 3

3. Forewing above with white basal part contrasting with dark distal part; the boundary between the two areas sharp and nearly straight, erect or somewhat oblique basad 4

— Forewing above with basal part not contrastingly paler than distal part, if paler than medial area then the

boundary between the two diffuse or strongly sinuous 5

4. Forewing above with white basal area extending to middle of wing; the area beyond dark fuscous, becoming lighter towards apex and termen; the boundary between the white and fuscous areas erect or only very slightly oblique ... *albibasalis* p. 241

— Forewing above with white basal area not extending to middle of wing; the area beyond light brownish fuscous; the boundary between the white and fuscous areas distinctly oblique basad .... *intermedialis* p. 238

5. Forewing above with a distinct, round, black discocellular dot ..... *adelalis* p. 238

— Forewing above with a generally indistinct, double discocellular bar 6

6. Ground color of forewing above white with irregular yellowish or brown areas; posterior part of medial area of forewing with diffuse brown and fuscous suffusion; hindwing above with fuscous scaling anterad and distad of patch of raised scales .... *sicalis* this page

— Ground color of forewing above white with rather even light-brown dusting, strongest towards apex and termen; posterior part of medial area of forewing not darkened; dark raised scales of hindwing contrasting, situated on a pale ground ..... *diabata* this page

Lipocosma sicalis (Walker)

PL. 12, FIGS. 14–17 (McD. 5340).

Leucinodes? sicalis Walker, 1859, *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum*, **19**: 942.
Type-locality: unknown.

Pyralis perfusalis Walker, 1865, *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum*, **34**: 1226.
Type-locality: North America.

The moth is the largest North American species of the genus, the length of the forewing ranging from 7–9 mm. It is easily recognized by the pale wings with confused darker median areas and with a weak double discocellular bar on the forewings.

The male genitalia have the uncus slender and rodlike; the valves are of moderate width and have the costa nearly straight, with a single peglike seta at the end of the costal sclerotization. The penis has a group of minute spinelike cornuti and a single small spinelike cornutus separated from the rest. The female genitalia have the apophyses rather small and delicate. The ductus bursae and bursa are largely sclerotized and a long band of spines extends from the ductus into the bursa. The diverticulum is conical and partly membranous.

The early stages are unknown.

The species is common over a wide geographical range from southern Quebec and Ontario to Florida as far south as Punta Gorda and to Missouri and Mississippi.

Lipocosma diabata Dyar

PL. 12, FIG. 18 (McD. 5341).

Lipocosma diabata Dyar, 1917, *Ins. Insc. Mens.*, 5: 70.
Type-locality: Florida.

The moth somewhat resembles *L. sicalis*, but is smaller, with somewhat more sinuate margins and with thinner scaling. The forewings lack the dark clouding in the posterior part of the medial area that is conspicuous in *L. sicalis*. The apical and terminal parts of the wing are

rather uniformly brown-dusted, not variegated with yellowish buff as in *L. sicalis*. The fringes are brown, not white. On the hindwings the dark raised scales are not flanked distally and anteriorly by a fuscous area.

The male genitalia are much like those of *L. sicalis*, but the penis has a long, slender, needlelike cornutus in addition to a small bundle of spinules. The female genitalia have the ovipositor lobes high, narrow and short-setose. The apophyses are short. The ductus bursae expands and becomes more strongly sclerotized from a narrow ostium towards the bursa. The bursa is unsymmetrical, mostly sclerotized, with an oblique anterior band of spines continuing into the large coiled diverticulum.

The life history is unknown.

The species occurs in central and southern Florida. It has been collected from April to August.

Lipocosma adelalis (Kearfott)

PL. 12, FIGS. 19, 20 (McD. 5344).

Symphysa adelalis Kearfott, 1903, *Jour. New York Ent. Soc.*, 11: 145, pl. 9, figs. 11, 20.
Type-locality: Anglesea, New Jersey.

The moth is smaller than *L. sicalis* and is easily distinguished by the virtual absence of fuscous shades on the forewings, by the round, black discocellular dot and by the restricted fuscous areas of the hindwings.

The male genitalia have the uncus short, parallel-sided and distally pointed. The juxta is large, with long, laterally spinose dorsal arms. The vinculum is wide and ventrally bilobed. The valves have the costa thickened, ending in a low triangular process; the sacculus is distinct and triangular; the remainder of the valve is wide, with the terminal margin broadly rounded. The penis is short and stout, with one thick cornutus about three-fourths as long as the aedoeagus and with several much smaller cornuti. The female genitalia have the ovipositor lobes high, narrow and long-setose. The apophyses are curved, the anterior ones longer than the posterior. The ostium is wide, with a narrow, strongly sclerotized rim. The ostial chamber is short, wide and sclerotized, leading into the short, tapering, sclerotized, fluted ductus bursae. The ductus bursae opens into the bursa on the left side of the posterior end; the bursa is lightly sclerotized throughout and rather evenly fluted. The ductus seminalis arises from a membranous diverticulum on the right posterior side of the bursa.

The life history is described by Kearfott in the original description of the species. The larva makes a flat pale-gray case which closely matches the oak-encrusting lichens on which it lives. The moths emerge in July and August.

Most of the known specimens were reared at the type-locality, but R. W. Hodges collected a specimen at Devil's Den State Park, Arkansas, on 24 June 1966. It seems likely that the moth is widely distributed and not uncommon, but that it is rarely attracted to light. Suitable habitats should be searched for larval cases and adults.

Lipocosma intermedialis Barnes and McDunnough

PL. 12, FIG. 23 (McD. 5343).

Lipocosma intermedialis Barnes and McDunnough, 1912, *Contrib. Nat. Hist. Lep. N. Am.*, 1(5): 32, pl. 3, fig. 3.
Type-locality: Kerrville, Texas.

NOTE—This species was described from three female syntypes, all from the same locality. I hereby designate as lectotype the specimen in the USNM labelled, "*Lipocosma intermedialis* B. & McD. Type ♀".

This species resembles *L. adelalis* in size and maculation, but has the distal two-thirds of the forewings suffused with light brownish fuscous. The base is contrastingly cream-colored and meets the fuscous area in an inwardly oblique line. The raised fuscous scaling on the anal margin of the hindwings is considerably more extensive in the present species than in *L. adelalis* and there is a small patch of dark raised scales behind the distal part of the cell of the forewings. There is also a considerable resemblance to *L. septa*. The differences are pointed out in the diagnosis of that species. The length of the forewing is 6 mm.

The male genitalia are unknown. The female genitalia are much as in *L. adelalis*, but the ostium is narrower and lacks the sclerotized band along its lip that is present in *L. adelalis*.

The early stages are unknown.

The species is so far known only from Kerrville, Texas. In addition to the type series I have seen a female collected on 19 June 1908 by F. C. Pratt.

Lipocosma septa Munroe, NEW SPECIES

PL. 12, FIG. 24; PL. F, FIG. 5; PL. K, FIG. 9.

Lipocosma septa Munroe
Type-locality: Punta Gorda, Florida.

DIAGNOSIS: The moth is about the same size as *L. intermedialis* and considerably resembles it in markings, but has the ground color of the forewings uniformly cream colored. The basal area is more restricted and is immediately followed by an inwardly oblique, reddish-brown patch or bar, running from the discal cell to the posterior margin. The discocellular spot is very weak or absent and the black apical spot is more strongly developed.

DESCRIPTION: The frons and vertex are white, the former smoothly scaled, the latter rough. The palpi are whitish buff. The basal scaling of the proboscis is white. The eyes and ocelli are fuscous. The antennae are pale yellowish buff beneath; dorsally they have alternate rows of white and brown scales. Those of the male are slightly thickened and compressed; those of the female are filiform. The thorax above is whitish buff. The abdomen above is dark gray, except at the tip, where it is cream-colored. The thorax beneath and the legs are cream-colored. The abdomen beneath is brownish fuscous, except at the tip, where it is cream-colored.

The forewings are broad, with curved costa, square apex, convex termen, obtuse tornus and curved, sub-basally tufted posterior margin. The ground color above is white, with extensive but inconspicuous creamy-buff patches and bands. The basal area is creamy buff on the basal part, white distally; it is smaller than in *L. intermedialis* and has its distal margin convex, not straight and inwardly oblique as in *L. intermedialis*. Beyond the basal area is an inwardly oblique reddish-brown band, extending from the cell to the posterior margin and tending to be divided along 2nd A. Anteriorly this band is continued as a creamy-buff band, which is angled at the anterior margin of the cell and thence proceeds obliquely basad to the costa. The antemedial line is faint and gray and is situated at the middle of the wing. It runs parallel to the distal margins of the creamy-buff and reddish-brown band just described. The

discocellular dot is absent or hardly indicated, not distinct as in *L. adelalis* and *L. intermedialis*. The postmedial line is far out on the wing, weak, indistinct and grayish buff. It runs obliquely distad from the costa at three-fourths from base to M_1, where it is obtusely angled, then erect to 2nd A, there again obtusely angled, thence oblique basad to the posterior margin. There is a diffuse creamy-buff subterminal band parallel to the postmedial line. There is a black apical spot, more distinct than that of *L. intermedialis*. The fringe is creamy buff.

The hindwings have the termen evenly rounded. The ground color above is white. There is a conspicuous band of broad dark-fuscous scales from beyond the end of the cell to near the anal margin at about its middle. Just basad of this band and adjoining it is a strong subanal tuft of reddish-brown scales. In the resting position these continue the line of the reddish-brown band of the forewing. There is also a line of raised, whitish, spatulate scales behind Cu; this line is continued as a patch of broader, fuscous, raised scales on the fuscous band beyond the cell. The postmedial line is weak, grayish, sinuate and obsolete anteriorly and posteriorly. Beyond it is a weak grayish subterminal band. There is also a weak gray terminal line. The fringe is creamy buff basally, white distally.

The forewings beneath are white. There is an oblique black discocellular bar, preceded by a gray patch in the cell. The anterior part of the postmedial line is visible as an outwardly oblique black bar on the costa. It is followed by a fuscous subterminal shade. The black apical patch of the upperside is repeated and from it a black terminal line extends down the anterior part of the termen, expanding into small black spots at the vein-ends. The fringe is white checkered with buff.

The hindwings beneath are white, sparsely dusted with brown and with a broken brown terminal line.

The male genitalia have the uncus triangular, the dorsal arms of the juxta strongly spinose and the costal sclerotization of the valves without a terminal spine or process. The female genitalia have the posterior apophyses about half as long as the anterior ones. The ductus bursae is sclerotized and fluted and is wider at the ostial end than at the distal end. The bursa is rather small and is minutely spinulose.

The larva makes a case much like that of *Lipocosma adelalis*, but smoother and relatively longer and flatter, with larger flattened expansions at the end. The habits and food of the larva are not indicated on the specimens I have seen, which were reared by F. M. Jones at Punta Gorda, Florida.

TYPES: Holotype: ♂. Punta Gorda, Florida; 13 April; F. M. Jones; genitalia slide 3653 MS. Type no. 11,967, CNC.

Allotype: ♀. Locality and collector as for holotype; genitalia slide 3641 MS. Type no. 11,967, CNC.

Paratypes: 3 ♂♂, 1 ♀. Same locality and collectors as for holotype (1 ♂, 1 ♀). Homestead, Florida; 8 and 14 May 1959; D. O. Wolfenbarger (2 ♂♂). Type no. 11,967, CNC; USNM; CPK.

This species might possibly be confused with *L. diabata*, which occurs sympatrically with it, but that species is yellower and more thinly scaled and has a black dot near the posterior angle of the cell of the forewings instead of the reddish-brown band of the present species.

Lipocosma albibasalis Barnes and McDunnough

PL. 12, FIGS. 21, 22 (McD. 5345).

Lipocosma albibasalis Barnes and McDunnough, 1911, *Jour. New York Ent. Soc.*, **19**: 161. Type-locality: San Diego, California.

The moth is easily distinguished from other species of the genus by the white basal half of the forewings, which meets the blackish-fuscous distal half in an erect sharply contrasting line. It can hardly be confused with anything else.

The male genitalia have the uncus of moderate width and decurved at the apex. The juxta is bifid. The vinculum has the lateral pieces rather wide. The valves are of moderate width and distally rounded; the costal thickening ends in a short pointed process. The penis has a row of six or eight strong, straight, pointed cornuti. The female genitalia have the ovipositor lobes rather large; the apophyses are fine and bent. The ductus bursae is weakly sclerotized and the bursa is finely spinulose.

The early stages are unknown.

The species ranges from Los Angeles and southwestern San Bernardino County to the San Diego region in southwestern California.

Lipocosma polingi Munroe, NEW SPECIES

PL. 11, FIG. 51; PL. F, FIG. 6; PL. K, FIG. 10.

Lipocosma polingi Munroe.
Type-locality: Baboquivari Mountains, Pima County, Arizona.

DIAGNOSIS: This is a fairly small moth (length of forewing 6.5–7 mm). It resembles *Glaphyria fulminalis* in its broad rounded forewings and in its maculation, but it has the base, costa and termen of the forewings whitish, not orange, and it has the antemedial and postmedial lines whitish and more distinct. The broad, spatulate, raised scales of the cubital and anal areas of the hindwings mark it as a *Lipocosma* and not a *Glaphyria*. It might be confused with *Lipocosmodes fuliginosalis*, but that species has the fuscous areas much rougher and more variegated, has the proboscis reduced, the maxillary palpi large and prominent and vein R_2 of the forewings stalked with R_{3+4}.

DESCRIPTION: The frons and vertex are white. The labial palpi are white, with a yellow band on each segment. The maxillary palpi and the basal scaling of the proboscis are white. The eyes and ocelli are fuscous. The antennae are weakly prismatic in the male, filiform in the female. The ventral surface is buff and finely pilose; the dorsal surface is white-scaled. The thorax above is white, with a few fuscous scales. The first two abdominal segments above are similarly colored; the rest are fuscous, with the posterior margins light gray. The body beneath is buff, with the pectus white. The legs are white, the forelegs banded with yellow.

The forewings are broad. The costa is convex, the apex narrowly rounded, the termen convex and oblique, the tornus obtuse and the posterior margin bent sub-basally. The base, the termen and a narrow zone along the costa are whitish buff; the medial and antemedial areas are broadly light fuscous. The antemedial line is narrow but distinct, whitish buff. It is erect or slightly arcuate and coarsely dentate from the costa just basad of the middle to the posterior margin at two-fifths from the base. There are dentations distad in the cell and on the anal fold and basad on Cu and 2nd A. The postmedial line is white. It is broadly

excurved around the cell from the costa at three-fourths from base to Cu_2; thence it is sinuate to the posterior margin at five-sixths from base. There are faint whitish subterminal and terminal lines. The fringe is buff.

The hindwings above are light buff in the anterior half, fuscous with rather broad raised scales in the posterior half. The postmedial line is whitish and weakly sinuated. The fringe is buff in the basal half, white in the distal half.

The wings beneath have the pattern of the upperside weakly repeated, with the postmedial lines margined on the basal side with fuscous.

The male genitalia have the uncus parallel-sided, distally pointed and hooked. The juxta is deeply U-shaped; the dorsal arms are abruptly narrowed and pointed at their ends. The vinculum is ventrally bilobed. The valves are narrow at the base, expanded and rounded distally. The costa is tubularly inflated and sclerotized; the sclerotized zone ends in a sharp, free, subapical spine. The penis is somewhat curved and tapers distally. It has one curved spinelike cornutus about one-fifth of the length of the aedoeagus and a group of several shorter ones. The female genitalia have the ovipositor lobes high, narrow and weakly setose. The posterior apophyses are slender, about $1\frac{1}{2}$ times the length of their crossbar. The anterior apophyses are somewhat longer and are expanded sub-basally. There is an X-shaped sclerite at the ostium. Following this, the ductus bursae is membranous for a short distance, then is sclerotized, fluted, slightly curved and gradually expanded. The whole ductus bursae is about as long as the bursa proper. It opens onto the left posterior corner of the bursa and its sclerotization extends for a short distance onto the bursa. The ductus seminalis arises from a membranous diverticulum on the right posterior corner of the bursa; anterior to this is a zone of moderate striation and longitudinal fluting. There is a zone of numerous fine spines around the middle of the bursa. The spinulation and the proximal sclerotization gradually diminish towards the anterior end of the bursa.

The early stages are unknown.

TYPES: Holotype: ♂. Baboquivari Mountains, Pima County, Arizona; 1–15 Aug. 1923; O. C. Poling; Barnes Collection. USNM.

Allotype: ♀. Data as for holotype. USNM.

Paratypes: 38 specimens. Locality and collector as for holotype; Aug. and Sept. 1923. USNM; type no. 11,966, CNC.

The United States National Museum also has a few specimens from San Benito, Texas, that seem referable to this species, but the pale borders of the forewing are a little narrower and crisper. Perhaps they represent a subspecies, but more material will be needed in order to decide this. I exclude these specimens from the type series.

GENUS *Lipocosmodes* Munroe

Lipocosmodes Munroe, 1964, *Can. Ent.*, **96**: 1296.
Type-species: *Lipocosma fuliginosalis* Fernald, 1888. Monotypy and original designation.

This genus in general resembles *Lipocosma* in maculation and external characters, but differs in having the maxillary palpi large and prominent, in having the proboscis reduced and in having vein R_2 of the forewings stalked with R_{3+4}.

The description and figure of the male genitalia given in my 1964 paper were based on misinterpretation of a badly mounted specimen and should be disregarded. The uncus is narrow and distally hooked; it has an accessory ventral spine just before the apex. The tegumen is high, with wide lateral parts. The juxta is U-shaped, with the dorsal extremities of the arms bent mesad and pointed. The valves have a large basal section, a thick and twisted costal sclerotization ending in a sharp process, and a membranous distal portion, the ventral margin set with specialized setae. The penis is short and cylindrical and is armed with a clawlike cornutus about one-third the length of the aedoeagus, flanked by a diminishing series of several much smaller ones. The female genitalia have the ovipositor lobes broad and soft, with rather sparse long setae and numerous short micropapillae. The apophyses are short and rather stout. The ductus bursae is strongly sclerotized; it has a thornlike process near the ostial end and expands gradually towards the bursa, becoming unsclerotized and heavily spinulose. The bursa is globular and thickly lined with fine spines; the diverticulum leading to the ductus seminalis is spinose basally, membranous distally.

The life history is unknown.

Only one species is known. Although the male genitalia are not as divergent as I supposed when I described the genus, the remaining characters are sufficient to warrant keeping it separate.

Lipocosmodes fuliginosalis (Fernald)

PL. 12, FIGS. 25, 26 (McD. 5342).

Lipocosma fuliginosalis Fernald, 1888, *Ent. Americana*, **4**: 37.
Type-locality: uncertain.

NOTE—This species was based on four syntypes, from Maine, Ontario and Illinois. I hereby designate as lectotype a female in the USNM with labels "37", "*Lipocosma fuliginosalis* TYPE", a Fernald collection label, a plain red label and my own lectotype label. A Saunders [Ontario] syntype is too badly broken to be chosen.

The moths are somewhat variable, but are always small in size, the length of the forewing ranging from 5–6 mm. The forewings are fuscous, the base and costa narrowly whitish, this color sometimes extending to the apical and terminal areas also. The antemedial and postmedial lines are obscure and fuscous. There are areas of raised scales on the discocellular and behind the end of the cell. The hindwings have the anterior part light gray. Posteriorly the wing is largely fuscous, with a pale bar basad of the anal angle, separating medial from postmedial tufts of raised scales.

The genitalia are as described for the genus.

The early stages are unknown.

The species is common from southern Quebec and Ontario to Florida and west to Mississippi, Missouri, Arkansas and probably eastern Texas.

The reduced proboscis and dark color will distinguish it from similar species.

GENUS *Dicymolomia* Zeller

Dicymolomia Zeller, 1872, *Verh. K.-K. Zool.-Bot. Ges. Wien*, **22**: 84.
Type-species: *Dicymolomia decora* Zeller, 1872, now considered a synonym of *Dicymolomia julianalis* (Walker), 1859.

Bifalculina Amsel, 1956, *Boletín Ent. Venezolana*, **10**: 148. NEW SYNONYMY. Type-species: *Bifalculina argentipunctalis* Amsel, 1954; now considered a synonym of *Dicymolomia metalophota* (Hampson), 1897.

The moths of this genus and the related genus *Chalcoela* resemble some nymphuline genera in having a row of metallic spots along the posterior margin of the hindwings. However, the other characters of structure and pattern are very different from those of Nymphulinae and the resemblance is the result of evolutionary convergence. The frons is somewhat flattened and smoothly scaled. The vertex has rough, erect scaling. The labial palpi are prominent, obliquely upturned. They have the scaling of the third segment shorter than that of the first and second, so that the third segment is well marked off and appears cylindrical. The maxillary palpi are prominent and cylindrically scaled. The eyes are large. The ocelli are strongly developed. The proboscis is well developed and scaled at the base. The antennae are prismatic in the male, filiform in the female; ventrally they are finely pilose, dorsally they have alternate scale-rows raised. The body is fairly robust.

The forewings are broad, with somewhat convex costa, rounded apex, rounded and somewhat oblique termen, obtuse tornus and basally curved posterior margin. Veins R_1 and R_2 are separate and arise close together near the anterior angle of the cell. R_{3+4} arises from the anterior angle. R_5 arises from the anterior angle of the cell, M_1 from somewhat behind it. The discocellular is bent near the middle and the posterior part is somewhat oblique. M_2 and M_3 arise near the posterior angle of the cell; their basal parts are somewhat curved and approximated. Cu_1 is not basally approximated to M_3; it arises basad of the posterior angle of the cell; Cu_2 arises still farther basad. 2nd A is well developed. 3rd A is short and free. The hindwings are broadly rounded and have the termen weakly incised at cell M_1. Sc and R_s are anastomosed for a considerable distance. M_1 is free and arises from the anterior angle of the cell. The discocellular is angled in the middle and its posterior part is strongly oblique distad. The cell is about half as long as the wing. M_2 and M_3 arise from the posterior angle of the cell; their basal parts are curved and strongly approximated. Cu_1 arises a little basad of the angle of the cell; it is not basally approximated to M_3. Cu_2 arises farther basad. The maculation of the wings is characteristic. In addition to the terminal spots of the hindwings, already mentioned, substantial area of the wings are irrorated with fuscous on a gray ground. There are strong patches of raised, spatulate, dark-colored scales in the cubital and anal areas of the hindwings.

The male genitalia have the uncus rather short and evenly tapering to a sharp point. The juxta is U-shaped. The ventral part of the vinculum is rather massive. The valves have the costa strengthened and concave, the strengthening ending in an acute prominence. Distad of this the terminal margin is very widely convex, curving gradually into the ventral margin. The penis is cylindrical and of moderate length and has a conspicuous array of strong cornuti. The female genitalia have the ovipositor lobes poorly developed and weakly setose. The apophyses are long, straight and fairly slender. The ductus bursae is short, straight, rather wide and often sclerotized. The bursa is variable in shape and armature. The ductus seminalis usually arises laterally.

The larvae live in a variety of organic habitats; as far as known they are mostly internal feeders; some are at least facultatively carnivorous. They are cylindrical and fairly slender, somewhat tapering anteriorly and posteriorly. The head and thoracic shield are dark.

The pinacula are inconspicuous. The legs and prolegs are well developed; the latter have the crochets arranged in a biordinal penellipse which is almost divided into anterior and posterior transverse rows. The setae are illustrated by Forbes (1923: 536). In the absence of comparative information on related genera it does not seem useful to give a description here.

The genus has several species in North America. One or two of these range into the tropics.

KEY TO NORTH AMERICAN SPECIES

1. Termen of hindwing above with four small black spots associated with a varying amount of lead-colored scaling 3
— Termen of hindwing above with more than four strong black spots associated with prominent leaden scaling 2

2. Extreme termen of hindwing above with four strong black spots alternating with conspicuous leaden areas and with four similar adterminal spots which adjoin the leaden areas ... *metalliferalis* p. 247
— Termen of hindwing above with terminal and adterminal spots not alternating but fused so as to form five conspicuous oval spots alternating with bright leaden areas ..... *opuntialis* p. 247

3. Wings above with gray and fuscous tones only, lacking fulvous shades 4
— Wings above with conspicuous fulvous shades in basal and terminal areas 5

4. Basal area of forewing above rather uniformly pale gray or with diffuse fuscous or rufous suffusion; hindwing above largely pale; southern California ..... *micropunctalis* p. 248
— Basal area of forewing and much of hindwing with conspicuous blackish-fuscous scaling; southern Florida ..... *grisea* p. 247

5. Length of forewing generally over 7 mm; medial area of posterior half of hindwing with extensive blackish-fuscous scaling; penis of male with an elongate row of numerous spinelike cornuti and a distal group of a few larger ones; female genitalia with sclerotized band of bursa less than twice as long as sclerotization of ductus bursae; Canada to Florida and Texas ..... *julianalis* this page
— Length of forewing about 5 mm; medial area of posterior half of hindwing with considerable brown scaling but little or no blackish-fuscous scaling; penis of male with two groups each consisting of few spinelike cornuti; sclerotized band of bursa several times as long as sclerotization of ductus bursae ..... *metalophota* p. 246

Dicymolomia julianalis (Walker)

PL. 12, FIGS. 27–31 (McD. 5347).

Cataclysta? julianalis Walker, 1859, *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum*, **17**: 438.
Type-locality: United States, Doubleday coll.

Dicymolomia decora Zeller, 1872, *Verh. K.-K. Zool.-Bot. Ges. Wien*, **22**: 85, pl. 2, fig. 13a, b, c.
Type-locality: Texas, Boll coll.

The moth has broad wings, the length of the forewing generally ranging from 7–9 mm, though dwarfed specimens may have the length reduced to 5 mm. The forewings have the basal and distal areas mainly reddish brown and the disc milky white, more or less extensively

irrorated with blackish fuscous, giving a bluish cast to the irrorated areas. The hindwings have the area distad of the postmedial line generally reddish brown. Basad of the postmedial line the anterior part of the wing is pale buff, the posterior part is light gray with extensive fuscous scaling, partly forming raised patches and partly in the form of fine irroration.

The male genitalia have a long row of numerous medium-sized, spinelike cornuti and a distal group of a few longer ones. The female genitalia have the ductus bursae fairly short and wide, with an oblong sclerotization. The bursa is largely membranous, but has a weak sclerotized and fluted longitudinal band, less than twice as long as the sclerotization of the ductus bursae.

The larva is pale buff with dark head and thoracic shield. It has been recorded from a variety of foods and habitats, including the heads and stems of cat-tails (*Typha* species), the eggs of bagworms, *Thyridopteryx ephemeraeformis* (Haworth), (several independent records for each of these habitats), dead bolls of cotton (*Gossypium* species), on thistle, *Cirsium lecontei* Torrey and Gray, milk-vetch, *Astragalus canadensis* L. and stems of prickly pears (*Opuntia* species).

The species is fairly common from Nova Scotia and southern Ontario west to Illinois and Arkansas and south to Florida and Brownsville, Texas. It most closely resembles *D. metalophota*, from which it can be distinguished by the characters given in the key. It also somewhat resembles the two species of *Chalcoela*, which occur together with it in some areas, but these can be told by the much better-developed terminal black and metallic spots of the hindwings, as well as by the generic characters.

Dicymolomia metalophota (Hampson)

PL. 12, FIGS. 32, 33.

Ambia metalophota Hampson, 1897, *Trans. Ent. Soc. London*, 1897: 166.
Type-locality: Jamaica.

Lipocosma consortalis Dyar, 1914, *Proc. U.S. Natl. Mus.*, **47**: 259. NEW SYNONYMY and NEW COMBINATION with *Dicymolomia*.
Type-locality: Alhajuelo, Panama.

Bifalculina argentipunctalis Amsel, 1965, *Boletín Ent. Venezolana*, **10**: 149, pl. 89, figs. 11, 12. NEW SYNONYMY and NEW COMBINATION with *Dicymolomia*.
Type-locality: Maracay, Venezuela.

The moth is closely similar to *D. julianalis* but is smaller than normal specimens of that species, the length of the forewing being about 5 mm. The posterior part of the hindwings has extensive brown scaling but little fuscous scaling. The genitalia of both sexes show good differences from *D. julianalis*. In the male the penis has two groups of cornuti each consisting of a few spines, instead of having one group of a few spines and one long row of numerous spines as in *D. julianalis*. In the female the sclerotized band of the bursa is narrow but strong and is several times as long as the sclerotized zone of the ductus bursae.

The species has been reared from pigeon pea, *Cajanus cajan* (L.) Millsp., in Florida.

The species is widely distributed in the West Indies and Central and South America. In our territory it is known only from Florida, where it occurs from Gainesville south to the Keys, according to records given by Kimball (1965). Its occurrence in Texas and other southern states is to be expected, but, as small specimens of *D. julianalis* are common in the South, records should be verified by examination of the genitalia.

Dicymolomia opuntialis Dyar
PL. 12, FIGS. 39–41 (McD. 5348).

Dicymolomia opuntialis Dyar, 1908, *Proc. Ent. Soc. Washington*, **10**: 113.
Type-locality: San Diego, California.

The moth is similar in size and general appearance to *D. julianalis* and to *Chalcoela* species. It is recognizable by the very uniformly bluish-gray-appearing, finely fuscous-irrorated wings, with dark-fulvous basal and distal markings on the forewings. On the hindwings the terminal metallic spots are distinctive: large, fused, black terminal and adterminal spots alternating with shining lead-colored areas.

I have not examined the male genitalia. The female genitalia have the ovipositor lobes rounded and weakly setose. The posterior apophyses are rather long and very slender. The anterior apophyses are about the same length and somewhat thicker; they have a triangular expansion at about one-third from the base. The ductus bursae is short and weakly sclerotized; it bulges on one side at the junction with the bursa. The bursa has a narrow but well-defined fluted sclerite running the whole length of one side and curving around the distal end.

The species has been reared from prickly-pear cactus (*Opuntia* species).

The species ranges from Riverside and Los Angeles to San Diego, California. It appears to be uncommon.

Dicymolomia metalliferalis (Packard)
PL. 12, FIGS. 34–36 (McD. 5349).

Calaclysta [sic] *metalliferalis* Packard, *Ann. Lyceum Nat. Hist. New York*, **10**: 265.
Type-locality: California, Edwards coll.

Dicymolomia sauberi von Hedemann, 1883, *Verh. Vereins für Naturwissenschaftliche Unterhaltung zu Hamburg, Abhang zu Band* **5**.
Type-locality: the cemetery of San Francisco, California.

The moth is readily recognized by the combination of grayish wings, the forewings tinted with dull brown basally and distally, and strong black and lead-colored terminal markings on the hindwings, the black spots arranged in alternating adterminal and terminal rows. The size and depth of coloring of the wings are somewhat variable; the length of the forewing ranges from 7–10 mm.

In the male genitalia the penis is somewhat tapering and sinuate; it has a group of short distal cornuti and a second group of longer ones towards the middle. The female genitalia are much like those of *D. opuntialis*, but have the sclerotized band of the bursa somewhat wider and less strongly fluted.

The early stages are unknown.

The species is common along the Pacific coast from southern Vancouver Island, British Columbia, to the vicinity of San Diego, California.

Dicymolomia grisea Munroe
PL. 12, FIGS. 37, 38.

Dicymolomia grisea Munroe, 1964, *Can. Ent.*, **96**: 1300, figs. 26, 60, 88.
Type-locality: Siesta Key, Sarasota County, Florida.

The moth is small (length of forewing about 5 mm). In general appearance it resembles

D. julianalis and *D. metalophota* but it is immediately distinguishable by being completely devoid of fulvous tones above, the maculation consisting entirely of shades of light and dark gray, except for the inconspicuous black and metallic terminal spots of the hindwings. The male genitalia have the uncus relatively wide and triangular. The penis has two rows of cornuti, one consisting of about half-a-dozen longer spines, the other of about a dozen shorter ones. The female genitalia have the ovipositor lobes weakly developed and sparsely setose, the ductus bursae short, wide, cylindrical and sclerotized, and the bursa saclike and unsclerotized except for a short, weak, linear sclerite on the right side.

The early stages are unknown.

The species is so far known only from the type-locality and from the Archbold Biological Station, but it will probably prove to be more widely distributed in southern Florida.

Dicymolomia micropunctalis Munroe

PL. 12, FIGS. 42–44.

Dicymolomia micropunctalis Munroe, 1964, *Can. Ent.*, **96**: 1300, figs. 25, 59, 87.
Type-locality: Atascadero, California.

This species is of moderate size (length of forewing 7–8 mm). Like *D. grisea* it is mainly gray in color, but the forewing generally has dull-brown shades in the basal and terminal areas. It is much less strongly mottled than *D. grisea* and has the terminal spots of the hindwings very weakly developed. The ranges of these two species are of course widely separate and in California, where it occurs, the present species is likely to be confused only with *D. metalliferalis*. That species is darker, has heavier brown tints and has two rows of alternating black spots separated by strong metallic spots on the termen of the hindwings, instead of the single row of very weak spots found in the present species.

The male genitalia have the uncus tapering, but narrower than in *D. grisea*. The cornuti are almost the same as in that species. The female genitalia have the ductus bursae and bursa membranous except for a small area of rough sclerotized fluting on the bursa.

The life history is unknown.

The species ranges from Santa Clara to San Diego counties in the coastal region of California. Only a few specimens are so far known.

GENUS *Chalcoela* Zeller

Chalcoela Zeller, 1872, *Verh. K.-K. Zool.-Bot. Ges. Wien*, **22**: 82.
Type-species: *Chalcoela aurifera* Zeller, 1872, now considered a synonym of *Chalcoela iphitalis* (Walker), 1859. Monotypy.

The moths are closely similar to those of the genus *Dicymolomia* in general appearance. They differ in having the labial palpi long and porrect, the proboscis greatly reduced or absent and the ocelli absent. The frons is rounded and smoothly scaled. The vertex is short and has rough, erect scaling. The labial palpi are porrect and have the segments cylindrically scaled and well marked off. The maxillary palpi are fairly prominent and are weakly dilated with scales distally. The proboscis is greatly reduced or absent. The eyes are large. The ocelli are absent. The antennae are prismatic in the male, filiform in the female. Their ventral surface is finely pilose; their dorsal surface is scaled, with alternate scale-rows strongly raised. The body is fairly robust. The legs are robust. The praecinctorium is transversely flattened.

The forewings are broad, with weakly convex costa, blunt apex, convex termen, obtuse tornus and basally convex posterior margin. Veins R_1 and R_2 arise separately from the cell basad of the anterior angle. R_{3+4} arises from the anterior angle; R_5 and M_1 arise slightly behind the angle. The discocellular is concave distad. M_2 and M_3 arise from the posterior angle of the cell. Their basal parts are weakly approximated. Cu_1 arises a little basad of the posterior angle. It is not approximated in its basal part to M_3. Cu_2 arises considerably basad of Cu_1.

The hindwings are broadly rounded. The termen is weakly excised at the median fold and has a prominent row of black and metallic spots behind the excision. Sc and R_s are anastomosed for some distance. M_1 is free and arises from the anterior angle of the cell. The cell is a little more than half the length of the wing. The discocellular vein is angled in the middle and its posterior part is fairly strongly oblique distad. M_2, M_3 and Cu_1 arise at or near the posterior angle of the cell. Their basal parts are strongly curved and approximated. Cu_2 arises from about the middle of the posterior margin of the cell. The cubital and anal areas above have a thick vestiture of spatulate scales.

The male genitalia have the uncus small and spikelike. The tegumen is broad and strongly sclerotized. The juxta is developed into a ringlike anellus. The vinculum has the lateral parts strongly expanded. The valves are small, with a wide, strongly curved, somewhat cup-like costal sclerotization. The penis is slender and lacks cornuti. The female genitalia have the ovipositor lobes short and moderately high, weakly setose. The apophyses are fairly long and moderately slender. The seventh sternite is sclerotized and posteriorly narrowed, and the ostium is flanked by a pair of irregular sclerites. The ductus bursae is narrow and the bursa is small, oval and membranous.

The larvae are whitish and grublike and live in the nests of various species of papermaking wasps, especially *Polistes* species, feeding on the larvae.

There are two species in North America.

KEY TO NORTH AMERICAN SPECIES

1. Forewing above with antemedial line convex distad, the fulvous basal area widely separated on costa from the fulvous apical area; tornal area fulvous, the part of the postmedial line that bounds it evenly curved ... *pegasalis* p. 250

— Forewing above with antemedial line oblique basad, the fulvous basal area generally united along costa with the fulvous apical area; tornal area bluish gray in appearance like the disc, with at most a few fulvous scales; the part of the postmedial line that limits it dentate ..... *iphitalis* this page

Chalcoela iphitalis (Walker)

PL. 12, FIGS. 45, 46 (McD. 5346).

Cataclysta iphitalis Walker, 1859, *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum*, **17**: 444.
Type-locality: "South Africa".

Chalcoela aurifera Zeller, 1872, *Verh. K.-K. Zool.-Bot. Ges. Wien*, **22**: 83, pl. 2, fig. 12a, b.
Type-locality: Texas, Belfrage coll.

The characters given in the key are sufficient to distinguish this species from *C. pegasalis*. In

general the fulvous areas are lighter and brighter in the present species, but this does not always hold.

The genitalia are much as in the *C. pegasalis*, but in the male the costal sclerotization of the valve is relatively longer and not as strongly curved.

The larvae have been recorded from the nests of *Polistes* species and *Mischocyttarus* species. A number of specific records are given by Rau (1941).

The species is common and widespread in the western half of the continent. It ranges from British Columbia to California and eastward to Michigan and southern Ontario in the north and to Texas in the south. It also extends through Mexico and into Guatemala. Druce (1895) and Grossbeck (1917) recorded the species from Florida, but I have not seen authentic specimens.

Chalcoela pegasalis (Walker), NEW COMBINATION

PL. 12, FIGS. 47, 48 (McD. 5350).

Cataclysta? pegasalis Walker, 1859, *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum*, **17**: 438.
Type-locality: Jamaica.

Cataclysta principalis Walker, 1865, *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum*, **34**: 1333. NEW COMBINATION with *Chalcoela*.
Type-locality: North America, Carter coll.

NOTE—This nominal species was described from two syntypes, one from North America, the other from Jamaica. I select the former as lectotype. The lectotype is in the BMNH.

Cataclysta egressalis Walker, 1865, *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum*, **34**: 1335. NEW COMBINATION with *Chalcoela*.
Type-locality: Jamaica.

Cataclysta robinsonii Grote, 1871, *Can. Ent.*, **3**: 181. NEW COMBINATION with *Chalcoela*.
Type-locality: Demopolis, Alabama.

Chalcoela discedalis Möschler, 1890, *Abhandl. Senckenb. Naturforsch. Ges.*, **16**: 320. NEW SYNONYMY.
Type-locality: Puerto Rico.

The moth is closely similar to *C. iphitalis* in appearance and structure. The forewings above normally have the brown areas dark; the tornal area as well as the apex and base is brown. The postmedial line is more distinct than in *C. iphitalis* and its posterior part, opposite the tornal brown patch, is evenly curved, not dentate as in *C. iphitalis*. The antemedial line and the distal edge of the brown basal area are evenly convex distad, not oblique basad as in *C. iphitalis*.

The genitalia are much like those of *C. iphitalis*, but in the male the costal sclerotization of the valves is shorter and more strongly curved and the saccus is longer.

The early stages have been discussed by Rau (1941). The larva, like that of *C. iphitalis*, lives in the nests of *Polistes* wasps, where it doubtless feeds on the young.

The species ranges from southern Ontario to Illinois and Missouri, and south to Florida and eastern Texas. It is also widespread in the West Indies. It is surprising that the species has generally been placed in *Dicymolomia*, for, as Harry K. Clench (*in litt.*) pointed out to me years ago, the characters are in all respects clearly those of *Chalcoela*. I can see no reason for separating the Puerto Rican *C. discedalis* from other populations, though a study of the species based on good material from different parts of the range has yet to be made.

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Many more individuals deserve to be listed by name. More detailed acknowledgements will be found in the introductory pages to Fascicle 13.1, when these appear. Meanwhile a general expression of appreciation must suffice, because of limitations of space, not of my own gratitude.

[1]To appear in Fascicle 13.1C

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