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Migration of Day-flying Moths Through Portachuelo Pass,
Rancho Grande, North-central Venezuela.¹

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(Plate I).

[This is one of a series of papers resulting from the 45th, 46th and 47th Expeditions of the Department of Tropical Research of the New York Zoological Society, made during 1945, 1946 and 1948, under the direction of Dr. William Beebe, with headquarters at Rancho Grande in the National Park of Aragua, Venezuela. The expeditions were made possible through the generous cooperation of the National Government of Venezuela and of the Creole Petroleum Corporation.]

[The characteristics of the research area are in brief as follows: Rancho Grande is located in north-central Venezuela (10° 21' N. Lat., 67° 41' W. Long.), 80 kilometers west of Caracas, at an elevation of 1,100 meters in the undisturbed montane rain forest which covers this part of the Caribbean range of the Andes. The migration flyway of Portachuelo Pass, which is also the water-shed between the Caribbean and Lake Valencia, is 200 meters from Rancho Grande. Adjacent ecological zones include seasonal forest, savanna, thorn woodland, cactus scrub, the fresh-water lake of Valencia and various marine littoral zones. The Rancho Grande area is generally subtropical, being uniformly cool and damp throughout the year because of the prevalence of the mountain cloudcap. The dry season extends from January into April. The average humidity during the expeditions, including parts of both wet and dry seasons, was 92.4%; the average temperature during the same period was 18° C.; the average rainfall over a five-year period was 174 cm. The flora is marked by an abundance of mosses, ferns and epiphytes of many kinds, as well as a few gigantic trees. For further details see Beebe & Crane, *Zoologica*, Vol. 32, No. 5, 1947. Unless otherwise stated, the specimens discussed in the present paper were taken in the montane cloud forest zone, within a radius of one kilometer of Rancho Grande.]

[For an account of Portachuelo Pass, together with a general introduction to the groups of migrating insects and migrating factors, see "Insect Migration at Rancho Grande," by William Beebe, *Zoologica*, 1949, Vol. 34, No. 12, pp. 107-110. Papers dealing with specific groups are as follows: Papilionidae (Vol. 34, No. 14, pp. 119-126); Danaidae, Ithomiidae, Acraeidae and Heliconidae (Vol. 35, No. 3, pp. 57-68); Pieridae (Vol. 35, No. 16, pp. 189-196); Nymphalidae, Brassolididae, Morphidae, Libytheidae, Satyridae, Riodinidae, Lycaenidae and Hesperidae (Vol. 36, No. 1, pp. 1-16).]

MIGRATION OF DAY-FLYING MOTHS.

In our early activities at Portachuelo Pass we thought of this mass emigration, from north to south, as essentially one of butterflies. From the first day onward, however, we saw and captured moths, passing in full sunshine. Thus began our record of diurnal moths. Towards dark these, like the butterflies, would disappear, their place gradually being taken by hosts of nocturnal moths, flying south through the night. These took the same route as the diurnal insects, but thousands upon thousands were deflected to our electric lights on the roof of Rancho Grande, some hundred yards to the east of the southern slope of the pass.

On July 21, 1948, I wrote that "day-flying moths appeared at 7.30 A.M. Today they had everything against them. The first few dozen, of several species, formed an irregular line in midair, then were scattered by the wind. Little by little, hundreds came up the valley, fluttering slowly but steadily until they reached the first gusts. One group after another was forced back. Many took shelter under or on leaves but soon took to wing again. None seemed to give up. Behind them, down the valley, was sun and only a slight breeze; far ahead were the same conditions down the southern slope. In the narrow pass neblina was forming, swirling and vanishing and the cool wind never ceased. A bush would be covered with one or two hundred of a dozen or more species. Then they would start again. Those which succeeded in surmounting the pass formed a narrow, scattered line, which could be seen well down the valley, all still headed swiftly for some unknown goal. In number of individuals laying eggs on capture, these moths equalled the butterflies. After dark not one joined the often congeneric hosts which fluttered about the electric lights."

This quotation could well apply to many other days of migration.

The efficiency of mimicry, in pattern, color and flight, at least to human eyes, was daily manifest. We constantly confused *Pericopis* with ithomiid *Tithorea* and *Melinaea*; *Pseudomennis*, *Polypaetes* and *Coreura* masqueraded, to our vision, as riodinid *Mesene*,

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Baeotis and *Lymnas*. *Eudolophasia* appeared at times indistinguishable from the nymphalid *Phyciodes*.

We caught species after species of Eucheromidae under the illusion that we were taking Diptera, Coleoptera or Hymenoptera.

Looking at the collection of day-flying moths as a whole we are struck with their relatively small size and the fact that almost all are clad in distinct, contrasting pattern and colors, and not the subdued hues which, for the most part, characterize small nocturnal species.

For ease of reference and other reasons it has seemed better in the present paper to arrange the sequence of families in the Macrolepidoptera and again in the Microlepidoptera in alphabetical order, and the same applies to the genera in each family.

The day-flying moths which we took number 20 families and 126 species. As in former papers dealing with this migration, I must re-emphasize the exceedingly small number, taken or observed, of these moths, compared with the myriads which eluded our utmost efforts, or which must have passed quite unseen.

The senior author is responsible for the field data and notes, the junior author for the taxonomic identifications. For additional help in this naming we express our gratitude to Doctors William D. Field, John G. F. Franclemont, Hahn W. Capps and J. F. Gates Clarke of the United States National Museum, and to Dr. D. S. Fletcher of the British Museum of Natural History.

NOTE: Under "Record," the first figure in parentheses refers to the number of specimens taken, and the figures following the comma are the catalog number or numbers.

MACROLEPIDOPTERA.

ARCTIIDAE.

Selemnina sp. nov., near *alpha* (Druce).

Species Range: Panama and Costa Rica.

Field Characters: This species is impossible to distinguish on the wing from many wasplike eucheromids.

Number: Total and taken, 1.

Date: July 21.

Record: 1948—July 21 (1,481296).

Calidota gigas (Dogn.).

Species Range: Panama, Ecuador and Peru.

Field Characters: This large, dark arctiid was taken only once, but five others passed at the same time. Wing span three inches.

Number: Total, 6. Taken, 1.

Record: 1948—May 26 (1 taken, 48632; 5 seen).

Utetheisa o. ornatatrix (Linn.).

Species Range: Kansas, West Indies, to southern South America.

Subspecies Range: Same, but not West Indies.

Field Characters: Seen now and then in small or large flocks. 385 counted on July 13, fluttering slowly through the pass, almost a pure culture. At other times seen with other small moths. Like our northeastern species but much paler, with white replacing scarlet on hind wings.

Number: Total, 413. Taken, 6.

Date: June 26 to July 21.

Record: 1948—June 26 (2,48977; 10 seen); July 13 (2,481155; 385 seen), 21 (2 taken; 12 seen).

DIOPTIDAE.

Brachyglene caenea (Drury),
form *dilatata* Hering.

Species Range: Mexico, Venezuela and Brazil.

Form Range: Valencia, Venezuela.

Field Characters: Only once were these moths seen in numbers, on May 25.

Number: Total, many. Taken, 3.

Date: May 25 to July 13.

Record: 1948—May 25 (1 taken from flocks); July 8 (1), 13 (1).

Brachyglene subtilis (Felder).

Species Range: Colombia.

Field Characters: On June 7 these moths appeared at 8 A.M. and came through the pass faster and faster, until at least five thousand had passed.

Number: Total, 5,000 plus. Taken, 6.

Date: April 29 to August 7.

Record: 1946—June 7 (3,46544, several thousand passed); August 1 (1 taken; 294 on leaves and flying), 7 (1,461161, several thousand passed). 1948—April 29 (1,48430; 3 seen).

Josia aurifusa Walker.

Species Range: Panama, Colombia, Venezuela and Brazil.

Field Characters: This species is fairly close to *ligata*, but was never taken on the same days. When flying close at hand it was clearly distinguishable.

Number: Total, 409. Taken, 22.

Date: April 29 to July 26.

Record: 1948—April 29 (1,48430); May 23 (1), 26 (1 taken, 13 seen), 29 (55 seen); June 6 (2; 28 seen); July 2 (2; 114 seen), 3 (1; 33 seen), 13 (1; 9 seen), 16 (1; 6 seen), 17 (1,48825; 23 seen), 20 (5 taken), 21 (5 taken; 106 seen), 26 (1 taken).

Josia flavissima (Walker).

Species Range: Colombia, Venezuela and Ecuador.

Field Characters: In flight close to the geometrid *Atyriodes jalapae* but much yellower, and larger in size. No large flocks, and often singly with other insects.

Number: Total, 253. Taken, 39.

Date: April 12 to August 2.

Record: 1948—April 12 (1,48367), 27 (1,48419A; 7 seen), 30 (1; 20 seen); May 21

(1), 23 (1), 25 (3; many found), 26 (2), 29 (3); June 6 (2), 15 (1), 18 (1; 17 seen), 21 (1; 2 seen), 23 (1; 11 seen); July 2 (1; 24 seen), 3 (3; 6 seen), 4 (1; 27 seen), 6 (3; 72 seen), 8 (1; 18 seen), 20 (3), 21 (7; 20 seen), 26 (1); August 2 (1).

***Josia ligata* Walker.**

Species Range: Guatemala, Colombia, Ecuador and Guiana.

Field Characters: Less abundant than *aurifusa* and in smaller flocks.

Number: Total, 71. Taken, 8.

Date: April 15 to July 21.

Record: 1948—April 15 (1, 48368; 33 seen); May 1 (1); July 4 (1; 30 seen), 15 (2), 16 (1), 20 (1), 21 (1).

***Phanoptis fatidica* (Dogn.).**

Species Range: Venezuela to Peru.

Field Characters: To be confused only with the euechroid, *Coreura interposita*, but when flocks did appear they seemed pure cultures of the respective species.

Number: Total, 420 plus. Taken, 16.

Date: April 13 to July 23.

Record: 1948—April 13 (2,48364; 41 in flight), 23 (1,48364A; 33 fighting up-wind); May 1 (1,481467); July 5 (1,481069; 48 seen), 6 (2; 54 seen), 9 (1; 22 seen), 13 (4; 100 plus seen), 17 (2 taken, 15th kilometer), 22 (90 seen), 23 (1; 16 seen).

***Polypoetes* spp.**

The geometrid genus *Polypoetes*, or Pearly Undersides, comprises a generous number of migrants. These moths are small, rather nondescript, black or dark brown, usually with a small orange or white dot near the tip of each forewing, and a greater or less amount of central white on the hindwing. This is often pearly blue on the underside and forms an easy field mark of identification in flight.

Owing to the present confused state of the systematics of this genus, we have indicated the ten species only by Roman numerals. In many cases when we caught a single specimen, others were seen passing in rather compact flocks. We could recognize the genus in flight but only rarely individual species. Hence the numbers "seen" are placed only provisionally with the individuals captured at the same day and place.

***Polypoetes*, species I.**

Number: Total, 51. Taken, 8.

Date: April 28 to July 15.

Record: 1948—April 28 (2,48428; 43 seen), 29 (1,481471); May 24 (1), 26 (1 taken); June 17 (1); July 8 (1,481119H), 15 (1).

***Polypoetes*, species II.**

Number: Total, 59. Taken, 15.

Record: 1946—May 21 (1,461519). 1948—May 26 (3); June 6 (4), 17 (1); July 4 (1 taken; 44 seen); August 2 (2), 8 (3,481119D,G, and I).

***Polypoetes*, species III.**

Number: Total, 9. Taken, 3.

Date: May 29 to June 24.

Record: 1948—May 29 (2); June 18 (1,48835; 6 seen).

***Polypoetes*, species IV.**

Number: Total and taken, 1.

Record: 1948—May 2 (1).

***Polypoetes*, species V.**

Number: Total, 70. Taken, 2.

Record: 1948—May 25 (1); June 28 (1 taken; 68 seen).

***Polypoetes*, species VI.**

Number: Total, 42. Taken, 18.

Date: April 30 to July 21.

Record: 1948—April 30 (1,48470); May 1 (2), 25 (2), 26 (1), 29 (2); June 6 (1), 22 (1,48882); July 3 (2), 9 (1 taken; 18 seen), 14 (1 taken; 6 seen), 15 (1), 16 (1), 20 (1), 22 (1).

***Polypoetes*, species VII.**

Number: Total, 7. Taken, 1.

Record: 1948—July 21 (1 taken; 6 seen).

***Polypoetes*, species VIII.**

Number: Total, 26. Taken 4.

Date: May 8 to July 2.

Record: 1948—May 8 (1), 25 (1), 29 (1); July 2 (1 taken; 22 seen).

***Polypoetes*, species IX.**

Number: Total and taken, 3.

Date: May 29 to July 2.

Record: 1948—May 29 (1); June 6 (1); July 2 (1).

***Polypoetes*, species X.**

Number: Total and taken, 1.

Record: 1948—May 1 (1,48478).

***Zunacetha annulata* (Guérin).**

Species Range: Mexico to Colombia, Venezuela and Guiana.

Field Characters: Flocks were seen on several occasions, easily told from other moths by color and extremely slow, fluttering flight.

Number: Total, 3,000 plus. Taken, 18.

Date: July 3 to 21.

Record: 1948—July 3 (1,481026; 12 seen), 8 (2,481119H,N), 13 (3,481154; 250 plus seen), 15 (5; many seen), 16 (4; many seen), 20 (1; several hundred seen), 21 (2; many seen).

EPIPLEMIDAE.

***Nedusia mutilaria cuticulata* Guenée.**

Species Range: Venezuela, Guianas, south Brazil.

Subspecies Range: Venezuela and Surinam.

Field Characters: Represented by a single individual; small, white, and very badly torn.

Number: Total and taken, 1.

Record: 1948—July (1,481098).

ETHMIIDAE.

Ethmia exornata Zeller.

Species Range: West Indies, Cuba and northern South America.

Field Characters: A sudden wave of these little dotted and banded moths filled the pass on May 24, resting on leaves or fluttering southward against a cool wind.

Number: Total, 301. Taken, 1.

Record: 1948—May 24 (1,48620; 300 plus counted).

EUCHROMIDAE.

Agunaix lacrumans Schaus.

Species Range: Colombia, Peru and Bolivia.

Field Characters: Look and fly exactly like small, black-winged Diptera which were also migrating but in very few numbers. Five times I mistook the flies for moths, but the former were usually flying singly, and the moths were low and slow.

Number: Total, 625. Taken, 11.

Date: May 29 to July 21.

Record: 1948—May 29 (1); June 6 (1), 18 (1,48836; 326 seen); July 3 (2,481033; 29 seen), 21 (6 taken; 259 seen).

Amycles tenebrosa Roth.

Species Range: Venezuela.

Field Characters: Taken twice with flies in same net, but the disparity in numbers and flocking makes our sight records fairly accurate.

Number: Total, 30. Taken, 3.

Date: June 22 and July 16.

Record: 1948—June 22 (1,48885); July 16 (2,481224; 27 seen).

Calonotus triplagus Hmps.

Species Range: Amazons.

Number: Total and taken, 1.

Record: 1948—June 9 (1,48777).

Ceramidia zerny Forster.

Species Range: Venezuela.

Field Characters: Resembling fair-sized, black-winged Diptera, but easily told from the smaller species.

Number: Total, 312. Taken, 15.

Date: April 29 to July 22.

Record: 1948—April 29 (1,48465; 18 seen), 30 (1,48466; 11 seen); May 9 (2), 29 (1); June 6 (1); July 2 (1,481010; 6 seen), 16 (1,481224A; 8 seen), 21 (1,481299; 244 seen), 22 (6,481500; 10 seen).

Coreura interposita Hmps.

Species Range: Venezuela.

Field Characters: Not a flocking species.

Five specimens had the pale forewing band colored yellow instead of white.

Number: Total, 60. Taken, 15.

Date: April 29 to July 20.

Record: 1948—April 29 (2,481470), 30 (1,48464); May 1 (2,481528, 481531), 21 (2,48365, 481532), 24 (2,48582; 38 seen), 29 (2,481533, 481536); June 5 (1,481535), 6 (1,48718), 24 (1; 7 seen); July 20 (1).

Correbia lycoides (Walker).

Species Range: Mexico to Paraguay, including Cuba, Jamaica and Puerto Rico.

Number: Total and taken, 1.

Record: 1948—April 12 (1).

Correbia rufescens Roth.

Species Range: Venezuela and Colombia.

Field Characters: Unmistakable from its resemblance to a lycid beetle.

Number: Total, 37. Taken, 2.

Date: July 7 and September 8.

Record: 1946—July 7 (1,461108); September 8 (1; 35 seen).

Cosmosoma telephus (Walker).

Species Range: Colombia to Argentina.

Number: Total and taken, 1.

Record: 1948—May 20 (1,48528).

Cosmosoma t. teuthras (Walker).

Species Range: Mexico to Argentina.

Number: Total and taken, 2.

Date: June 6 and July 15.

Record: 1948—June 6 (1,48715); July 15 (1,481182).

Cosmosoma, sp. nov.

Field Characters: Large Amber-winged euechromid.

Record: 1948—July 9 (1,481131).

Ctenuchia cyaniris Hmps.

Species Range: Venezuela and Ecuador.

Number: Total and taken, 1.

Record: 1948—May 8 (1).

Cyanopepla agyrtidia Hmps.

Species Range: Peru and Bolivia.

Number: Total and taken, 3.

Date: May 26 to July 21.

Record: 1946—June 6 (1,461517). 1948—May 26 (1); July 21 (1).

Cyanopepla alonzo (Butler).

Species Range: Venezuela, Colombia, Ecuador, Peru and Bolivia.

Field Characters: One of the most brilliant of the euechromids—pink, scarlet, iridescent green and blue; very conspicuous on wing.

Number: Total and taken, 8.

Date: April 26 to July 21.

Record: 1948—April 26 (1), 29 (1,481-472); May 6 (1); July 15 (1), 16 (1), 21 (3,481293, 481294, 481295).

Cyanopepla micans (H.-S.).

Species Range: Colombia and Venezuela.

Number: Total and taken, 4.

Date: May 2 to July 16.

Record: 1948—May 2 (1,48481), 9 (1), 29 (1,481527); July 16 (1,481226).

Delphyre titilla (Dogn.).

Species Range: Colombia, Ecuador and Peru.

Field Characters: On July 18 there passed around me a flurry of these little moths. We counted 198.

Number: Total, 201. Taken, 3.

Date: May 29 and July 18.

Record: 1946—May 29 (1); July 18 (2,46784; 198 seen).

Euagra cerymica Druce.

Species Range: Ecuador and Paraguay.

Field Characters: On May 26 we counted 31 and must have missed many more.

Number: Total, 35. Taken, 4.

Date: May 26 to July 16.

Record: 1948—May 26 (1,48624; 31 seen); July 15 (2), 16 (1,481225).

Eucereum cimonis Schaus.

Species Range: Costa Rica, Venezuela and Ecuador.

Number: Total and taken, 1.

Record: 1948—July 23 (1,481506).

Eucereum costulatum H.-S.

Species Range: Panama and Venezuela.

Number: Total and taken, 1.

Record: 1948—May 29 (1).

Eupyra distincta Roth.

Species Range: Venezuela.

Field Characters: These many-spotted black moths were easily distinguished from the smaller, banded *Syntomeida melanthus*.

Number: Total, 24. Taken, 7.

Date: April 30 to July 21.

Record: 1948—April 30 (1,48467); July 15 (1,481181), 16 (3,481223; 17 seen), 21 (2,481501).

Gymnelia bricenoi (Roth.).

Species Range: Venezuela.

Field Characters: Bee-like, flight direct, and identifiable except against bright sky.

Number: Total, 65. Taken, 4.

Date: July 2 to July 13.

Record: 1948—July 2 (1,481009), 4 (1 taken; 39 seen), 13 (1 taken; 22 seen), 16 (1,481226).

Gymnelia flavitarsa (Walker).

Species Range: Colombia, Venezuela and Brazil.

Field Characters: These amber-winged bee mimics, flew straight and swift, usually one at a time, day after day through the pass. Hundreds more too high to be sure of the

species, but great numbers certainly took part in this mass migration. On July 18 eight came through, in single file, so that if within reach, a single sweep of the net would have captured all.

Number: Total, 66 counted, 100's seen. Taken, 6.

Date: July 8 to 18 taken, but seen throughout month.

Record: 1948—July 2 (1,481010), 8 (1; 16 seen), 9 (1,481131; 36 seen), 10 (1 taken; many seen), 11 (1 taken; hundreds seen), 18 (1 taken; 8, plus many more, seen).

Homoeocera sp.

Field Characters: The bright orange body bands were distinct even in flight.

Number: Total, 25. Taken, 2.

Date: April 26 and July 5.

Record: 1948—April 26 (1 taken); July 5 (1,481066; 23 seen).

Horama panthalon (Fabr.).

Species Range: Haiti and Venezuela.

Number: Total and taken, 1.

Record: 1948—July 28 (1,481429).

Macrocneme caerulea Dogn.

Species Range: Venezuela.

Number: Total and taken, 1.

Record: 1948—July 21 (1,481290).

Macrocneme vittata (Walker).

Species Range: Venezuela to north Brazil.

Number: Total and taken, 1.

Record: 1948—July 20 (1).

Macrocneme yeppei Forster.

Species Range: Venezuela.

Number: Total and taken, 3.

Record: 1948—July 20 (3).

Macrocneme sp. nov.

Field Characters: Both specimens were taken on ginger blossoms in the pass. Twenty-two others, very probably of this species, were flying around in rather a dense gathering, slowly headed south.

Number: Total, 24. Taken, 2.

Record: 1948—July 20 (2,481265, 481266; 22 seen).

Mesothen sp. nov.

Field Characters: Mimicking small, black-winged dipteran.

Number: Total and taken, 1.

Record: 1948—July 15 (1,481183).

Napata alterata (Walker).

Species Range: Venezuela, Brazil, Ecuador and Peru.

Number: Total and taken, 2.

Date: June 24 and July 8.

Record: 1948—July 24 (1,481522); July 8 (1,481119M).

***Napata leucotelus* Butler.**

Species Range: Mexico to Surinam—not reported from Colombia.

Field Characters: The white body band showed even in flight.

Number: Total, 27. Taken, 7.

Date: May 21 to July 21.

Record: 1948—May 21 (1,48540), 29 (2,48662); July 2 (1,481012; 4 seen), 21 (3,481301, 481302, 481303; 16 seen).

***Poliopastea viridis* (Druce).**

Species Range: Ecuador.

Field Characters: A black fly mimic. The one flock was dense, flying low and slow.

Number: Total, 54. Taken, 2.

Date: July 12 and August 13.

Record: 1946—August 13 (1 taken). 1948—July 12 (1,481152; 52 seen).

***Pseudosphex ichneumoneus* H.-S., ab. *crabronis*.**

Species Range: Central America to Argentina.

Field Characters: This is the most perfect wasp mimic taken on migration. It was caught in one sweep of the net together with a brown wasp (481037) from which it was indistinguishable on the wing. The two were pinned and catalogued together as Hymenoptera, and only later was it recognized as a euechroid. The two were flying with other small insects.

Record: 1948—July 3 (1 taken, 481038).

***Syntomeida melanthus* (Cr.).**

Species Range: Mexico to Uruguay and Peru.

Field Characters: The banded wings set this species apart, especially when it rested on leaves.

Number: Total, 328. Taken, 18.

Date: April 27 to July 22.

Record: 1948—April 27 (1); May 29 (1; 4 seen); June 6 (1, 48717), 24 (1,48900; 11 seen), 27 (1,48968; 8 seen), 28 (5,48968A; 262 seen); July 2 (1,481011; 25 seen), 16 (2,481225), 17 (1,481238), 20 (2,481291), 21 (1,481292), 22 (1,481300).

***Syntrichura reba* Druce.**

Species Range: Panama, Colombia, Venezuela, Guiana and Brazil.

Field Characters: Closely resembles a small wasp. On June 17, 30 or more were gathered in a group on a shrub, before they flew off south.

Number: Total, 32. Taken, 2.

Date: June 6 and June 17.

Record: 1948—June 6 (1,48714), 17 (1,48827; 30 seen).

***Trichura esmeralda completa* Draudt.**

Species Range: Honduras, Guatemala, Colombia, Venezuela and Brazil.

Subspecies Range: Colombia.

Number: Total and taken, 1.

Record: 1948—June 6 (1,48743).

GEOMETRIDAE.***Anemplocia i. imparata* Walker.**

Species Range: Colombia, Venezuela, Peru and Bolivia.

Subspecies Range: Colombia and Venezuela.

Number: Total, 2. Taken, 2.

Date: May 1 and 29.

Record: 1948—May 1 (1,48477), 29 (1,481537).

***Atyriodes jalapae* Schaus.**

Species Range: Mexico.

Field Characters: It was easy to record the presence and relative numbers of this brilliantly patterned geometrid. They came singly, or in small or very large flurries. About 2,000 were counted and it is certain many times that number were missed.

Number: Total, 2,004. Taken, 27.

Date: April 17 to September 8.

Record: 1946—September 7 (1,461157; 1,200 counted), 8 (1,461182; 250 plus counted, 22 singly). 1948—April 17 (1,48373; 13 seen), 27 (1,48419), 29 (1,481466); May 21 (2), 23 (1), 25 (3); June 15 (1), 17 (1), 18 (2; 400 plus seen, dense flocks, pure culture), 19 (1; 6 seen), 22 (1; 3 seen), 23 (1; 18 tried to pass but were beaten back by cold wind); July 6 (1), 8 (1), 15 (1), 16 (1; 12 seen), 17 (1,481502; 30th kilometer), 19 (1,381503; 15th kilometer), 20 (1; 75 seen), 23 (2,481504, 481505).

***Bronchelia puellaria* Guenée.**

Species Range: Brazil, Paraguay and Argentina.

Field Characters: Close to *Thyrintina arnobia*, but even a glance showed the dusky wing-tip.

Number: Total, several hundred. Taken, 1.

Date: March 15.

Record: 1948—March 15 (1,481325; several hundred migrating).

***Eratina hermaea* Druce.**

Species Range: Venezuela, Colombia, Ecuador, Peru and Bolivia.

Field Characters: Small gray and white moths superficially like the diopiid *Polybetes*. All taken and seen were ragged and worn.

Number: Total, about 40. Taken, 5.

Date: May 29 to June 6.

Record: 1946—May 29 (1,46666); June 6 (1,461521). 1948—June 6 (3 taken, several dozen drifting past).

***Eudolophasia invaria* Walker.**

Species Range: Central America to Venezuela.

Field Characters: The general orange color is visible on flight and at a considerable distance. On several days the steady stream precluded accurate counting.

Number: Total, 167. Taken, 18.

Date: May 23 to September 8.

Record: 1946—July 18 (1,46785; 60 seen); September 5 (6,461133), 8 (1,461183; steady stream of migrants). 1948—May 23 (1,48579); June 16 (1; 4 seen), 17 (2,48823; 46 seen), 18 (2); July 2 (2; 14 seen), 3 (1), 4 (1; 25 seen).

***Eudule cupraria* Walker.**

Species Range: Colorado and Arizona south to Venezuela.

Number: Total and taken, 3.

Date: July 16 to 20.

Record: 1948—July 16 (1), 17 (1), 20 (1,481558).

***Eudule lobula* Hübner.**

Species Range: Colombia, Venezuela, Ecuador, Brazil and Argentina.

Number: Total and taken, 3.

Date: May 21 to June 15.

Record: 1948—May 21 (2,48565); June 15 (1).

***Eupithecia purpureoviridis* Warren.**

Species Range: The type was from Ecuador.

Record: 1948—July 15 (1,481189). This is the second known specimen.

***Heterusia atalantata* Guenée.**

Species Range: Central America, Colombia and Brazil.

Field Characters: Rarely taken or seen, except on July 18 when hundreds flew in a scattered swarm up to and through the pass. The only similar-appearing moth was the pericopid *Crocomela intensa*, one of which was taken on this date.

Number: Total, 519. Taken, 13.

Date: May 21 to July 18.

Record: 1946—May 21 (2); July 18 (6,46787; 500 plus seen). 1948—June 17 (1,48824); July 3 (1,481041; 6 seen), 8 (1), 15 (2).

***Heterusia hippomenata* Snellen.**

Species Range: Colombia and Venezuela.

Record: 1948—May 26 (1,481523).

***Melanchroia chephise* (Stoll).**

Species Range: Florida and the West Indies to Central America and Paraguay.

Field Characters: No other small, dusky moths were flying on the days when counts were made, so identification is reasonably certain.

Number: Total, 84. Taken, 11.

Date: May 26 to July 22.

Record: 1946—June 8 (1,46553). 1948—May 26 (1,48628); June 20 (1); July 4 (2,481054; 54 seen), 5 (2), 6 (1; 16 seen), 9 (3 seen), 10 (1), 21 (1), 22 (1).

***Melanoptilon* sp. nov.**

Field Characters: Many thousands passed within our view, of which, on various occa-

sions, we counted 4,481. Of my notes, I present the following, made on September 5, 1946.

"These small orange and black geometrids were the dominant species today as on many other days. They were very abundant at 2 p.m., dwindling to a small stream at 4 p.m. 2083 in count but missed hundreds. Toward the end there was only one every ten seconds. They were out of sight of each other but all took the identical path, coming up the steep gorge, slowly and wearily, a few stopping for a while on weeds. Rarely they alighted on a small flower, sometimes on the leaves but never for more than two minutes. Then on and up.

"The lee of the wind lay between two wild bananas, and nine out of ten of the moths took the same path between them, although the pass extended for several yards on each side. Insects could be seen siphoning up from an extended area on the gorge slopes, all narrowing inward as they came and bottlenecking between the two plants.

"Just above the *Heliconias* the wind caught the moths and whirled them about, up and back in a wide skyward curve, or forced them down close to the herbage. About one in four returned to the weeds for a rest. I never saw the same individual make more than two efforts before resting. Then a lull would come and allow a flock to attain the summit and start down toward quiet and warmth. Often the upper stretches were opaque with fog but the insects dived into it without hesitation.

"The majority seemed weary today but all I caught were freshly emerged and one laid eggs immediately."

Number: Total, 4,546 counted. Taken, 62.

Date: April 29 to September 8.

Record: 1946—July 29 (1 taken; hundreds seen), 30 (1 taken; 96 seen); August 7 (600 plus seen), 13 (1,46935; 776 seen); September 1 (1 taken; 244 seen), 5 (8,461133; stopped counting after 2,083), 7 (1,461158; 655 seen), 8 (1 taken; many passing), 9 (1,461178; 22 seen). 1948—April 29 (1); May 21 (11 taken), 22 (1), 23 (3), 24 (2,48581; 8 seen), 25 (2), 26 (4), 29 (4); June 6 (12 taken, 48719), 7 (1,481520), 9 (1); July 2 (2,481023), 5 (1), 8 (1), 16 (1).

***Nelo* sp. nov.**

Number: Total and taken, 2.

Record: 1945—August 1 (1,45485). 1948—July 21 (1,481507).

***Oospila* sp. nov.**

Record: 1948—May 9 (1,48520), 24 (1); July 16 (1), 21 (1,481308).

***Phrudocentra opaca* Butler.**

Species Range: Brazil.

Number: Total and taken, 1.

Record: 1948—July 22 (1,481361).

***Pseudomennis bipennis* Walker.**

Species Range: Central America, Venezuela to Peru and the Amazons.

Field Characters: These little orange moths, with conspicuous translucent, black-veined wing tips, are easy to recognize. Though many must have been missed, the more than 800 counted reveals their abundance.

Number: Total, 844. Taken, 28.

Date: April 30 to July 20.

Record: 1945—May 20 (1 taken); June 29 (1). 1946—July 17 (1,46787; 500 plus seen). 1948—April 30 (1); June 17 (2,48823; 46 seen), 18 (1,48834; 14 singly), 19 (1), 22 (2; 16 seen), 24 (1; 10 seen), 27 (1; 35 seen), 30 (1; 31 seen); July 2 (1), 3 (1; 4 seen), 4 (1; 56 seen), 5 (1; 66 seen), 8 (1), 13 (2; 35 seen), 14 (3 seen), 15 (4), 16 (2), 20 (2).

***Ptychamalia nigricostata* Warren.**

Species Range: Bolivia.

Number: Total and taken, 1.

Record: 1948—May 20 (1,48527F).

***Racheospila* sp. nov.** Perhaps a new genus.

Record: 1948—May 20 (1,48527E).

***Scordylia coerulescens* Dogn.**

Species Range: Colombia.

Number: Total, 8. Taken, 5.

Date: April 30 to July 21.

Record: 1948—April 30 (1,48470; 3 seen); June 6 (1); July 5 (1), 21 (2).

***Scordylia hippominata* Snellen.**

Species Range: Colombia.

Number: Total and taken, 1.

Record: 1948—May 29 (1).

***Thyrintina arnobia* Cramer.**

Species Range: Mexico to south Brazil.

Field Characters: Three large, faintly lined, white moths were seen and taken only once.

Number: Total, 10. Taken, 2.

Date: July 2.

Record: 1948—July 2 (2 taken, 481021; 8 on leaves, later flying south).

GLYPHIPTERYGIDAE.

***Tortyra cuprinella* Busck.**

Species Range: Described from Panama.

Field Characters: Unrecognizable until taken, except when resting on leaves. Our records are from aerial and herbage-top net sweeping on days of dense, aerial, insect nekton. On June 22 more than a half-hundred were seen clinging to leaves in high cool wind; on July 15, twenty were taken with dozens of other small moths, and on the 21st, 17 were taken in the same way.

Number: Total, 94. Taken, 43.

Date: March 28 to July 21.

Record: 1946—March 28 (1); May 1 (1). 1948—June 22 (20,48884; 50 plus seen on leaves or taking off; 2 taken at 15th kilometer); July 15 (1,481186; 20 taken sweeping the air for three minutes. Hundreds of others must have passed), 16 (1,481229), 21 (18,481307; others seen on leaves in wind).

LITHOSIIDAE.

***Argylla* sp.**

Number: Total and taken, 1.

Record: 1948—May 29 (1,48665).

***Chrysochlorosia splendida* (Druce).**

Species Range: Ecuador and Bolivia.

Field Characters: This brilliant bronze-green moth is very conspicuous despite its small size.

Number: Total, 96. Taken, 25.

Date: April 30 to September 8.

Record: 1946—May 1 (3 taken); September 8 (1,461167; 38 seen). 1948—April 30 (11,48469; 21 seen); May 21 (1), 25 (1), 29 (2); June 6 (1); July 13 (1,481162; 12 seen), 16 (2,481227), 21 (2,481298, 481303).

***Cisthene* near *lycomorphodes* Draudt.**

Number: Total and taken, 1.

Record: 1946—August 7 (1,461159).

***Cisthene* sp.**

Number: Total and taken, 1.

Record: 1948—April 30 (1,48462).

***Cisthene* sp.**

Number: Total and taken, 1.

Record: 1948—July (1,481185).

***Metalobosia similis* Draudt.**

Species Range: Colombia.

Number: Total, 17. Taken, 2.

Date: May 26 and 29.

Record: 1948—May 26 (1,48623; 15 seen), 29 (1).

***Odozana* sp.**

Number: Total, 12. Taken, 2.

Date: April 30 and June 22.

Record: 1948—April 30 (1,48463); June 22 (1,48883; about ten fluttering through pass).

***Pseudomacroptila argentea* Fleming.**

Species Range: Rancho Grande, Venezuela.

Field Characters: Several of these moths with wings like watered silk were seen.

Number: Total and taken, 1.

Record: 1946—June 22 (1,46644; 4 others seen). This specimen proved to be representative of a new genus and species. (*Zoologica*, 1951, Vol. 36, No. 13, pp. 183-184).

LYMANTRIIDAE.

Eloria subapicalis Walker.

Species Range: Mexico to Venezuela.

Field Characters: These good-sized, gauze-winged moths were easy to recognize. They flew low and their flight was slow.

Number: Total, 154. Taken, 12.

Date: April 27 to July 26.

Record: 1948—April 27 (2,48397; 35 seen); May 26 (2); July 2 (1,481022; 80 plus passed), 8 (2,481114), 15 (2; 27 seen), 26 (3).

Eloria venosa Walker.

Species Range: Colombia.

Number: Total, 90. Taken, 4.

Date: May 25 to June 6.

Record: 1946—May 28 (1 taken). 1948—May 25 (1,48588); June 6 (2; 86 counted, probably this species).

NOCTUIDAE.

Alabama argillacea (Hübner).

Species Range: Widely distributed; southern United States to tropical America.

Number: Total and taken, 1.

Record: 1948—May 21 (1,48566).

Anticarsia gemmatalis Hübner.

Species Range: United States to Paraguay.

Number: Total and taken, 1.

Record: 1948—June 6 (1,48745).

Blosyris tuisama Schaus.

Field Characters: One tattered specimen taken at 1 p.m. in full sun going through pass. A dozen were seen at 2:30 p.m.

Number: Total, 13. Taken, 1.

Record: 1948—July 22 (1,481332; 12 passing at 2:30 p.m.).

Cydosia nobilitella (Cramer).

Species Range: Tropical America.

Field Characters: Many of these little harlequin moths appeared now and then on leaves, or flew through the pass.

Number: Total, 111. Taken, 3.

Date: June 12 to July 13.

Record: 1948—June 12 (1), 27 (1,48967; 40 seen); July 13 (1,481156; 68 seen).

Gonodonta pyrgo (Cramer).

Species Range: Southern United States to Guiana.

Field Characters: This species is essentially nocturnal and a frequent visitor to our electric lights. The four noted were flying with diurnal moths and butterflies through the pass in full sunlight.

Number: Total, 4. Taken, 2.

Record: 1948—June 29 (2,48999; 2 others flying past).

Laphygma frugiperda (Smith & Abbot).

Species Range: New World.

Number: Total and taken, 1.

Record: 1948—July 6 (male, 481143).

Sylectra erycata (Cramer).

Species Range: Tropical America.

Number: Total and taken, 1.

Record: 1948—July 21 (1,481500).

NOTODONTIDAE.

Lusura alatrix (Stoll).

Species Range: Guiana and Colombia.

Field Characters: A nocturnal-appearing species, taken in full sunlight.

Number: Total and taken, 1.

Record: 1948—April 29 (1,481473).

PERICOPIDAE.

Crocomela intensa Walker.

Species Range: Venezuela.

Field Characters: These black-bordered orange moths appeared usually singly, occasionally in large numbers.

Number: Total, 767. Taken, 38.

Date: April 4 to September 9.

Record: 1946—September 9 (1,461181; 80 plus seen). 1948—April 4 (1,48355), 23 (1), 29 (1,48146); May 3 (1), 25 (2), 26 (2); June 17 (1), 28 (2); July 2 (2), 3 (2), 4 (1), 9 (1), 10 (1; 14 seen), 11 (1), 13 (1), 14 (1; 3 seen), 15 (2), 16 (2), 17 (1,48324; 232 seen), 20 (1), 21 (2), 22 (7; 400 plus seen), 26 (1).

Hyalurga leucophlebia Hering.

Species Range: Venezuela.

Number: Total and taken, 1.

Record: 1948—April 16 (female taken).

Pericopis angulosa Walker.

Species Range: Colombia and Venezuela.

Field Characters: Close mimic of large ithomiid butterfly. Probably many passed without being recognized.

Number: Total and taken, 2.

Date: May 28 and June 9.

Record: 1946—May 28 (1 taken). 1948—June 9 (1,48792).

Pericopis bivittata Walker.

Species Range: Panama to Venezuela.

Field Characters: A good butterfly mimic.

Number: Total and taken, 1.

Record: 1948—August 2 (1,481456).

Pericopis hypoxantha (Hübner).

Species Range: Venezuela, Colombia, Peru, Bolivia and Brazil.

Number: Total and taken, 1.

Record: 1948—September 3 (1,481127).

Pericopis tricolora jansonis Butler.

Species Range: Panama and tropical South America.

Subspecies Range: Panama, Colombia, and Venezuela.

Number: Total and taken, 1.

Record: 1948—August 2 (1,481499).

***Sagaropsis centralis* Hering.**

Species Range: Venezuela.

Number: Total and taken, 1.

Record: 1948—May 21 (1,48552).

PYRALIDAE.

***Acrobasis slossonella* Hulst.**

Species Range: United States southward.

Number: Total, 4. Taken, 4.

Record: 1948—July 22 (4,481331 A, B, C, D).

***Chrysauge kadenii* Lederer.**

Species Range: Brazil.

Field Characters: These unmistakable yellow and black moths caught the eye easily.

Number: Total, 74. Taken, 6.

Date: June 6 to July 16.

Record: 1945—June 6 (1). 1946—June 15 (1). 1948—June 15 (1,48806; 68 seen); July 3 (2,481027), 16 (1).

***Diaphania arguta* (Lederer).**

Species Range: Brazil.

Number: Total and taken, 2.

Date: May 20 and June 23.

Record: 1948—May 20 (1,48527C); June 23 (1,48892).

***Diaphania quadrastigmatis* (Guenée).**

Species Range: United States, West Indies and South America.

Number: Total and taken, 1.

Record: 1948—June 6 (1,48746).

***Eudiotis sibilalis* Walker.**

Species Range: West Indies and South America.

Number: Total and taken, 1.

Record: 1948—June 6 (1,48744).

***Eudiotis confinis* Druce.**

Number: Total and taken, 1.

Record: 1948—July 25 (1,481386A).

***Lamprosema coeruleonigra* Schaus.**

Record: (461221). A single specimen was present, taken in migration but without exact date. Mr. Fleming records this species as being abundant in 1946, along the road just north of Portachuelo Pass.

***Mapeta xanthomelas* Walker.**

Species Range: Mexico to Venezuela and Trinidad.

Field Characters: One of the most striking of the pyralids, both at rest and in flight.

Number: Total, 355. Taken, 14.

Date: March 28 to July 21.

Record: 1945—June 11 (1); July 12 (1). 1948—March 28 (1,48345); July 8 (3 taken; 27 seen), 15 (2 taken), 16 (2), 20 (3 taken; 80 seen), 21 (1; 234 seen).

***Nachaba tryphoenalis* (Felder).**

Species Range: Brazil.

Number: Total and taken, 1.

Record: 1948—April 30 (1,48468).

***Nymphala hermesalis* Walker.**

Number: Total and taken, 1.

Record: 1948—May 20 (1,48527N).

***Sylepta* near *excelsalis* Schaus.**

Number: Total and taken, 1.

Record: 1948—May 20 (1,48527G).

***Stenia* sp.**

Number: Total and taken, 2.

Record: 1946—August 8 (1,461185). 1948—July 21 (1,481305).

***Syngamia florella* (Cramer).**

Species Range: Tropical America.

Field Characters: Thousands of these little gold-spots appeared day after day, only recorded a few times, but present week after week.

Number: Total, thousands. Taken, 2.

Date: May 20 to June 26.

Record: 1948—May 20 (1); June 12 (1,48788), 24 (thousands migrating), 25 (thousands for days), 26 (more than ever).

URANIIDAE.

***Urania leilus* (Linn.).**

Species Range: Neotropics in general.

Field Characters: This famous migrant was seen only thirteen times in three years at the pass.

Number: Total, 13. Taken, none.

Date: July 14 to 26.

Record: 1945—July 14 (6 south through pass in high wind). 1948—July 16 (1 seen), 21 (1 seen), 26 (5 through pass).

MICROLEPIDOPTERA.

GELECHIIDAE.

***Calliprora*, near *trigramma* Meyrick.**

Number: Total and taken, 1.

Record: 1948—July 15 (1,481191).

***Charistica* sp.**

Number: Total and taken, 1.

Record: 1948—May 20 (1,48527D).

PSYCHIDAE.

***Psyche surinamensis* Möschler.**

Number: Total, 23. Taken, 1.

Record: 1948—July 6 (1,481077; 22 seen).

TINEIDAE.

Tineid, genus?

Number: Total and taken, 1.*Record*: 1948—July 25 (1,481376).

TORTRICIDAE.

Amorbia sp.*Number*: Total and taken, 1.*Record*: 1948—March 13 (1,48313).*Tortrix* sp.*Number*: Total and taken, 1.*Record*: 1948—July 25 (1,481378).

ZYGAENIDAE.

Genus and Species new.

Number: Total and taken, 2.*Record*: 1948—July 3 (2,481036, 481038).

EXPLANATION OF THE PLATE.

One hundred and twenty-six species of day-flying moths were taken as migrants at Portachuelo Pass, Rancho Grande, north-central Venezuela. The following forty-five have been chosen for illustration as representative species.

ARCTIIDAE.

- Fig. 1. *Utetheisa o. ornatrix*.
Fig. 2. *Calidota gigas*.

DIOPTIDAE.

- Fig. 3. *Phanoptis fatidica*.
Fig. 4. *Zunacetha annulata*.
Fig. 5. *Josia aurifusa*.
Fig. 6. *Josia ligata*.
Fig. 7. *Josia flavissima*.
Fig. 8. *Polypoetes*, species III.

GEOMETRIDAE.

- Fig. 9. *Nelo* sp. nov., near *satellitia*.
Fig. 10. near *Erateina hermaea*.
Fig. 11. *Thyrinteina arnobia*.
Fig. 12. *Atyriodes jalapae*.
Fig. 13. *Eudolophasia invaria*.
Fig. 14. *Heterusia atalantata*.
Fig. 15. *Pseudomennis bipennis*.
Fig. 16. *Melanchroia chephise*.

NOTODONTIDAE.

- Fig. 17. *Lusura altrix*.

NOCTUIDAE.

- Fig. 18. *Cydosia nobilitella*.

PERICOPIDAE.

- Fig. 19. *Crocomela intensa*.
Fig. 20. *Pericopis bivittata*.
Fig. 21. *Pericopis tricolora jansonis*.
Fig. 22. *Pericopis angulosa*.

LITHOSIIDAE.

- Fig. 23. *Chrysochlorosia splendida*.
Fig. 24. *Pseudomacroptila argentea*.

LYMANTRIIDAE.

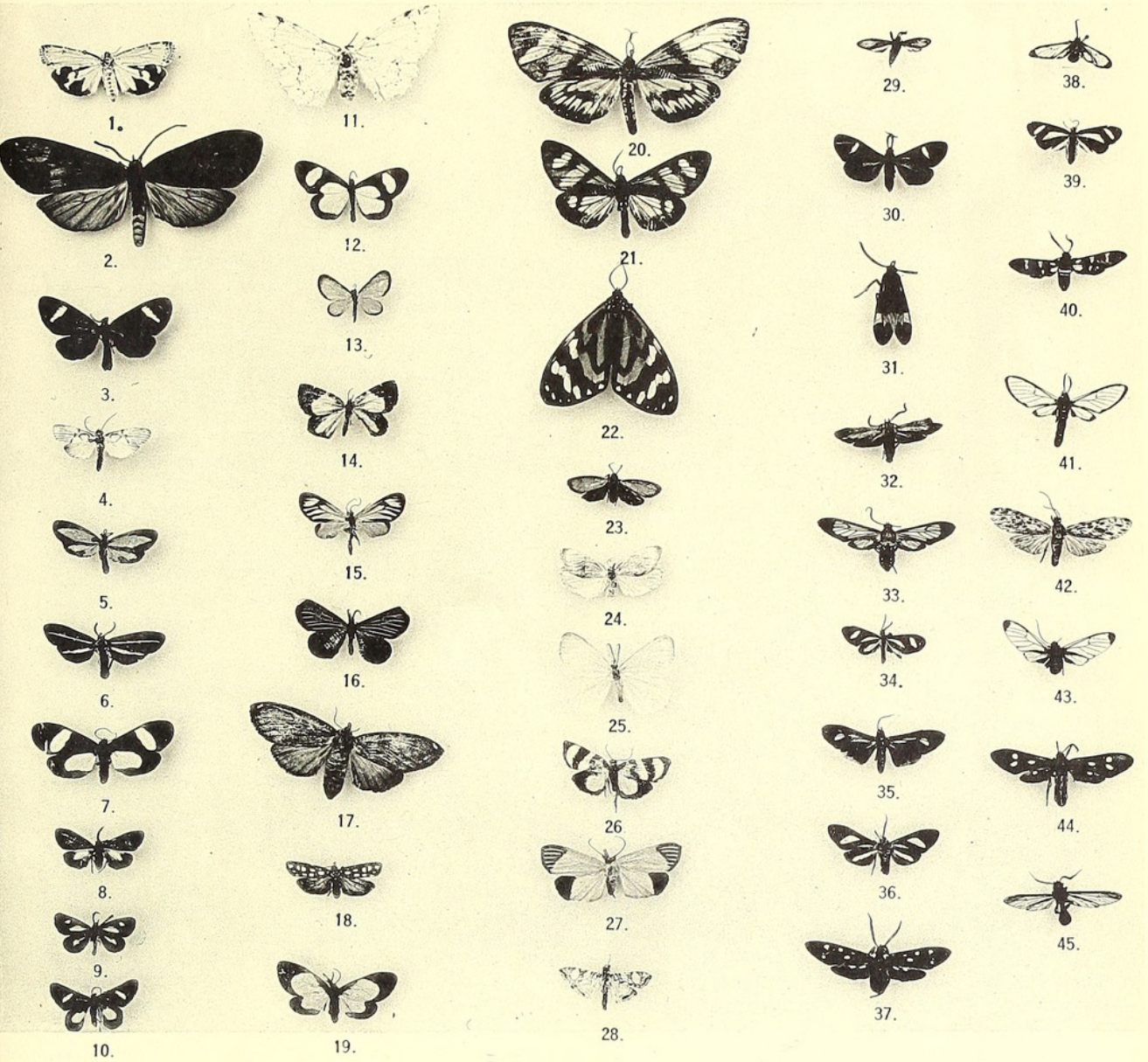
- Fig. 25. *Eloria subapicalis*.

PYRALIDAE.

- Fig. 26. *Chrysauge kadenii*.
Fig. 27. *Mapeta xanthomelas*.
Fig. 28. *Eudiotis sibilalis*.

EUCHROMIDAE.

- Fig. 29. *Agunaix lacrumans*.
Fig. 30. *Coreura interposita*.
Fig. 31. *Correbia lycoides*.
Fig. 32. *Correbia rufescens*.
Fig. 33. *Cosmosoma telephus*.
Fig. 34. *Cyanopepla agyrtidia*.
Fig. 35. *Cyanopepla micans*.
Fig. 36. *Euagra cerymica*.
Fig. 37. *Eupyra distincta*.
Fig. 38. *Homoeocera* sp.
Fig. 39. *Napata alterata*.
Fig. 40. *Syntomeida melanthus*.
Fig. 41. *Trichura esmeralda completa*.
Fig. 42. *Eucereum cimonis*.
Fig. 43. *Gymnelia bricenoi*.
Fig. 44. *Calonotus triplagus*.
Fig. 45. *Pseudosphex ichneumoneus*.



MIGRATION OF DAY-FLYING MOTHS THROUGH PORTACHUELO PASS, RANCHO GRANDE, NORTH-CENTRAL VENEZUELA.



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