

DIURNAL LEPIDOPTERA FROM WYOMING AND COLORADO.

Distribution, Life Zone and Habitat Notes—New Subspecies.

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Introduction.

Localities—descriptions and abbreviations used.

List of species and data.

List of Life Zones with characteristic species.

Figures.

INTRODUCTION.

The present paper represents an effort to make available some data gathered by the author on collecting trips in Wyoming and Colorado. These data are rather heterogeneous, but of a kind which will probably prove of value to taxonomic and ecological workers.

To the field naturalist and the ecologist a mere knowledge of the name of the food-plant and the appearance of the early stages of a species represent only a part of what should be known about the life history of that species. In the case of a large proportion of the species of Rocky Mountain diurnals even this little, however, is still unknown. The author has therefore considered it worth while to include many notes on habitat and local distribution, although such information will be of little value to the majority of present-day collectors. The student of the future, however, who cannot spend all his time in frantically searching for something to name because everything that possibly could be named will have been by that time, and who therefore will probably concentrate on biology and ecology just as mammalogists are doing now, will probably find such information valuable.

It is surprising how few published records are available for determining accurately the exact ranges of most of our insects. For Wyoming especially the writer has been able to find practically no data of this kind, yet Wyoming presents far more interesting distributional problems than most of the States. In the East the Great Plains area enters the state; in the Southeast the Medicine Bow Range of Colorado extends as far north as Elk Mountain, bringing with it a distinct fauna; in the Southwest the Great Basin fauna enters, both along the Uinta Mountains and in the Red Desert; and in the North a very distinct fauna extends down from

Montana. Yet with all these very different faunas entering the state and mingling, Wyoming is entomologically one of the least known areas in the country.

Very little work has been done in the Rocky Mountains in checking insect distribution with the Life Zone work done by the Biological Survey. In an attempt to do something of this sort the writer has tried to analyze the different localities collected and thus to gain some idea of the Life Zone ranges of the species taken. The records here included must, of course, be regarded as merely a small beginning of such a study, and are not intended to be in any way conclusive. It is hoped that they may prove suggestive of what can be done in this field, and be of use in the future as well.

In Life Zone Work it is, of course, almost impossible to establish hard and fast boundaries between the Zones. There is much overlapping of Zones, for reasons that vary with each locality. In the mountains a study of Life Zones is largely a study of "vertical distribution," but many other very important elements must be considered. Steepness of the mountains, quality of soil, amount of water available, exposure to sunlight and prevailing winds, early or late melting of snow, and many other such factors must be considered both individually and together.

The occurrence of the food-plant is of course the most essential factor in determining the distribution of Lepidoptera. Many other factors undoubtedly play a large part, and can be learned only by careful and detailed study of habitat and local distribution data.

The Life Zones of Colorado and Wyoming and their flora and vertebrate fauna have been extensively studied by the Biological Survey. The fundamental works on this subject are: Cary, Merritt. Life Zone Investigations in Wyoming. North American Fauna No. 42, 1917; and, a Biological survey of Colorado. North American Fauna No. 33, 1911. In these will be found detailed information which it would be superfluous to repeat here.

LOCALITIES.

The following are localities where collections were made. To avoid much useless repetition abbreviations have been used for these in giving records in the species list, as shown below.

Bellevue = Bellevue, Larimer Cy., Colo. Alt. 5200 ft. Collecting in arid grassy fields, in a few irrigated fields, and along a

small creek bottom. Upper Sonoran Zone, with Transition Zone elements.

Brooklyn = Brooklyn Lake, Snowy Range west of Centennial, Wyo. Alt. 10500 to 11000 ft. Barren, windswept upland plateau with many small lakes, stunted spruces in irregular patches and low Alpine vegetation. Typical Hudsonian Zone.

Centennial = Centennial, Wyo. Alt. 8000 ft. Collecting in arid sagebrush flats east of town and in marshy bottom of Little Laramie River. Transition Zone.

Foxpark = Foxpark, Wyo. Alt. 8500 ft. Collecting in grassy meadows, along roads and on sagebrush flats at lower edge of coniferous forest. Lower Canadian Zone with Transition Zone elements.

Libby = Libby Lodge about 2 miles west of Centennial, Wyo. Alt. 8500 ft. Collecting in grassy meadows and along road in lower portion of Canadian Zone coniferous forest. Lower Canadian Zone with a few Transition Zone elements.

Moose = Moose P. O., Jackson Hole, Wyo. A considerable area was intensively collected, containing a number of very different habitat zones. The vertical distribution is very marked, three Life Zones being noted within a horizontal distance of six miles.

TRANSITION ZONE.

Bottoms. In the Snake River bottom (alt. 6600 ft.) and extending up the bottom of its tributary Cottonwood Creek the fauna and flora are dominantly Transition. Thick growths of *Salix* are found on the gravel bars. Heavy groves of narrow leaved cottonwood (*Populus angustifolia*) occur, shading a luxuriant undergrowth. There are occasional areas of grassy marsh, and a few grassy meadows, where homesteaders have irrigated fields. Even in the bottoms, however, Canadian Zone elements are found, mostly plainly marked by growths of quaking aspen (*Populus tremuloides*).

Flats. The floor of the valley (alt. 6600-6800 ft.) is mostly level, arid flats, where sagebrush (*Artemisia tridentata* and *trifida*) are the dominant plants. The flats are dominantly Transition Zone, but there is a considerable mixture of Canadian Zone species, especially in the more grassy areas along the border of the coniferous forest. The steep slopes by

which the flats descend to the river and creek bottoms show not only a marked concentration of the normal flats species but also a few species that are not found elsewhere in nearly such abundance.

CANADIAN ZONE.

Forest. The most typical Canadian Zone area is the broad belt of coniferous forest which extends from the sagebrush flats up the mountains to an elevation of 9,500–10,000 ft. Along its lower edge the forest fauna is considerably diluted with Transition species, especially in grassy meadows. A few species appear to be characteristic of the forest proper. Along its upper edge the forest is much broken up by grassy meadows, growths of quaking aspen, and steep slopes unsuited for tree growth. The lower portion of the forest is dominantly Lodgepole Pine (*Pinus murrayana*) with a mixture of blue spruce (*Picea parryana*), while in the upper portion Engelmann spruce (*Picea engelmanni*) becomes dominant. The upper border of the Zone is much obscured and mixed with Hudsonian Zone elements, owing to peculiar features of the landscape such as the steepness of the mountains, the occurrence of heavy "slides" in the Spring, and the scanty soil on many rocks buttresses. As an example of this mixture, the writer has taken the Pika (*Ochotona* sp.), a typical Hudsonian Zone mammal, in Bradley Canyon at 9000 ft. elevation, in the same place as *Plebeius icarioides* and *Papilio rutulus*, normal Transition-Canadian Zone butterflies. In many places the Hudsonian Zone is almost entirely obliterated by the presence of perpendicular cliffs or extensive rock "slides."

Most of the Moose records can be taken as fairly indicative of the dates of emergence and periods of flight of the species. No attempt has been made to collect in other parts of Jackson Hole, although the writer is aware of the occurrence in the valley of species which he has not taken at Moose.

Poudre = 23 miles up Little South Poudre River Canyon from "The Forks." Alt. about 6500 ft. Collecting in grassy meadows and arid flats and along river banks. Transition Zone with Canadian Zone elements.

- Red Desert = Red Desert, Wyo., on the Union Pacific R. R. west of Wamsutter. Arid Upper Sonoran Zone.
- Red Feather = Red Feather Lakes, Larimer Cy., Colo. Alt. 82-8400 ft. Collecting in grassy meadows and fields along streams and roadsides. Scattered growth of *Pinus scopulorum* and *Pinus murrayana*. Lower Canadian Zone with strong Transition Zone elements.
- Spring = Spring Canyon, west of Forth Collins, Colo. Alt. 52-5500 ft. Collecting in arid grassy foothills, with a few irrigated fields. Upper Sonoran Zone with Transition elements.
- Univ. Camp. = University of Wyoming Summer Camp, Snowy Range west of Centennial, Wyo. Alt. 9600 ft. Grassy meadows at the upper edge of the Canadian Zone coniferous forest. Canadian Zone with Hudsonian Zone strays.
- Virginia Dale = Virginia Dale, Larimer Cy., Colo. Grassy meadows with scattered *Pinus scopulorum*. Transition Zone.

LIST OF SPECIES AND DATA.

In recording the Life Zone records the occurrence of a Zone name in parentheses signifies that only weak elements of that zone were present in the locality where the specimens were taken.

The synonymy used throughout is that of Barnes and Benjamin, List of the Diurnal Lepidoptera of Boreal America north of Mexico. Bull. S. Cal. Acad. Sci. Jan. 1926. 25: 3-27. Numbers are prefixed to names as in this list.

- 7 *Papilio zelicaon* Luc. Foxpark vi-28-'29; Univ. Camp vii-1, 2, 5-'29. The specimen vii-5-'29 may be *P. bairdii* Luc. Found in open meadows and fields, and along roads.

Zones: (Upper Transition) Canadian (Lower Hudsonian).

- 15 *P. r. rutulus* Luc. Libby vi-26-'29, Foxpark vi-28-'29, Univ. Camp vii-2-'29, Moose v-20-'24 to middle of August or later. Within its range found almost everywhere except in thick coniferous forest. Often found sucking up moisture at muddy places.

Zones: Upper Transition, entire Canadian.

- 16 *P. multicaudata* Kirby. Moose vii-14-'29 to middle of August or later. In river bottoms and along edges of flats. I have never taken it in pure Canadian Zone.

Zones: Transition, (lower Canadian).

- 17 *P. eurymedon* Luc. Libby vi-26-'29, Foxpark vi-28-'29, Moose vi-12-'29 to middle of August or later. Mostly taken along trails and in meadows in coniferous forest, less frequently in river bottoms and along edges of flats. A female, Moose vii-12-'29 is of a yellow ground color, fully as deep as many *rutulus* males.

Zones: Upper Transition, entire Canadian.

- 25 *Parnassius clodius* Men. Moose vi-23-'24 to latter part of July. Moose specimens are a bit difficult to determine. They appear to be somewhat intermediate between *baldur* Edw. and *gallatinus* Stichel. One male matches perfectly with *gallatinus* as figured in Elrod, M. J., The butterflies of Montana, fig. 15, the plate from which Stichel described *gallatinus*. The species was taken mainly on the edges of the flats along the edges of the bottoms. It appears either to emerge earlier than *smintheus* or to become worn much more easily, for by the end of the first week in July only very much worn specimens of *clodius* are obtainable, while fresh *smintheus* continue to emerge until well into August.

Zones: Upper Transition, Canadian.

- 26 *P. smintheus* Dblidy. & Hew. Red Feather vi-19-'29, Poudre vi-20-'29, Foxpark vi-27 & 28-'29, Univ. Camp vii-6-'29, Moose vi-12-'24 to end of August. Specimens from Red Feather are most like *hermodur* Hy. Edw. but the female is lighter. Specimens from Poudre are much like *sayii* Edw. having a very light female and being larger. Only one specimen, a small dark male, was taken at Univ. Camp (alt. 9600 ft.). This agrees well with *hermodur*. The specimens from Foxpark and Moose appear to be intermediate between *sayii* and *magnus* Wright. The species swarms at Moose along the edges of the flats, favoring flowers of *Sedum* and *Saxifraga* (the food-plants) and paying little attention to the flowers of *Apocynum* and *Epilobium* which most of the other butterflies visit most eagerly.

Zones: Upper Transition, entire Canadian, lower Hudsonian.

- 33 *Ascia sisymbrii* (Bdv.) Moose v-16-'24 to middle of June. Appears to have only this early Spring brood, as I have never taken it later in the summer when the second brood of *A. occidentalis* is very common. On edges of the flats along the bottoms.

Zones: Upper Transition, lower Canadian.

- 34 *A. occidentalis* (Reak.) Bellevue vi-18-'29, Univ. Camp vi-29-'29 to vii-6-'29, Brooklyn vii-7 & 8-'29, Moose v-18-'24 (first brood), vi-29-'24, flies through August. First brood specimens at Moose are uniformly very dark beneath as in *calyce* (Edw.). Specimens of the second average much larger and lighter in coloring. In all the localities collected during July and August *calyce*-like specimens occurred constantly, although toward the end of the season the lighter forms predominated. These dark summer specimens, although often as deeply colored as first brood *calyce*, average larger. Conversely occasional specimens occur which strongly resemble typical *protodice*. In view of the dominance in numbers of typical *occidentalis*, with frequent intergrades to these *protodice*-like specimens, these specimens must be considered as merely light *occidentalis*. The species appears to favor flowers of *Saxifraga*. At Moose it was taken most commonly along the edges of the flats along the bottoms, but was found in small numbers almost everywhere. The species always prefers large open spaces.

Zones: Transition, Canadian, Hudsonian.

- 36 *A. napi* (L.) Libby vi-26-'29, Foxpark vi-27 & 28-'29, Univ. Camp vi-29 to vii-6-'29. Moose v-1-'24 (first brood) vii-9-'24 (summer brood) to ix-2-'24 (incomplete third brood). All specimens taken appear to belong to race *napi pseudonapi* (B. & McD.) Summer specimens are much lighter beneath than specimens of the Spring brood, but are not nearly all as immaculate as *pallidissima* (B. & McD.) which appears to represent merely immaculate specimens of this brood, and not the entire brood. Often taken in shaded Cottonwood groves in the bottoms. Prefers damp environments.

* *Zones:* Upper Transition, Canadian, lower Hudsonian.

- 40 *Euchloë creusa* (Dblly. & Hew.) Moose v-20-'24 (one female). This is the only specimen I have taken in Colorado or Wyoming that can by appearance be referred to *creusa*. It is perfectly typical. All other specimens, many of them taken flying with this one, are *ausonides coloradensis*, although many of these show intergradation to the *creusa* condition. A definite means of separating *creusa* and *ausonides*

is badly needed. Moreover the life history differences between the two forms should be very carefully checked. I personally consider that they represent no more than color varieties within one species.

- 41 *E. ausonides coloradensis* (Hy. Edw.) Red Feather vi-19-'29, Libby vi-26-'29, Foxpark vi-28-'29, Univ. Camp vi-26 to vii-6-'29, Moose v-16-'24 to end of June. The species appears to prefer the flowers of *Saxifraga*. The majority of females show a marked yellow suffusion on the secondaries above. There is much variation in the extent of the black and green markings and the intensity of the pearly white ground color on the secondaries beneath. Early Spring specimens average considerably smaller in size than those emerging later in the year, and in every way strongly resemble *creusa*. At the University Camp this species fairly swarmed in large open meadows at the upper edge of the coniferous forest, but was never taken a short distance higher up in typical Hudsonian Zone.

Zones: Upper Transition, entire Canadian.

- 47 *Anthocharis sara julia* Edw. Red Feather vi-19-'29, Libby vi-26-'29, Foxpark vi-27 & 28-'29, Univ. Camp vii-3 & 6-'29, Moose v-20-'24 to vii-29-'29. I have found this species, unlike *ausonides*, preferring small shaded glades in the forest. In Colorado and Wyoming all the females taken were the yellow form to which *stella* Edw. is probably applicable. High altitude specimens (Univ. Camp 9600 ft.) are quite constantly smaller than those from lower altitudes, and have the orange of the apex of the primaries lighter and the subapical black bar more or less diffused and often not broken. Some hair-splitters may consider this form worth a name. I do not, especially as all intergrades to the condition appear with ascending altitude. A male at Moose vii-29-'29 had evidently just emerged. Aside from this one specimen I have never seen any other evidence of a second brood there.

Zones: Upper Transition, Canadian.

- 58 *Eurymus m. meadii* (Edw.) Univ. Camp vii-5-'29 (one male), Brooklyn vii-6 to 8-'29. Very definitely a Hudsonian Zone species. The single male taken at the University Camp was evidently a windblown stray. I have not found this species so difficult to collect as some published accounts would

lead one to believe. It occurs in barren windswept areas at and above timberline. In a strong wind, which is usually present, the butterflies alight on the ground and invariably sit sidewise to the wind, which blows them so that they are nearly resting on their sides. They may then be easily stalked.

Zones: (Upper Canadian), Hudsonian.

61 *E. eurytheme* (Bdv.)

f. *amphidusa* (Bdv.) Red Feather vi-19 & 22-'29, Univ. Camp vii-2 to 6-'29.

f. *eriphyle* (Edw.) Moose vii-29-'29 & viii-2-'29.

gen. vern. *autumnalis* (Ckll.) Poudre vi-20-'29, Libby vi-26-'29, Centennial vi-27-'29, Foxpark vi-27 & 28-'29, Spring vi-18-'29, Univ. Camp vii-1 to vii-6-'29, Brooklyn vii-7-'29, Moose viii-9-'24.

The great amount of variation shown by the yellow forms of this species makes accurate identification somewhat difficult. Specimens of the Spring *autumnalis* brood intergrade freely to *eriphyle* and f. *eurytheme*. It is also practically impossible to lay down any hard and fast rules for separating *autumnalis* and *eriphyle* from *philodice* (Godt.). Specimens of *autumnalis* also frequently approach *scudderii* (Reak.) in appearance. The species favors large open spaces, being very seldom found in small glades in the forest. At the University Camp many females were taken ovipositing on *Astragalus alpinus*, in the large open meadows above the forest belt. At Moose there is a very definite Autumn brood of *autumnalis*.

Zones: Upper Sonoran, Transition, Canadian, lower Hudsonian.

67 *E. alexandra* (Edw.) Foxpark vi-27 & 28-'29. Quite common in open fields at the lower edge of the forest. Very fond of puddles along roads. One white female (*hatui* B. & Benj.?) was taken vi-27.

Zones: Upper Transition, lower Canadian.

68 *E. scudderii* (Reak.) Univ. Camp vii-6-'29, Moose vii-25 & 30-'29. The University Camp specimens appear to be typical *scudderii*. The Moose specimens are quite different. In both sexes the under side of the secondaries lacks the

greenish suffusion characteristic of *scudderii*, resembling rather that of *pelidne*. The female is fully as yellow above as the male, and strongly resembles a female *interior*. These specimens probably represent a form more or less intermediate between *scudderii*, *pelidne* and *interior*, which three forms are probably all conspecific. This may be *pelidne skinneri* Barnes.

- 85 *Danaus menippe* (Hbn.) Moose vi-12-'24. One specimen only.
- 106 *Coenonympha ochracea* Edw. Spring vi-18-'29, Red Feather vi-19-'29, Poudre vi-20-'29, Libby vi-26-'29, Foxpark vi-27 & 28-'29, Univ. Camp vii-2-'29, Moose vi-17-'24 to middle of August. Prefers large open spaces.
Zones: Upper Sonoran, Transition, Canadian.
- 108 *C. haydenii* (Edw.) Moose vii-25 to viii-2-'29. Taken only in open meadows and hillsides above the main forest belt. A specimen was taken at 10,000 ft. up Bradley Canyon in Lower Hudsonian. The Moose specimens show considerable tendency to reduction of the submarginal ocelli on the secondaries beneath. In this they agree with specimens from Yellowstone Park, the type locality, but differ from specimens from further north in Montana.
Zones: Canadian, lower Hudsonian.
- 117 *Cercyonis oëtus* (Bdv.) Moose vii-12-'29 to end of August, Red Desert viii-6-'29, Virginia Dale viii-7-'29. The species is very common on sagebrush flats, where it is somewhat difficult to catch owing to its habit of flying close to the ground between clumps of brush. It also occurs in open spaces above the main forest belt.
Zones: Upper Sonoran, Transition, Canadian.
- 122 *Oeneis uhleri* (Reak.) Poudre vi-20-'29, one very poor specimen. This was in Upper Transition Zone with Canadian elements.
- 140 *Erebia epipsodea* Butl. Foxpark vi-28-'29, Univ. Camp vi-29-'29 to vii-6-'29. Only one specimen was taken at Foxpark. At University Camp the species did not become at all common until vii-3, so that these dates may be taken as fairly indicative of the time of emergence. Found in small glades in the forest, but most abundant in open meadows above the forest belt.
Zones: Canadian (lower Hudsonian).

149 *Euptoieta claudia* (Cram.) Brooklyn vii-2-'29. A very much worn specimen in typical Hudsonian Zone.

157 *Dryas aphrodite cypris* (Edw.) Spring vi-23-'29 (2 fresh males), Virginia Dale viii-7-'29 (2 fresh females).

Zones: Upper Sonoran, Transition.

161 *D. hesperis* (Edw.) Moose vii-9-'24 to end of August. Most of the specimens taken were either along the edges of shaded bottoms or else along trails in the coniferous forest. The adults appear to favor the flowers of a large Mint (*Monarda?*). There is a great deal of variation in the amount of silver on the underside, with all intergrades between unsilvered and fully silvered specimens.

Zones: Upper Transition, Canadian.

167 *D. hydaspe* (Bdv.) Moose vii-8-'29 and vii-27-'29, all worn specimens. All were along trails in the forest and in small open glades and favored flowers of Mint. The specimens appear to be most like *h. hydaspe*, but are not typical. In the present state of North American *Argynnis* no more can safely be said.

Zones: Canadian.

170 *D. nevadensis* (Edw.) Foxpark vi-27-'29, Moose vi-25-'24 through August. f. *meadii* (Edw.) Poudre v-20-'29. Many specimens taken at Moose are very much like *meadii*, which here evidently is no more than a color form. Many other Moose specimens are very much like *gallatini* McDunnough, some females being almost a pale cream color. Very common on open flats and meadows. Shows a strong partiality for the flowers of Dogbane (*Apocynum*). At Moose also occurs in open meadows above the forest.

Zones: Upper Transition, entire Canadian.

171 *D. edwardsii* (Reak.) Spring vi-23-'29, Foxpark vi-28-'29, Univ. Camp. vii-2 to 4-'29.

Zones: Upper Upper Sonoran, Transition, Canadian.

172 *D. platina* (Skin.) Moose vii-12-'29 to end of August. Swarms along the edges of the flats, being very fond of Dogbane flowers. It also occurs in open meadows above the main forest.

Zones: Upper Transition, entire Canadian.

173 *D. halcyone* (Edw.) Bellevue vi-18 & 21-'29, Spring vi-18 & 23-'29.

Zones: Upper Upper Sonoran, (lower Transition).

- 182 *D. montivaga* (Behr.) Moose vii-14-'29. One specimen, a fresh male, is possibly referable to this species. The basal portion of the secondary beneath is, however, a deeper more chocolate brown.
- 185 *D. eurynome* (Edw.) Univ. Camp vi-'29 to vii-6-'29. Brooklyn vii-7-'29, Moose vii-12-'29 to end of August.
f. *clio* (Edw.) Univ. Camp vii-1-'29, Moose, vii-17 & vii-23-'29.

Clio is here evidently a rare color form. One specimen has the silver only about half gone. Like *nevadensis* and *platina* the species is found very commonly on sagebrush flats and meadows, and prefers the flowers of Dogbane. Of the *Argynnis* taken at Moose *hesperis* and *hydaspe* may be said to form one group in similarity of habitat and action, while *nevadensis*, *platina* and *eurynome* form another and are almost always associated together.

Zones: Upper Transition, Canadian, Lower Hudsonian.

- 186 *Brenthis myrina* (Cram.) Moose vi-25-'24, vii-17-'29, viii-2-'29. Taken both in bottoms in the valley proper, and in the marsh at the head of Bradley Lake.

Zones: Upper Transition, Canadian.

- 194 *B. freija* (Thun.) Univ. Camp vi-26-'29 to vii-3-'29, Brooklyn, vii-7 & 8-'29. Uncommon in the meadows just above the main forest. Comparatively common in typical Hudsonian Zone. One specimen was contentedly sitting on a snowbank.

Zones: Upper Canadian, Hudsonian.

- 212 *Euphydryas editha* (Bdv.) Univ. Camp vi-29 to vii-5-'29. I cannot tell to what subspecies the specimens belong. According to Gunder (Pan-Pac. Ent. July 1929, 6: 1-8) they should be nearest to *montanus* McD. They do not appear to be so. Identification to species was made by examination of the male genitalia. I am unable to separate the females from those of the *anicia* form which was taken in the same locality. Very common in open meadows above the forest belt.

Zones: Upper Canadian.

- 221 *E. anicia* (Dbldy. & Hew.) Foxpark vi-27 & 28-'29, Univ. Camp vii-2 to 6-'29, Moose v-24-'24, vi-12-'24, vii-18-'29, viii-2-'29. These records are for males only, as explained above. The Moose specimens represent a distinct race from those from southeastern Wyoming. The Moose specimen

viii-2-'29 was a very fresh male that had evidently just emerged. The species appears to occur in much the same sort of habitat as *editha*, although it is worthy of note that no specimens of *editha* were taken at either Foxpark or Moose in Lower Canadian or Transition Zone.

Zones: Upper Transition, Canadian.

222 *E. gillettii* (Barnes). Moose vii-19-'29. In creek bottom.

Zones: Upper Transition.

227 *Lemonias acastus* (Edw.). Moose vii-1-'24 to end of July or later. Specimens were taken along the edges of creek bottoms in strong Transition localities, and also in small glades of the purely Canadian Zone forest.

Zones: Upper Transition, Canadian.

243 *L. pola* (Bdv.). Virginia Dale viii-7-'29. Common in grassy fields.

Zones: Transition.

251 *Phyciodes tharos pascoensis* Wright. Poudre vi-29-'29, Foxpark vi-27 & 28-'29, Moose vi-4-'24 (first brood), vii-9-'24 (second brood.) *Tharos* does not appear to extend as far up the mountains at Moose as does *camillus*, never being taken in any numbers in the purely Canadian Zone area. Especially common on flats along edges of bottoms, preferring flowers of *Apocynum* and *Epilobium*.

Zones: Transition, Lower Canadian.

254 *P. camillus* Edw. Red Feather vi-19-'29, Poudre vi-20-'29, Foxpark vi-27 & 28-'29, Univ. Camp vi-29 to vii-5-'29, Moose vii-12-'29 through August. Found throughout the entire Canadian Zone.

Zones: Transition, Canadian, possibly lower Hudsonian.

245 *P. ismeria* (Bdv. & Lec.). Poudre vi-20-'29, Bellevue vi-21-'29.

Zones: Upper Sonoran, Transition.

274 *Polygonia satyrus* (Edw.). Moose v-1-'24 (appearance of hibernators) viii-3-'24 (year's brood). Females show considerable tendency to a reduction of the subterminal markings as in f. *chrysoptera* Wright. A female was observed at Moose ovipositing on *Ribes*, v-20-'24. The egg hatched v-29. Most commonly taken in bottoms, but also occurs in coniferous forest.

Zones: Upper Transition, Canadian.

276 *P. hylas* (Edw.). Foxpark vi-28-'29 (hibernator) Moose vii-9-'24 (fresh specimen of year's brood?).

Zones: Upper Transition, Canadian.

- 277 *P. zephyrus* (Edw.). Red Feather vi-19-'29, Libby vi-26-'29, Univ. Camp vii-2-'29, Moose iv-22-'24. All the preceding records apply to hibernators.

Zones: Transition, Canadian.

- 280 *P. oreas* f. *oreas* (Edw.). Moose v-20-'24.

Zones: Upper Transition, Lower Canadian.

- 284 *Hamadryas milberti* (Godt.). Bellevue vi-21-'29, Univ. Camp vii-1-'29, Moose iv-7-'24 (appearance of hibernators), vii-12-'29 (year's brood). Specimens may be referred to f. *subpallida* Ckll. but are not all typical. Most common in bottoms, but occurs throughout entire Canadian.

Zones: Upper Sonoran, Transition, Canadian.

- 285 *H. antiopa* (L.). Moose iv-9-'24 (hibernators), viii-2-'24 (year's brood). Pupæ may be found under the eaves and window casings of almost every cabin in the valley that is located near willows. Most common in bottoms, but occurs throughout entire Canadian.

Zones: Upper Transition, Canadian.

- 288 *Cynthia cardui* (L.). Univ. Camp vii-1 to 5-'29, Moose v-1-'24. Relatively uncommon at Moose.

Zones: Upper Transition, Canadian.

- 289 *C. carye* (Hbn.). Moose vii-12 & vii-18-'29. Both are worn specimens and are the only records I have for the region.

Zones: Upper Transition, lower Canadian.

- 309 *Basilarchia weidemeyerii* (Edw.). Bellevue vi-21-'29, Spring vi-23-'29, Moose vii-1-'24 to end of August. Prefers shaded woods. Most common in bottoms, but often found in coniferous forest. An individual often has a number of definitely preferred perches and when frightened flies regularly from one of these to another. The Colorado specimens show a reduction in width of the white band, representing a transitional stage to *angustifascia* B. & McD.

Zones: Upper Sonoran, Transition, Canadian.

- 357 *Strymon melinus* Hbn. Poudre vi-20-'29.

Zones: Transition.

- 363 *S. titus* (Fabr.). Moose vii-23-'29 to middle of August or later. Both on flats along edges of bottoms and in forest

glades. Shows a strong preference for flowers of *Apocynum* and *Epilobium*.

Zones: Upper Transition, Canadian.

364 *S. acadica* (Edw.). Moose vii-29-'29 to middle of August. Both on flats along edges of bottoms and in forest glades.

Zones: Upper Transition, Canadian.

367 *S. sylvinus* (Bdv.). Moose vii-20-'29 to middle of August. In bottoms, on flats along edges of bottoms, and in forest glades.

Zones: Upper Transition, Canadian.

377 *Mitoura spinetorum* (Hew.). Libby vi-26-'29 (one female). In a grassy marsh surrounded by coniferous forest.

Zones: Lower Canadian.

384 *Incisalia augustinus* (Westw.). Poudre vi-20-'29. Two specimens very much worn.

Zones: Upper Transition.

392 *I. eryphon* (Bdv.). Red Feather vi-19-'29, Foxpark vi-27-'29, Moose v-12-'24. In small glades and along roadsides. Both the Red Feather and the Foxpark specimens showed a distinct preference for perching on gooseberry bushes.

Zones: Upper Transition, lower Canadian.

396 *Callophrys sheridani* (Edw.). Red Feather vi-20-'29 (very worn), Moose iv-30-'24 to middle of July. At Moose this species is exceedingly common in the early Spring, on the sagebrush flats. Moose specimens show more reduction of the markings beneath than in typical *sheridani*, but less than in *neoperplexa* B. & Benj.

Zones: Upper Transition, lower Canadian.

397 *C. apama homoperplexa* B. & Benj. Foxpark vi-27-'29, Centennial vi-28-'29, Moose v-20-'24 to end of July. On sagebrush flats.

Zones: Transition, lower Canadian.

400 ***Satyrium fuliginosa semiluna*** new subspecies (See Figs. 5 & 6).

Differs from *f. fuliginosa* from California, the type locality, as follows:

Male (1) Upper side of wings grey tinged with brown; stigma light grey, conspicuous; fringes wide, very light grey tinged with brown.

(2) Under side of wings light brownish grey; spots at ends

of discal cells light grey, conspicuous; postmedial rows of spots large, well defined; all spots definitely pupiled with black except in some cases the two immediately below costa of the secondary; submarginal row of spots distinct on both wings.

Female (1) Upper side of both wings light greyish brown; fringes wide, very light grey faintly tinged with brown.

(2) Under side of wings as in male, somewhat lighter grey in color, especially on secondaries.

The race is characterized in general by the much greyer ground color of the wings above, and the greater development of the markings below. In this latter respect it may be considered as more primitive than *f. fuliginosa*, showing the ancestral pattern more distinctly. Females of *semiluna*, though greyer than males, are still distinctly less brown above than males of *f. fuliginosa*.

Holotype male—Half Moon Ranch, Moose P. O. Jackson Hole, Wyo. vii-23-'29 deposited in American Museum of Natural History.

Allotype female—Half Moon Ranch, Moose P. O. Jackson Hole, Wyo. vii-22-'29 deposited in American Museum of Natural History.

Paratype no. 1, male—Half Moon Ranch, Moose P. O. Jackson Hole, Wyo. vii-31-'29 deposited in Carnegie Museum.

Paratype no. 2, female—Half Moon Ranch, Moose P. O. Jackson Hole, Wyo. vii-23-'29 deposited in Carnegie Museum.

Paratype no. 3, male—Half Moon Ranch, Moose P. O. Jackson Hole, Wyo. vii-27-'29 in author's collection.

Paratype no. 4, female—Half Moon Ranch, Moose P. O. Jackson Hole, Wyo. vii-27-'29 in author's collection.

I am much indebted to Mr. E. Irving Huntington and the American Museum of Natural History for the loan of California *fuliginosa* for comparison with *semiluna*.

Specimens were taken in irrigated fields and along the edge of the flats, just below the lower border of coniferous forest.

Zones: Upper Transition, lower Canadian.

408 *Lycaena editha* (Mead). Moose vii-6-'24 to middle of August. Common on sagebrush flats, especially along edges of bottoms.

Zones: Upper Transition, lower Canadian.

- 409 *L. thoë* (Guér.). Spring vi-23-'29. In irrigated field.
Zones: Upper Sonoran.
- 410 *L. mariposa* (Reak.). Moose vii-25-'29 to end of August.
Taken only in small shaded glades in coniferous forest.
Zones: Canadian.
- 411 *L. nivalis* (Bdv.). Moose vi-25-'24 to middle of August.
Mostly on flats, one specimen in meadow at Taggart Lake.
Zones: Upper Transition, Canadian.
- 412 *L. helloides* (Bdv.). Centennial vi-28-'29. Wet meadows
in river bottom.
f. *florus* (Edw.). Moose vii-6-'24 through August. The
great majority of the specimens are typical *florus*, but a num-
ber are very nearly as light in color as typical *helloides*.
Mostly in shaded areas in creek and river bottoms.
Zones: Transition, (lower Canadian).
- 418 *L. rubidus* (Behr.). Moose vii-29-'29. One male in wet
meadow.
Zones: Upper Transition (Lower Canadian).
- 419 *L. heteronea* Bdv. Moose v-20-'24 through August. Very
common on flats. More pugnacious than other species of the
genus.
Zones: Upper Transition, lower Canadian.

L. heteronea gravenotata new subspecies (see Figs. 1-4).

Differs from *h. heteronea* from California, the type locality, as follows:

Size: Larger, the average wing-spread (sum of length of primaries from base to apex) of holotype, allotype and 18 paratypes being 34 mm. as opposed to an average of 30 mm. for the specimens of *h. heteronea* examined.

Markings beneath: heavier and more distinct; the sub-marginal row of spots on both primaries and secondaries is nearly always complete, while in *h. heteronea* the spots below veins R_5 and M_1 of the primaries and nearly all of those of the secondaries are almost always absent; postmedial row of spots of both primaries and secondaries heavy, while in *h. heteronea* these spots are usually very small on the primaries and only faintly if at all indicated on the secondaries; discocellular and basal spots of both wings always present as shown in figures, clearly marked, while in *h. heteronea* these spots are much smaller, the basal ones of the secondaries being often absent.

Gunder (Ent. News. July 1925. 36: 194. Pl. V, fig. 1.) has applied the name *coloradensis* to an aberration of this race which is characterized by the fusion of the black spots beneath. If names applied to aberrations are considered as having any status in nomenclature *coloradensis* will have to be used as the race name and *gravenotata* for the normal form of this race. If aberrational names are considered as having no status in nomenclature *gravenotata* will be used as the race name. The subject of the status of sub-subspecific names will in the near future, it is hoped, be considered by the International Commission on Zoological Nomenclature and perhaps be ultimately settled.

Gravenotata appears to be limited to the Great Plains side of the Front Range in Colorado. Specimens from Fort Collins and Estes Park in Larimer County, and from Plainview in Jefferson County are all *gravenotata*. Those from Fort Collins and Estes Park are the most extreme. Specimens from Grant, Park County, and Tolland, Gilpin County, are more or less intermediate between *h. heteronea* and *h. gravenotata*. Specimens from Granby, Sulphur Springs, Tennessee Pass, Aspen, Cimarron and Ridgway are *h. heteronea* with light specimens resembling *h. clara*.

Of a series of 4 males and 2 females from Glenwood Springs, Garfield County, 3 males are *h. heteronea* while the other male and the 2 females are distinct. In the more distinct spotting beneath these specimens strongly resemble *gravenotata*, but the primaries appear to be relatively shorter, and the females possess a very distinct marginal row of orange brown lunules on the secondaries above. I am inclined to think that they may represent a distinct local form, but have insufficient data.

It is to be expected, in the case of a race as limited in range as *gravenotata* that not only will a certain amount of intergradation occur around the borders of the race's territory but also occasional specimens will be found even in the center of distribution which will not conform to type. It is only where extreme isolation is possible that a race may become so distinct that it will show no grading back to the ancestral form. In all other cases there will be found intergrades, so that the race must be considered as based, not on the characters as shown by one or two chance specimens, but upon the average of a series of specimens. It is certain that *gravenotata* is far from being completely isolated from *heteronea*, and so the occasional atypical specimens which occur even in the center of *gravenotata* territory (I have one perfectly

typical *h. heteronea* from Fort Collins) need not be taken too seriously.

Holotype male and allotype female, Plainview, Jefferson County, Colo. alt. 6783 ft. vii-9-'27 and vii-12-'27 respectively, Collection E. I. Huntington No. 87, deposited by Mr. Huntington in American Museum of Natural History.

Paratype, males 1-9, Plainview, Colo. as above, Collection E. I. Huntington No. 87, vii-6 to 13-'27, in collection Mr. Huntington.

Paratype male 10, Spring Canyon, west of Fort Collins, Colo. alt. 52-5500 ft. vi-23-'29, in author's collection.

Paratype male 11, Estes Park, Colo. vii-15-'97, coll. by Emma Gillette, No. 2684 in collection Dep't. Entomology and Zoology, State Agricultural College, Fort Collins, Colo.

Paratype male 12, Estes Park, Colo. vii-20-'13, Acc. 4260 in coll. American Museum of Natural History.

Paratype females 13-15, Plainview, Colo. vii-10 to 12-'27, Coll. E. I. Huntington No. 87, in collection Mr. Huntington.

Paratype female 16, Plainview, Colo. vii-9 to 14-'22, alt. 7-8000 ft. Coll. E. I. Huntington No. 39, in coll. Mr. Huntington.

Paratype female 17, Estes Park, Colo. vii-16-'94, coll. by C. P. Gillette, No. 1734 in coll. Dep't. of Entomology and Zoology, State Agricultural College, Fort Collins, Colo.

Paratype female 18, Fort Collins, Colo. iv-25-'92, coll. by C. F. Baker, No. 317 in coll. Dep't. of Entomology and Zoology, State Agricultural College, Fort Collins, Colo.

The only specimen of *gravenotata* taken by the author, paratype 10, was in Upper Upper Sonoran Zone.

430 *Everes amyntula* (Bdv.). Bellevue vi-21-'29, Foxpark vi-27-'29.

Zones: Upper Upper Sonoran, Transition, lower Canadian.

432 *Plebeius melissa* (Edw.). Spring vi-18 & 23-'29, Poudre vi-20-'29, Bellevue vi-21-'29, Foxpark vi-27 & 28-'29, Moose vi-20-'24 to end of July. Dry meadows and flats.

Zones: Upper Upper Sonoran, Transition, lower Canadian.

434 *P. aquilo rustica* (Edw.). Red Feather vi-19 & 22-'29, Poudre vi-20-'29, Libby vi-26-'29, Foxpark vi-27 & 28-'29, Univ. Camp vi-30 to vii-6-'29, Brooklyn vii-8-'29, Moose vii-15-'29. In grassy meadows and fields.

Zones: Upper Transition, Canadian, Hudsonian.

435 *P. s. saepiolus* (Bdv.). Spring vi-18-'29, Red Feather vi-19-'29, Libby vi-26-'29, Univ. Camp vi-29 to vii-6-'29, Brooklyn vii-8-'29, Moose vii-12 to vii-29-'29. In open grassy meadows and fields.

Zones: Upper Upper Sonoran, Transition, Canadian, Hudsonian.

438 *P. icarioides* (Bdv.). Spring vi-18-'29, Poudre vi-20-'29, Bellevue vi-21-'29, Red Feather vi-22-'29, Foxpark vi-27-'29, Univ. Camp vii-2 to 6-'29, Moose vii-6-'24 to middle of August. In grassy fields and meadows. Specimens from Colorado are referable to race *lycea*. (Edw.). Those from Wyoming are nearest to race *pembina* (Edw.) but do not appear to be quite typical. Those from Moose are most like *pembina*, while those from Foxpark and Univ. Camp appear almost like transitionals between *pembina* and *ardea* (Edw.)

Zones: Upper Upper Sonoran, Transition, Canadian.

442 *P. a. acmon* (West & Hew.). Spring vi-18-'29, Poudre vi-20-'29, Foxpark vi-27-'29, Moose vi-20-'24 to the middle of August. Grassy meadows and sagebrush flats.

Zones: Upper Upper Sonoran, Transition, lower Canadian.

450 *P. enoptes ancilla* B. & McD. Spring vi-18-'29, Poudre vi-27-'29, Moose vii-12 to viii-2-'29. Identification to species was by examination of the male genitalia. The male specimens show a great deal of variation in size, width of the black border above, amount of orange at the anal angle of the secondaries above, and in the markings beneath.

Zones: Upper Upper Sonoran, Transition, (lower Canadian).

455 *Phaedrotes piasus* (Bdv.). Spring vi-18 & 23-'29.

Zones: Upper Upper Sonoran.

456 *Glaucopsyche lygdamus* (Dblly.). Spring vi-18 & 23-'29, Red Feather vi-19-'29, Poudre vi-20-'29, Bellevue vi-21-'29, Libby vi-26-'29, Foxpark vi-27 & 28-'29, Univ. Camp vi-29 to vii-6-'29, Moose v-20-'24 to middle of July.

Zones: Upper Upper Sonoran, Transition, Canadian, (lower Hudsonian).

458 *Lycaenopsis pseudargiolus* (Bdv. & Lec.). Univ. Camp vi-26 to vii-2-'29, Moose v-10-'24 to end of June. These specimens all appear to belong to *p. pseudargiolus*. Two females, Univ. Camp vi-26 & vii-2-'29 are f. *lucia* (Kirby).

The latter of these has the dark discal patch of the secondaries beneath very large, and the border of the same wing very heavily and broadly fuscous.

Zones: Upper Transition, Canadian.

For the identification of the following *Hesperiidæ* I am indebted to the kindness of Messrs. F. E. Watson and E. L. Bell.

467 *Epargyreus tityrus* (Fabr.). Spring vi-18-'29.

Zones: Upper Upper Sonoran.

498 *Urbanus ruralis* (Bdv.). Red Feather vi-19-'29, Foxpark vi-27-'29. In dry grassy fields.

Zones: Upper Transition, lower Canadian.

503 *U. tessellata* (Scud.). Bellevue vi-18 & 21-'29, Spring vi-18-'29. In arid grassy fields.

Zones: Upper Upper Sonoran, (Transition).

513 *Pholisora catullus* (Fabr.). Bellevue vi-18 & 21-'29. Dry grassy fields.

Zones: Upper Upper Sonoran, (lower Transition).

523 *Erynnis icelus* (Scud. & Burg.). Moose v-24-'24 to end of June.

Zones: Upper Transition, (lower Canadian).

528 *E. p. persius* (Scud.). Red Feather vi-19-'29, Bellevue vi-21-'29, Libby vi-26-'29, Foxpark vi-27 & 28-'29, Univ. Camp vii-5 & 6-'29, Moose vi-7-'24 to end of July. Grassy fields and meadows.

Zones: Upper Upper Sonoran, Transition, Canadian, (lower Hudsonian).

548 *Oarisma garita* (Reak.). Bellevue vi-18 & 21-'29, Spring vi-18 & 23-'29. Dry grassy fields.

Zones: Upper Upper Sonoran, (lower Transition).

560 *Hesperia uncas* Edw. Cheyenne Wells, Colo. viii-9-'29. Arid grassy prairie.

Zones: Upper Sonoran.

568 *H. comma colorado* (Scud.). Moose vii-9-'24 to end of August. Virginia Dale viii-7-'29. At Moose very abundant on sagebrush flats, also occurring, though uncommon, in meadows of Canadian Zone areas.

Zones: Transition, Canadian.

571 *H. viridis* (Edw.). Spring vi-18 & 23-'29. Arid grassy fields.

- Zones:* Upper Upper Sonoran, (lower Transition).
- 572 *H. nevada* (Scud.). Red Feather vi-19-'29, Foxpark vi-27 to 28-'29, grassy fields.
- Zones:* Upper Transition, lower Canadian.
- 583 *Ochlodes sylvanoides napa* (Edw.). Moose viii-3-'29. Common in grassy fields in river bottom, to which area it appears to be restricted.
- Zones:* Upper Transition, (lower Canadian).
- 589 *Polites manataaquia rhena* (Edw.). Bellevue vi-21-'29, Spring vi-23-'29. In arid grassy fields.
- Zones:* Upper Upper Sonoran, (lower Transition).
- 593 *P. mystic dacotah* (Edw.). Bellevue vi-21-'29. In grassy bottom of small creek.
- Zones:* Upper Upper Sonoran, (lower Transition).
- 595 *P. coras* (Cram.). Moose vii-15-'29 to middle of August. Found only in wet grassy marsh in river bottom, where it is very common.
- Zones:* Upper Transition, (lower Canadian).
- 597 *P. draco* (Edw.). Red Feather vi-19-'29, Libby vi-26-'29, Foxpark vi-27 & 28-'29, Univ. Camp vii-1 to 5-'29, Moose vi-13-'24 (one female, only record). Grassy fields and roadsides.
- Zones:* Upper Transition, Canadian.
- 605 *Atrytone vestris* (Bdv.). Bellevue vi-21-'29. Grassy fields.
- Zones:* Upper Upper Sonoran, (lower Transition).

LIST OF LIFE ZONES WITH CHARACTERISTIC SPECIES.

In the following lists an attempt has been made to list those species which appear to the writer to be sufficiently limited to one Life Zone so that they may be considered as characteristic of that zone. In the case of the majority of species this listing is not in the least conclusive in view of the extremely small amount of data available, and will probably not prove at all permanent. In the case of a few species, however, the listing is undoubtedly accurate. When a species has been taken in a zone or in zones other than the one which is considered to be its main center of distribution the initial letter or letters of the secondary zones are placed after the species name.

The placing of a zone in parentheses signifies that the occurrence of the species in that zone is comparatively uncommon or rare.

Many species have been omitted from the list, either because their zonal range is too great, or because the writer has insufficient data about them.

Upper Sonoran.

<i>Urbanus tessellata</i> T.	<i>Hesperia viridis</i>
<i>Oarisma garita</i>	<i>Dryas halcyone</i>
<i>Hesperia uncas</i>	

Transition.

<i>Papilio multicaudata</i> U. S., (C.)	<i>Incisalia eryphon</i> C.
	<i>Callophrys sheridani</i>
<i>Dryas aphrodite cypris</i> U. S.	<i>Callophrys apama homoperplexa</i>
<i>Dryas nevadensis</i> C.	<i>Lycaena editha</i> C.
<i>Dryas platina</i> C.	<i>Lycaena nivalis</i> C.
<i>Brenthis myrina</i> C.	<i>Lycaena helloides</i> (C.)
<i>Euphydryas gillettii</i>	<i>Lycaena heteronea</i> U. S., (C.)
<i>Phyciodes tharos pascoensis</i> C.	<i>Plebeius melissa</i> U. S., (C.)
<i>Phyciodes ismeria</i> U. S.	<i>Plebeius acmon</i> U. S., C.
<i>Basilarchia weidemeyeri</i> U. S., C.	<i>Philotes enoptes</i> U. S., (C.)
<i>Strymon melinus</i>	<i>Urbanus ruralis</i> C.
<i>Strymon titus</i> C.	<i>Hesperia comma colorado</i> C.
<i>Strymon acadica</i> C.	<i>Hesperia nevada</i> (C.)
<i>Strymon sylvinus</i> C.	<i>Ochlodes sylvanoides napa</i> (C.)
<i>Incisalia augustinus</i>	<i>Polites coras</i> (C.)

Canadian.

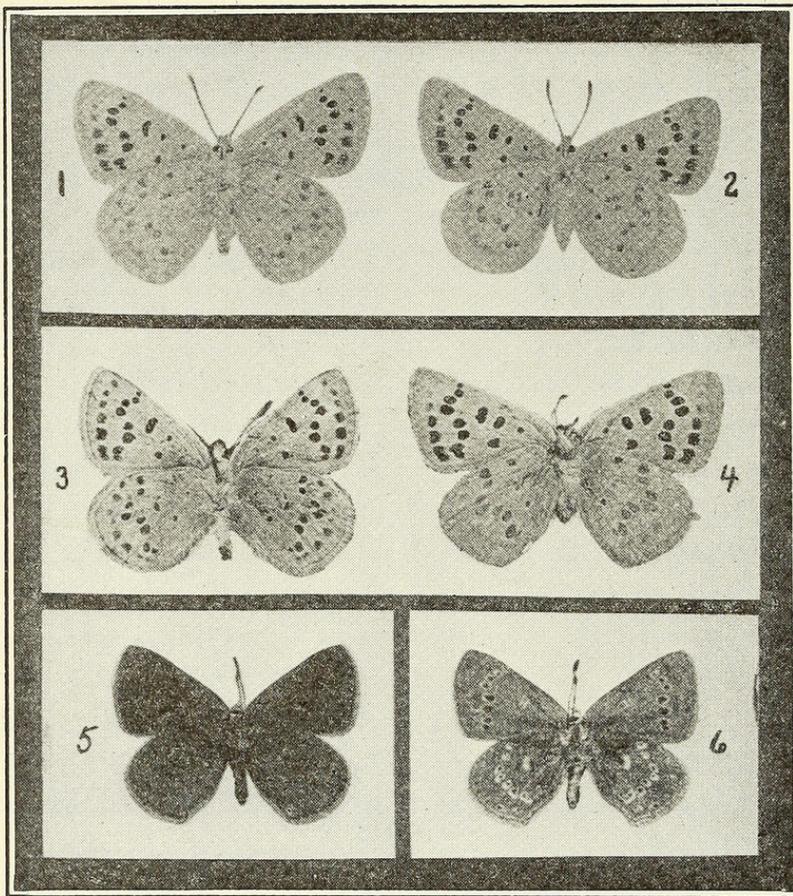
<i>Papilio zelicaon</i> (T., H.)	<i>Coenonympha haydenii</i> (H.)
<i>Papilio rutulus</i> T.	<i>Erebia epipsodea</i>
<i>Papilio eurymedon</i> (T.)	<i>Dryas hesperis</i> T.
<i>Parnassius clodius</i> (T.)	<i>Dryas hydaspæ</i>
<i>Parnassius smintheus</i> T., (H.)	<i>Dryas eurynome</i> (T.)
<i>Ascia sisymbrii</i> T.	<i>Euphydryas editha</i>
<i>Ascia occidentalis</i> U. S., T., H.	<i>Euphydryas anicia</i> (T.)
<i>Ascia napi</i> T., H.	<i>Polygonia satyrus</i> T.
<i>Euchloë ausonides</i> (T.)	<i>Polygonia hylas</i> T.
<i>Anthocharis sara julia</i> T.	<i>Polygonia zephyrus</i> T.
<i>Eurymus alexandra</i> (T.)	<i>Lycaena mariposa</i>
<i>Eurymus scudderii</i> (T.)	<i>Plebeius aquilo rustica</i> T., H.
<i>Coenonympha ochracea</i> (U. S.)	<i>Plebeius icarioides</i> U. S., T.
T.	<i>Plebeius saepiolus</i> U. S., T., H.

Glaucopsyche lygdamus U. S., *Lycaenopsis pseudargiolus* T.
T., H. *Polites draco* (T.)

Hudsonian.

Eurymus meadii (C.)

Brenthis freija C.



Approximately $\times 3/4$.

- Fig. 1. Under side, holotype male, *Lycaena heteronea gravenotata* Kots.
 Fig. 2. Under side, allotype, female, *L. heteronea gravenotata* Klots.
 Fig. 3. Under side, paratype male 10, *L. heteronea gravenotata* Klots.
 Fig. 4. Under side, paratype female 17, *L. heteronea gravenotata* Klots.
 Fig. 5. Upper side, holotype male, *Satyrium fuliginosa semiluna* Klots.
 Fig. 6. Under side, holotype male, *Satyrium fuliginosa semiluna* Klots.

For data on specimens figured see text.



Klots, Alexander B. 1930. "Diurnal Lepidoptera from Wyoming and Colorado." *Bulletin of the Brooklyn Entomological Society* 25, 147-170.

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