BECKER'S WHITE.

Pontia beckeri, Edwards.

Butterfly—Expanse, 2 to 2.2 inches, 51 to 56 mm. Easily discriminated from all other allied species by the green markings on the under side of the hind wings, concentrated in broad blotches on the disk; by these markings the species recalls the species of the genus **euchole.**

Male. Upper side pure white; base of wings not powdered with black, as in allied species; at the outer edge of the cell a dense black subrectangular spot (not reaching the costa), with a central white streak. Secondaries immaculate.

Under side white; the veins at apex and on upper hind margin bordered by black scales and suffused with greenish yellow; cellular spot enlarged, its base broadened and posterior edge excavated.

Secondaries have all the veins and branches yellow; those terminating on hind margin edged by broad bands of yellow green reaching to middle of disk and connected anteriorly; three large spots of same color about the cell; another large triangular subapical spot on costa; the veins at base banded with green; all these bands and spots slightly sprinkled with black scales.

Body above gray, yellowish beneath abdomen, white beneath thorax; legs white; palpi white, grey on upper side and at tip. Antennae white above and at base below, beyond brown; club black, tip pale fulvous.

Female. Similar to male, but with larger and more numerous spots; secondaries with black spots and dark streaks along the veins; under side with a round black spot in submedian inter-space on primaries, in addition to discal black spot.

Early Stages—The mature larva is 1.25 inches, 32 mm. long, greenish white, thickly marbled or sprinkled with gray, and with a very distinct orange belt between the segments; each segment also has 16 or 18 jet black tubercles which taper into black bristles; the head is tinged with yellow. It feeds on cruciferous plants.

Distribution—From Washington to Central California, east to Colorado. Taken in the state by Cooley at Bozeman, and by Allen at Dillon.

Genus SYNCHLOE, Huber.

(Euchloe-Anthocharis.) Fig. 29.

Butterfly—Small butterflies, white in color, with the apical region of the primaries dark-brown, marked with spots and bands of yellowish orange or crimson. On the underside the wings are generally more or less profusely mottled with green spots and striae.

Egg—Spindle shaped, laterally marked with raised vertical ridges, between which are fine cross lines.

Caterpillar—In its mature stage, it is relatively long, with the head small.

Chrysalis—With the head relatively projecting; wing cases compressed.

Key to Species.

1. Orange apex, surrounded by black; lower surface of hind wings complete green network, sara.
   No orange at apex of fore wings, 2.

2. Having the tips of wings marked with gray; a conspicuous bar at the end of the cell, 3.
3. Under side; apex of fore wings with many green scales; hind wings with a network of greenish yellow scales. creusa.
   Under side; apex of fore wings with a few green scales; hind wings crossed with several green bands, outer one trifid, olympia.
   Under side; hind wing with three irregular bands, outer one much forked, ausonides.

THE AUSONIDES ORANGE-TIP.

Synchole ausonides Boisduval. Fig. 30.

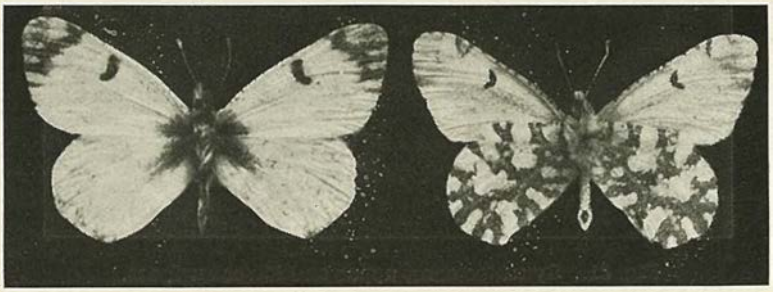


Fig. 30. Synchloe aussonides.

Butterfly—Fore wings greenish beneath; hind wings marked with three irregular green bands, the outer one forking into six or seven branches toward the outer and inner margins. Expanse ,1.65 to 1.90 inches, 41-48 mm.

Early Stages—Caterpillar pale whitish green, with dark-green longitudinal strips on the side and back. It feeds on cruciferous plants.

Distribution—It ranges from Arizona to Alaska, eastward to Colorado. Brandegee reports it common at Helena. It is one of the most abundant insects about Missoula in the spring, although not so abundant as **sara.**

THE SARA ORANGE-TIP.

Synchloe sara, Boisduval, Fig. 31.

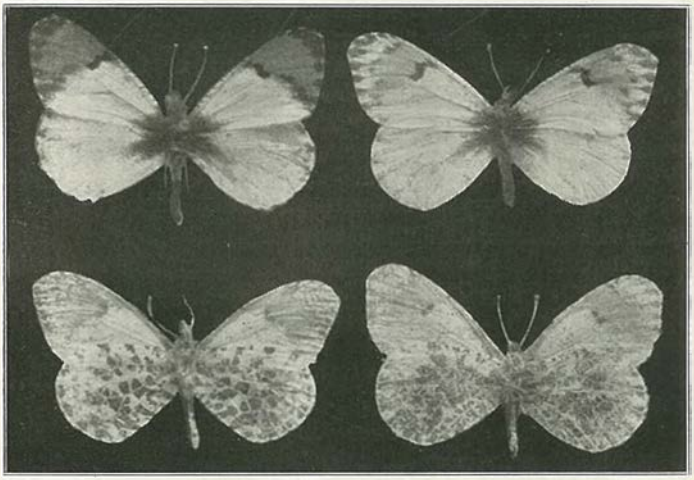


Fig. 31. **Synchloe sara,** upper and lower surfaces.

Butterfly—White with orange tips. There is a black bar dividing the apical patch. The female is sometimes yellow instead of white. On the under side the hind wings are marked with dark irregular patches of greenish brown scales, loosely scattered over the surface, and having a "mossy" appearance. There are different varieties.

Early Stages—Unknown.

Distribution—This species in all its forms belongs to the Mountain States of the Pacific Coast. It is abundant around Missoula, where it seems to thrive. The mountain slope back of the University is a favorite field, as it faces the west, catching the warm rays of the sun in spring. Here dozens may be captured in a short time. It is common around Helena (Brandegee) and about Bozeman (Cooley).

Var. **julia,** Edwards, in which the black bar dividing the red apical patch from the white on the remainder of the wing is broken, or tends to diminution at its middle, is reported by Brandegee as common at Helena.

Variety **reakertii** is smaller than **sara,** with dark spots at the ends of the veins of the hind wings. Taken by Brandegee at Mt. Ascension, near Helena.

THE OLYMPIA ORANGE-TIP.

Synchloe olympia Edwards. Fig. 32.

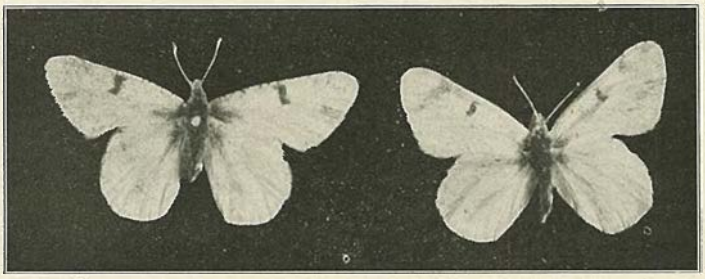


Fig. 32. Synchloe olympia.

Butterfly—Expanse. about 1.25 inches. Upper surface white, gray at base of wings; a large gray patch at the apex of the fore wings, partially replaced by white. Costal margin slightly specked with black; a black bar at the end of cell. The hind wings have a few black scales at the outer angle and a small wedge-shaped black spot near the base on the costa. Under side white. The fore wings have a small gray subapical patch on the costa, nearly covered with green scales, and a faint greenish patch on the outer margin. Discal spot narrow, lunate, enclosing a white streak.

Hind wings crossed by bands of yellow-green on a gray ground. The one near the base is slightly trifid on the costa, the outer one broadly trifid, but running from the outer margin instead of the costa, the middle and outer one joined on the median vein. There is also a spot of the same color between the anterior ends of the second and third.

Body black above, the under side white, the thorax tinged with greenish yellow.

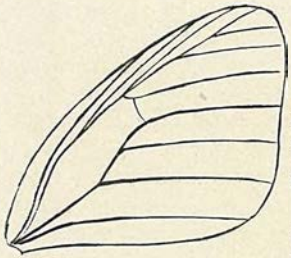
Early Stages—The caterpillar is striped lengthwise with pale slate color and bright yellow; feet, legs and head grayish green. The food plants are the cruciferous species.

Distribution—Found from West Virginia to the Rocky Mountains, and from Montana southward to Texas. In Montana collected abundantly by Wiley at Miles City; taken by Cooley at Bozeman, and by Barnes at Aldridge.

Butterflies and Fairies.

Lily Mordaunt in "Kenelm Chillingly" had some beliefs that make her too fanciful for a real character. One of the most conspicuous of these was her idea about butterflies. She had a green-house inclosed with wire and covered with vines and draperies, into which she put every butterfly she could catch. Butterflies to her were not insects, but the souls of infants who had died unbaptized. If they were taken care of for a year they turned to fairies. So she fed and tamed her colonies of butterflies, releasing them when she believed their year of life completed, that they might be free to change into fairies.

NELLIE A. WHITNEY.



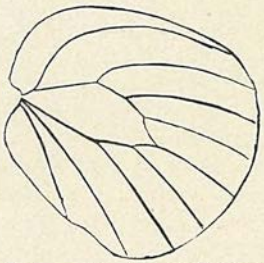


Fig. 33. Venation of Eurymus.

GENUS EURYMUS, Swainson.
(The Sulphurs.)
Fig. 33.

Butterfly—Medium sized, yellow or orange in color, with black borders upon the wings. In many species this border is heavier in the female than in the male.

Egg—The egg is spindle shaped, thickest at the middle, tapering at the apex and at the base, generally attached by an enlarged disk-like expansion, to the point on which it is laid. The caterpillar feeds upon Leguminosae and especially upon the clover.

Distribution—This genus is represented throughout the temperate regions of both hemispheres. It also occurs in the cooler portions of South America and along the ranges of the Andes.

Key to Species.

1. Ground color of wings yellow, no black at base; underside with a sub-marginal row of dark points, philodice.
2. Ground color of wings orange, or at least an orange patch in the middle of fore wings.
   Wings orange above and below, eurytheme.
   Wings deep orange above, green below meadii.
3. Under side without sub-marginal row of black spots. Apex of fore wings and the entire surface of hind wings greenish gray, color generally white, scudderi.
   Canary yellow, larger than preceding; ocellus on under side, hind wings white, alexandra.

THE COMMON SULPHUR.
Eurymus philodice Godart. Fig. 34.

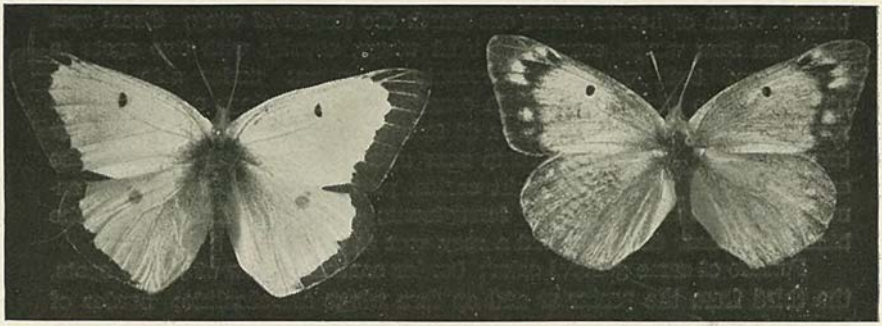


Fig. 34. Eurymus philodice, left figure, male; right female.

Butterfly—Wings above rather pale greenish yellow, outer borders black; border of female is broader than in male, and contains a submarginal row of yellow dots; discal spot in the male is elliptical; antennae, costa and fringes roseate; a submarginal row of dots on the under side, the last three on the fore wings black, the remainder brown with pink scales. Dimorphic females occur with wings nearly or quite white, and also a black form. Expanse 1.75, 2.25 inches, 38-57 mm.

Early Stages—The food plant is clover. The eggs are pale yellow, changing after being laid to crimson. The caterpillar is slender, green, striped longitudinally with paler green. The chrysalis is pale green.

Distribution—The species ranges from New England to Florida and westward into the Rocky Mountains. The collection at the University of Montana contains specimens from Missoula, Fish Creek, McDonald Lake in the Mission Mountains, Lo Lo Hot Spings, Flathead Lake, Madison Valley, National Park and Mount Lo Lo.

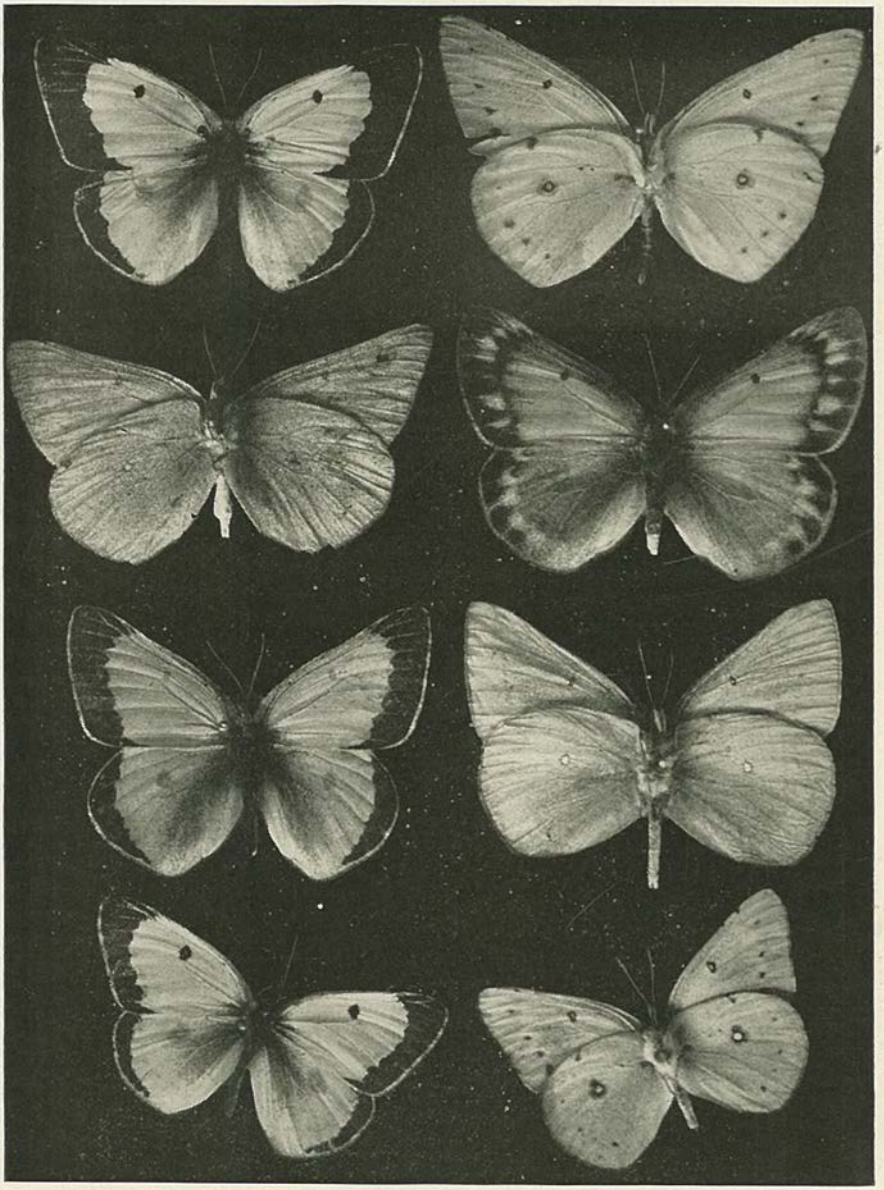
Remarks—It is one of our common butterflies. It shows many variations in size, coloration and markings. We have despaired of separating the males of **philodice, eurytheme and alexandra,** so much are they alike, and so much do they vary. It would at first seem as though **philodice** should not be found west of the range, but specimens from Flathead Lake are indistinguishable from those in the eastern end of the state; and if the labels of Montana specimens were exchanged with those collected by Wiley and the writer from Iowa, Michigan, Illinois, and Missouri the difference could not be told. The large series (about 100) of insects of this species in the University collection shows that the species in markings and coloration apparently merges into Eurytheme, and it has often occurred to us that they may possibly overlap.

THE EURYTHEME SULPHUR.

Eurymus eurytheme, Boisduval. Plate IV.

Butterfly—Expanse of wings 2 to 2.35 inches, 50-90 mm. Closely resembling **philodice** in size, shape and markings, but color orange, of varying shades, instead of yellow. Male usually orange-yellow, shading to sulphur yellow on the costa of both wings and on inner margin of hind wings, base and inner margin sprinkled with black scales; outer border black, broadest at apex; anterior veins yellow where they cross the black; width of border about one-fourth the length of wing; discal spot black on fore wings, orange on hind wings, usually with two spots in the latter; both wings have roseate reflection; under side yellow, middle of fore wings tinged with orange; on both wings a sub-terminal row of dots, the three posterior of fore wings black, the remainder brownish, also two dots on costa near apex; discal spots repeated, the anterior black, with a few light scales, posterior gemmate, silvery, annulate with roseate brown or ferruginous; a dash on the costa of the hind wings near the apex, and a rosy spot at the base.

Female of same general color; border contains a row of yellow spots, the third from the posterior and on fore wings sub-obsolute; border of hind wings wider than in male, and with rudiments of yellow spots; under side similar to that of male.



Eurymus eurytheme, 3, under side; 4, upper side of female; 1, upper side of male; 2, lower side of female, form keewayden; 5, upper side of male; 6, lower side of female, form meadii; 7, upper side of male; 8, lower side of female, form ariadne.

A white or albino female, Fig. 35, is sometimes found with all the markings as in the yellow form, white replacing the yellow. There are the following seasonal and local variations from the typical form.

Form **aridadne,** Edwards, Plate IV, emerging from winter chrysalis, has the fore wings tinged with orange, a spring form. Expanse, 1.75 inch, 45 mm.

Form **keewaydin,** Edwards, Plate IV. Larger than preceding, more deeply flushed with orange, a winter form. Expanse, 1.85 inch, 48 mm.

Form **eriphyle,** Edwards, yellow, not laved with orange, summer form. Expanse, 2.00 inch, 50 mm.

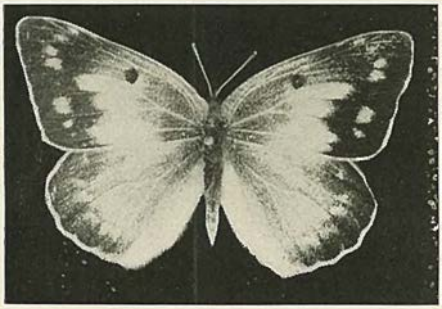


Fig. 35. Eurymus eurytheme, albino, female

Albinos have been taken at Flathead lake on the west side and at Fish creek east of the range, with expanse of wings 52-55 mm.

Early Stages—Egg .06 inch long, narrow, fusform, ribbed lengthwise, crossed by numerous striae; color buff-white when deposited, changing to crimson, then to black; mature larva from 1.1-1.2 inches, 26-28 mm. in length, dark green, with band of pure white with crimson line; chrysalis with anterior part and wing cases dark green, abdomen yellow-green; the food plant is clover.

Distribution—The range of **eurytheme** is very wide. It extends from the Atlantic to the Pacific, and from Canada to the far south, though it is rare in the south. It has been collected in the state by Elrod at Flathead Lake, Missoula, Mission mountains, Dodge Mountain at 7,400 feet, and Mount Lo Lo. Douglass has taken it at Fish Creek, Laurin, Ruby mountains, Tobacco Root range, and Madison valley; Wiley has collected it at Miles City, Brandegee at Helena and Gold Creek, and Cooley at Bozeman. It is found in all parts of the state, and will be one of the first specimens captured by the young entomologist. The reader is referred to "Remarks" under **philodice.** Coubeaux says form **eriphyle** is very common near Big Sandy. Allen has taken **eriphye, ariadne** and **keewayden** at Dillon. Coues collected **keewayden** and **eriphyle** along the the 49th parallel in 1874.

THE ALEXANDRA SULPHUR.

Eurymus alexandra, Edwards, Fig. 36.

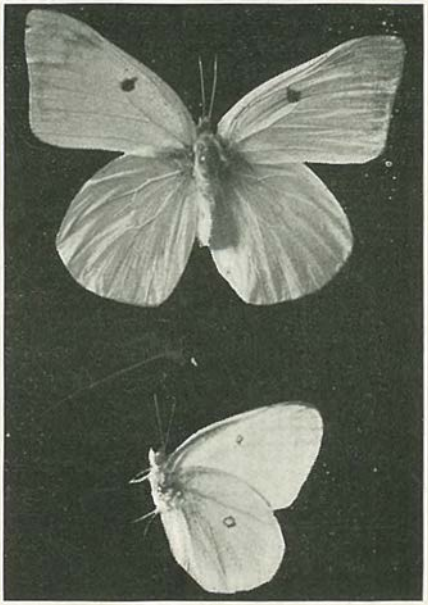


Fig. 36 Eurymus alexandra, female with expanded wings; male showing under side. From specimens taken at Bigfork.

Butterfly—Expanse of wings of females 2-2.3 inches, 50-60 mm.; of males, 1.75 inches, 45 mm. Male pale canary yellow, the black border much narrower than in **philodice** or **eurytheme**; a fine yellow line borders the black on outer margin; base of wings, thorax and abdomen with considerable black; anterior of thorax, antennae and legs roseate; under side of fore wings much paler than upper, uniform; under side of hind wings pale greenish gray, sprinkled with black scales; discal cell of hind wing silver, without rings; black border above showing through wing from below. Female larger than male, without black border above; sometimes the apex of fore wings is sprinkled with black, giving indications of markings; wings paler than in male, sometimes almost white; discal spot in fore wings black, oval, sometimes with yellow splash in the middle; on hind wing orange yellow, usually double; under side, silvery gray, yellow only at the base and on inner margin of the primaries; discal spot of hind wings silvery, with brown margin. Discal spot of fore wing dark brown with light spot in center; the roseate of the male repeated on the female, continuing around the outer border of the wings.

Early Stages—Caterpillar uniformly yellowish-green, with a white band on each side, broken with orange dashes running through it. The chrysalis resembles that of **philodice**, is yellowinsh green, darkest on the

dorsal side, and adorned with three small red dots on the central side of the abdomen near the wing cases. The caterpillar eats **Astragalus, Thermopsis** and white clover.

Distribution—The species is found in Colorado and the Mountain region to the north and west of that state. In Montana it has been taken at the University of Montana Biological Station at Bigfork, in 1903, at Flathead lake. It is not common, and is rather difficult to catch, as it keeps to the bushes and does not rest often. Brandegee has collected it at Alhambra. A single frazzled and battered female was taken by Elrod on MacDaugal Peak in the Swan range at 6,500 feet August 4, 1903, and another August 1, 1904.

SCUDDER'S SULPHUR.

Eurymus scudderi, Reakirt.

Butterfly—Expanse, 1.80 to 2.00 inches, 45 to 50 mm. Similar to **alexandra.** The male on the upper side is colored like **C. pholidice,** but the black borders are much wider. The fringes are rosy. The female is generally white—very rarely slightly yellow—with very pale dark borders, or often without any trace of black on the outer margin of the wings. On the under side the apex of the fore wings and the entire surface of the hind wings are greenish gray. The discal spot of the secondaries is well silvered and margined with pale red.

Early Stages—The larva feeds on the leaves of the huckleberry and willow. Otherwise it is unknown.

Distribution—The species is found in Montana, Colorado, Utah, and British Columbia. Wilsey's collection contains one specimen from Miles City. We have not taken it west of the range.

STRECKER'S SULPHUR.

Eurymus meadii, Edwards, var elis Strecker. Plate IV and Fig. 37.

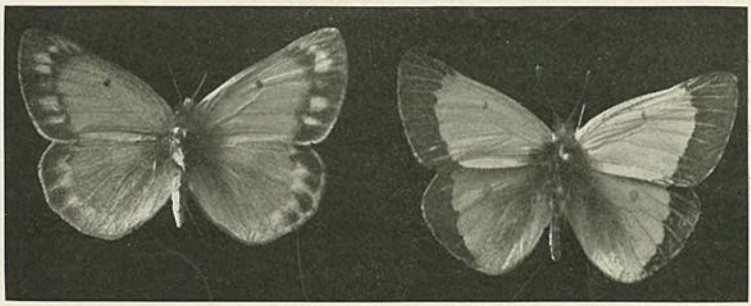


Fig. 37. **Eurymus meadii,** var. **elis,** left hand, female; right hand, male.

Butterfly—Expanse of wings 1.85 inches, 48 mm. Male; deep orange red above, with wide black border fringed with red; wing veins in both wings showing through black; black border covering outer third of fore wings, a little less of hind wings; fore wings black at base, extending to hinder angle of wings as a widening wash, ending in black scales over the orange ground; posterior edge of the hind wings with greenish gray

from 2 to 5 mm. wide, bordered exteriorly by the black border above showing through; discal spots above deeper orange than ground color; below, discal spot on fore wings small, dark brown, on hind wings light silver with red border; legs, antennae, anterior of thorax, hairs of head and fringe deep rose red; sometimes the outer anterior angle of the fore wings and the posterior angle of the hind wings above and below suffused with deep red. Female, similar in general color to male, less pronounced, and if anything, lighter; discal spot on anterior wings black, showing through on under side; discal spot on hind wings similar to male; less black at base of wings, posterior edge of lighter color than in male; black border not so wide as in male, with dashes of much lighter orange than ground color; dashes suffused at anterior angle of hind wing; under side as in male; rose red antennae, thorax, head, legs, and fringe as in male.

Early Stages—Holland says "closely resembling those of **meadii**, of which it may be only a varietal form.

Distribution—It is recorded as inhabiting the lofty peaks of the Western Cordilleras. It has been taken by Douglass at Fish Creek, August 16, 1900, and in the Tobacco Root Range July 14, 1900.

Remarks—It differs materially from the **meadii** in the writer's collection taken at Pike's Peak in 1892. Elis as described above from Montana is larger in both sexes than **meadii**, has much less green, and with decidedly different washings of orange on the borders of the wings of the female. This female **meadii** has much more red in the ground color than in **elis.** The **meadii** were taken at 12,000 feet and **elis** at about 8,000 which would of course make some difference. We have taken neither **meadii** nor **elis** west of the main range.

Collecting Butterflies at High Altitudes in the Andes.

While forming these collections I was led to remark the frequency with which closely similar forms recurred at similar altitudes, upon mountains often long distances apart. This was observed in regard to things living in the soil, as well as in respect to winged insects of roving habits. It was not unusual to see butterflies, at closely similar altitudes upon widely separated mountains. This was the case with a **Lycaena** that has not been described which was taken at 11-12,500 feet on Pichincha and thirty-six miles away at 12,000 feet on Colocachi, and was not seen elsewhere. But, for the most part, butterflies which were taken at considerable elevations were also found on the connecting, lower ground. Thus **Pieris xanthodice,** Lucas, though captured so high as 14,000 and 15,000 feet, was found everywhere in the intervening basins; and as, even had this not been so, it would need little effort for them to pass from one mountain to another, and further as they may sometimes suffer involuntary transportation, no particular stress can be laid upon such instances of occasional recurrence at similar elevations.

One Butterfly, however, was exceptional in being found upon nearly all the mountains visited, in numbers, and seemed to be established between the elevations 12,000—16,000 feet. This is described by Messrs. Goodman & Salvin, at p. 107 of the Supplementary Appendix, as **Colias alticola.** It was first obtained near Tortorillas, Chimboraza (13,000 feet), and was seen in the Vallon de Carrel as high as 16,000 feet. When we were camped upon Antisana it attracted attention by the great elevation above the level of the sea at which it was flying (16,000 feet). It was seen subquently upon all the mountains we visited (except Sara-urcu) between the elevations of 12-15,000 feet, and was captured at 12,000 feet on Pichincha, on 13,000 feet on Cayambe, and at 15,000 feet on the western side of Chimborazo, and was never either taken or seen in the basins between these mountains.

Whymper in "Travels Amongst the Great Andes of the Equator."

Family NYMPHALIDAE.

The Brush-Footed Butterflies.

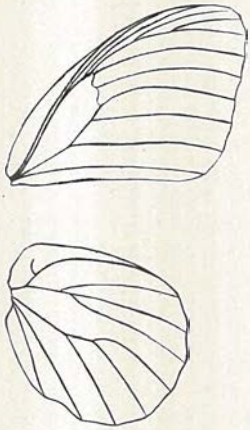


Fig. 38. Venation of Nymphalidae, Argynnis leto.

The family includes chiefly butterflies of medium or large size; but a few of the species are small. With a single exception, these butterflies differ from all others in our fauna, in having the fore legs greatly reduced in size in both sexes. They cannot be used for walking, but are folded on the breast like a tippet.

In the venation of the wings all of the branches of the radius of the fore wings are retained, this vein being five branched. (Fig. 38).

The caterpillars are, in most of the sub-families, provided with horny or fleshy projections. The chrysalids are usually angular, sometimes rounded. They always hang head downwards, supported only by the tail, which is fastened to a button of silk.

Five sub-families are represented in the United States, but three of the five in Montana. The following key will serve to separate them.

FAMILY NYMPHALIDAE.

Key to Sub-families.

1. With some of the veins greatly swollen at the base Agapetinae P. 105
   with none of the veins of fore wing usually swollen at the base 2.
2. Antennae clothed with scales, at least above, 3.
   antennae naked Euploeinae. P. 44
3. Fore wings at least twice as long as broad Heliconinae
   Fore wings less than twice as long as broad 4.
4. Papli much longer than thorax Libytheinae
   Palpi not as long as the thorax Nymphalinae. P. 50

SUBFAMILY EUPLOEINAE.

Butterfly—Large butterflies; head large, antennae inserted on the summit, naked. The wings are rounded and somewhat elongated.

Egg—The eggs are ovate, conical, broadly flattened at the base and slightly truncated at the top.

Caterpillar—On emerging from the chrysalis, the head is not larger than the body. The body has a few scattered hairs on each segment. On reaching maturity the head is small, the body large.

Chrysalis—It is relatively short and thick, rounded, with very few projections.

Key to Genera.

Palpi remote, not extending much beyond the head; discal cell of hind wings closed; a black spot on vein of hind wings of male. Anosia

Genus ANOSIA, Hubner.

Butterfly—Large seized, fore wings greatly produced at the apex.

Egg—The egg is ovate conical, ribbed with many cross-lines. The eggs are pale green in color.

Caterpillar—Cylindrical, fleshy, transversely wrinkled, with long, slender filaments.

Key to Species.

Color fulvous; veins black plexippus

THE MONARCH BUTTERFLY, Anosia plexippus L., Fig. 39.

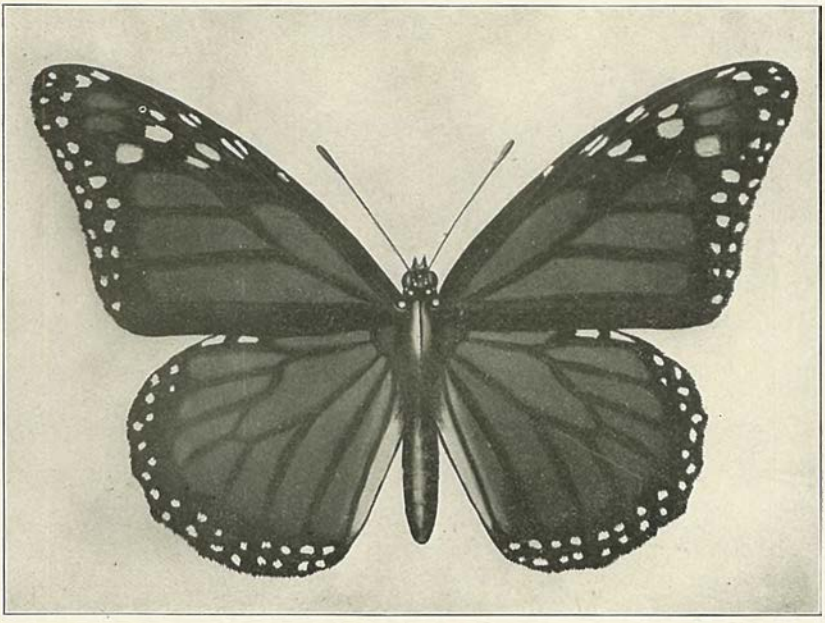


Fig. 39. **Anosia plexippus,** From water color by Mrs. Edith Ricker.

Butterfly—Expanse of wings 3.75-4.5 in., 96—114 m m. Upper surface tawny red or fulvous, with the veins heavily marked with black, a black terminal border containing two rows of white spots, a complete and partial row of white or lighter fulvous spots in a black space beyond the cell of the fore wings. The males have the wings less broadly bor-

dered with black than the females, and on the first median nervule of the hind wings there is a black scent-pouch. Body black with white spots.

Early Stages—When first deposited the eggs are white, but in two or three days turn yellow, just before hatching change to dull gray. Somewhat conical in form, and marked by twenty-five ribs with the same number of transverse ridges. The young larva is yellowish white, with a large black head. The mature larva is about 1.75 in., 45 mm. long; the head yellowish marked by two triangular black stripes. The body is marked with transverse stripes of black. yellow, and white. It is furnished with black fleshy thread-like appendages.

Chrysalis—About 25 mm. long, pale green, spotted with gold. There are two or more broods in a season.

Distribution—United States generally. The collection of the U. of M. contains specimens from Missoula, the Ruby Mountains, and Miles City. Collected by Coues along the 49th parallel in 1874.

The Seasonal Migration of Anosia Plexippus.

The range of Anosia plexippus is from Patagonia to Hudson Bay. It has not been found in hibernation and, considering its size and conspicuous coloring, it may well be said that it does not pass the winter North of latitude 31 degrees. A careful study of its range, time of appearance, and habits, shows unquestionably that there is a seasonal migration of this very interesting form.

Riley first suggested these movements, when state entomologist of Missouri, in the following words: "There is a southward migration late in the growing season, in congregated masses, and a northward dispersion early in the season, through isolated individuals."

The more evident movement is in the fall, when in the Mississippi valley and along the Atlantic Coast, the September air seems to be full of brown butterflies, usually apparently taking advantage of the cooler winds from the North, though many times bravely beating into the winds with a very strong flight for a butterfly. The Aster patches growing along the roadside and in neglected fields seem to be the favorite places of assembly. At such times a zoology class has no difficulty in providing themselves with material. In fact an active boy with a net can catch them by the hundred in one afternoon.

The collecting together of such numbers was formerly accounted for by the presence of plenty of food. This alone seems inadequate, since many fields, equally inviting, will contain a normal population. It seems likely that a swarm may busy themselves in this way in the fields, awaiting favorable winds. We must pause to consider the probable absence of initiative on the part of the insect. It is more likely influenced by the temperature, the North wind being the cooler, and, for some reason not explained, awakening in the insect the dormant instinct of migration.

An instance of the gathering of thousands of Anosia in one tree and the fact that they remained there with occasional short excursions, until a change of wind and temperature, was noted in Burlington, Iowa, the last week of September, 1905. The fact that these insects alight on trees in such swarms as to give their color to the tree, has been often recorded. This is not the only evidence of their flocking. There is the best of authority for stories of southward migration. Some have reported clouds so dense as to at times cast a shadow. Dr. Scudder relates a flight on September 2, in New Hampshire, when the southward flight of a swarm was observed by himself. He states that they stretched out in a thin stream that occupied hours in passing. He estimated that in a limited field in front of him, they were passing at the rate of 1,500 per hour. It is little wonder that they are said to fill a tree, bending the twigs to breaking with their weight. Granting that these accounts of large numbers of Anosia in one swarm are exceptional, we can see that spread over this broad land there must be countless millions moving southward every autumn. What advantage, if any, is gained in the association of these insects in swarms, is not easily discerned.

The fact of Northward movement in the spring is not so easily established. As before stated the Anosia is not reported to have been found North of latitude 31 degrees in the winter. When Spring opens neither the egg, pupa or adult is to be found. The milkweed is a foot high in Iowa and much good fodder is awaiting the larvae, before the adult makes its appearance, and lays eggs on the tender unfolding leaves near the tip of the growing plant. Some say that the appearance is not that of a tattered "left over," as is usually the case with hibernating species. They appear as a whole to be a fresher and newer lot; though I have seen some that looked a good deal the worse for wear rather early in the season. There seems little doubt, however, that the new arrivals have not hatched in our region, since there has been no opportunity for larvae to develop and pupate. It seems more probable that they are the spring brood from an earlier season in the south. We must not, however, confuse them with those that disappeared in that direction last fall.

In Southern Iowa it seems probable that the eggs laid by the first arrivals produce a new brood in July. These in turn produce the brood that soon after arriving at maturity southward. We seem to have two broods; while New England and northern climes have one only, and that one, from the eggs of the first brood hatched in our latitude. The northward migration is continued to Hudson Bay and north of the range of the food plant of the larvae; a significant fact, in itself, proving the migration of the species. The northern boundary of the food plant limits the adult of other species sharply. This is noticeably the case with Papilio ajax in southern Iowa, where a species very abundant south of us is limited by the food plant, the Pawpaw, which disappears near the 40th parallel.

There are several known peculiarities of this insect that especially fit it for this sort of a life. The well known immunity from molestation by insectivorous birds, the comparatively long intervals between oviposition, enable a butterfly of this species to scatter its progeny over a great territory, since but one egg is laid in a place. The slow northward movement of the season in spring allows time for additional broods further South. The adults that first arrive here in the spring are supposed to be from larvae grown several hundred miles to the southward, where there may be four or more broods in one season. This northward movement may therefore be considered a sort of a relay race. The returning hosts contain none of the brood that came northward, since the life of an insect after final oviposition is usually short and its excuse for existence has expired.

Granting that the seasonal migration of this butterfly is established, we may say that this is merely another way in which nature replenishes the earth after the life destroying frosts of winter, so fatal to insect life. Hibernation has its advantages, and does not call for so complex an adaptation. Why Anosia has this different means of preservation is as much a puzzle as ever. This illustrates anew a striking observation by Mr. Frank Springer, the paleontologist, when sepaking of the marvelous perfection to which an organism may be brought through a period of development, only to be apparently discarded and the whole problem worked out in an entirely different way in succeeding forms. He says

that "it seems as though Nature delights to show in how many different ways the same result can be accomplished." In this case, it seems as though the combination of the striking adaptations of Anosia have made it second only to the Pieris rapae, or "cabbage butterfly", in numbers and distribution over the earth.

In recent times this insect has spread to Australia, and from there to all the East Indies and the Philippines. It is captured in Europe with increasing frequency, and will doubtless be as successful in the old world as in the new. It is a harmless species and will not prove as unwelcome as has the little white pest in this country. We may wish it success in its efforts to colonize the East, and fear no reports of misbehavior to discredit the benefits to be derived from New World expansion. As a rule we have given them few plants and animals that have merited their disapproval. The Phylloxera is a notable exception, since it threatens the vinyards of the Old World. On the other hand you can hardly name a weed or obnoxious animal in this hemisphere that has not been imported to our country. At all events the behavior of Anosia will be watched in the Old World with a growing interest to see if it will there develop any new and interesting traits.

MAURICE RICKER.

Burlington, Iowa, September, 1905.

SUBFAMILY NYMPHALINAE.

The Nymphs.

Butteryfly—The butterflies of this subfamily are mainly of moderate or large size, though some of the genera contain quite small species. The antennae are always more or less heavily clothed with scales, and are usually as long as the abdomen, and in a few cases even longer.

It is impossible to briefly describe these butterflies because they vary so much. It is the largest of the subfamilies.

Key to Genera.

1. Palpi nearly connivent, porrect 2.
2. Eyes naked 3.
   Eyes hairy 13.
3. Club of antennae short, ovoid, usually flattened in dry specimens 4.
   Club of antennae obconic or generally terminating in a knob. 12.
4. Outer margin of fore wings sinnous.

4a. Upper surface with eye spots, Euptoieta, P. 51
   Upper surface without eye spots, Speyeria, P. 52
   Outer margin of fore wings not sinnous 5.

5. Large or medium size; cell in secondaries closed or open 6.
   Small cell in secondaries open 10.
6. Color of both wings fulvous, with silver spots 7.
   Fore wings fulvous, hind wings black Semnopsyche.
   Color of both wings fulvous, without silver spots 9.
7. Two innermost sub-costal nervules arise before or at the end of the cell 8.
8. Branch to the median vein of the front wings Argynnis, P. 54
   No branch to the median vein of the front wings 9.
9. Only one sub-costal nervule vein arises before or at the end of the cell Brenthis, P. 69
10. General color fulvous or black Lemonias, P. 72
   General color fulvous, with a prominent black border; no silver spots on the under side 11.
11. Under side of hind wings brownish or brownish yellow Phyciodes, P. 78
12. Hind wings not tailed; ground color black, fulvous or mahogany brown Basilarchia, P. 102
13. A golden or silver spot on under side of hind wings Polygonia, P. 84
   No golden or silver spot on under side of hind wings 14.
14. Apex of fore wings somewhat truncate, the angles rounded Vanessa, P. 98
   Apex of fore wings distinctly truncate, the angles sharp 15.
15. Ground color deep fulvous or brown; black bar across the cell of fore wing; black border or submarginal band Eugonia, P. 90
   Ground color maroon brown, out margin yellow, supplemented by a row of blue spots Euvanessa, P. 96
   Ground color brown, submarginal band fulvous Aglais, P. 97

THE VARIEGATED FRITILLARY, Euptoieta claudia, Cramer. Fig. 40.

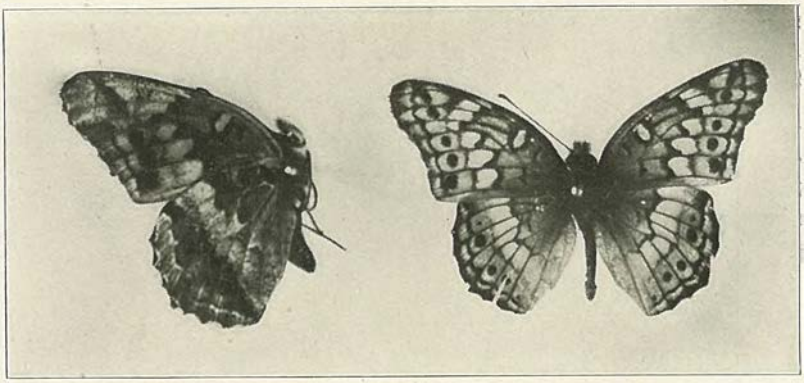


Fig. 40. **Euptoieta claudia**, from Miles City, showing upper and lower surfaces.

Butterfly—Expanse of wings from 1.75 to 2.75 inches, 45-70 mm. Upper side of both wings fulvous or dull ferruginous, darker toward the base, crossed by an irregular black median line, which is darker, broader, and more zigzag on the fore wing than on the hind wing. This line is followed outwardly on both wings by a pair of more or less blackish spots. The outer margin is black, fringes pale fulvous, checkered with black at the end of each nervule. At the end of the cell in the fore wing there are two black lines inclosing paler fulvous spots, and both wings near the base have some curved black lines.

Under side of fore wings fulvous to the zigzag line, with discal pale spot. The outer half of the wing is pale, with a little submarginal reddish wash below the apex, and a large gray triangle on the costa. A brown spot near the posterior angle sends a marginal streak toward the apex.

The hind wings are pale brown in the basal half, streaked with white along the veins, and with transverse striae of darker brown. Beyond the middle they are whitish, shading off into the same brown as the base, with more or less whitish along the margin, the anal portion of the outer half being nearly as dark as the base, while the costal portion is almost white. There are about three indistinct marginal ocelli.

Early Stages—The egg is conoidal, depressed at top, flat at base marked by about twenty longitudinal ribs, half of which reach the summit. Mature larva is 1.2 inches, 28 mm., cylindrical, of an orange ochre color, smooth, striped longitudinally with black, which is almost concealed by the white spots that cover it. The chysalis is .8 inch, 21 mm. long, pearl white, irridescent, marked with dark brown patches and points. On the abdomen there are four rows of conical tubercles. There are two or three broods during a season, the last one probably hibernating in the larval state. It feeds on violet, passion flower, mandrake, Sedum, Desmodium, and Portulaca.

Distribution—The species has been taken as far north as Long Island and Connecticut, though it is a rare visitor in New England; it is quite common in Virginia and thence southward, and occurs not infrequently in southern Illinois and Indiana, ranging westward and southward over the entire continent to the Isthmus of Panama, and thence extending over the South American Continent, wherever favorable conditions occur.

In Montana it has been taken by Cooley at Forsyth and in Gallatin County, and by Wiley at Miles City. At the latter place it is common, but averaging smaller in size. The species seems to be confined to the Great Plains region of the state, although later collections may show it farther west than it seems from present records to be.

THE REGAL FRITILLARY.

Speyeria idalia, Drury. Fig. 41.

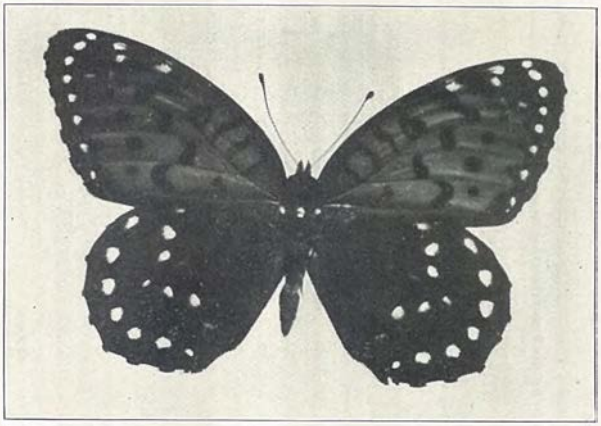


Fig. 41. **Speyeria idalia, Drury.**

Butterfly—Expanse of wings from 2.75—3.6 inches, 70-90 mm.

Male. Upper surface of fore wings fulvous, black along the costa, with a black outer border which is a little wider than the costal border; base and hind margin brown; three black bars in cell, another bar at the end with an open S united to it enclosing a fulvous spot; beyond the cell runs a transverse zigzag line, a submarginal row of black dots, and next the border a row of black crescents. Hind wings black, with violet reflections; base of wings washed with fulvous; a black spot in cell, an irregular row of yellowish spots beyond cell, and a marginal row of fulvous spots; fringes alternate spots of black and white. Under side of fore wings fulvous, white along the costa, a marginal row of silver spots enclosed in black crescents, and some silver on the costa near the apex; black of upper side repeated; under side of hind wings yellowish brown, with twenty-nine silver spots and patches, besides some silver shading.

Female differs from male in being larger, with broader terminal band, which contains a row of white spots, with six or more white spots near the apex, the outer row of spots on the hind wings of same color as the inner.

Early Stages—Egg conoidal, truncated, rounded at base, marked vertically with eighteen ribs. Larva hatches in about twenty-five days. Larva at maturity 1.75 in., 45 mm., long, velvety black, banded and striped with ochre yellow changing to dull orange or red, and furnished with six rows of fleshy spines, each with several black bristles; head red above and black beneath. Chysalis an inch long, brown and yellow on abdomen, remainder pinkish brown or brown. The larva feeds on violets.

Geographical Distribution—Wiley has collected it at Miles City. It is not reported from other places, and the Wiley collection has but a single specimen. It is reported as common from Maine to Nebraska. It is to be expected the species would be found in the eastern end of the state. In the eastern states it is rather local, and frequents open spots on the borders of woodlands. At times it is apparently common, and then for a succession of seasons is scarce. It flies from the end of June to the beginning of September.

THE FRITILLARIES, THE SILVER SPOTS, THE ARGYNNIDS.

Genus Argynnis. Key to Species.

1. Under side of wings with silver spots 2.
   Under side of wings without silver spots 6.
2. Basal half of wings fulvous brown, strong colored sub-marginal band leto, P. 56
   Less than half the wings brown 3.
3. Under side of hind wings with a light sub-marginal band 5.
   Under side of hind wings without a light sub-marginal band 4.
4. Under side hind wings brown aphrodite, P. 57
   Under side hind wings olive green 9.
5. Under side of hind wings light brown aphrodite, P. 57
   Under side hind wings maroon atlantis, P. 63
   Under side apex fore wings buff, base pale cinnamon red electa, P. 63
   Under side hind wings apex buff, mottled with green eurynome, P. 64
   Under side hind wings basal two-thirds reddish brown, size large, cybele, P. 54
   Under side hind wings deeply ferruginous bremneri, P. 62
   Under side hind wings dark reddish brown rhodope, P. 62
6. Under side of hind wings ferruginous 7.
   Under side of hind wings greenish 8.
7. Spots yellowish white hesperis, P. 61
8. Spots dull green, eurynome, var. artonis, P. 65
   Spots dull green ,dark at outer edge, eurynome, var. clio, P. 65
9. Under side hind wings olige green
   Ground color green, spots large edwardsii, P. 59
   Ground color yellow and buff nevadensis, P. 60

THE GREAT SPANGLED FRITILLARY.

Argynnis cybele, Fabricius, Fig. 42.

Butterfly—The expanse of wings of specimens in the eastern states is from 3 to 4 inches, or 76 to 102 mm. Upper surface fulvous or yellowish brown, more yellowish in the male than in the female. In the cell of the fore wings five black bars, except in the fourth bent outward in the lower half, the two outer united above. Beyond the cell are the usual zigzag black line and the subterminal row of dots, the middle ones of the fore wings the largest. Just within the outer margin is a termnial narrow line, and within this, and on the fore wings with their points resting on this line, is a row of crescents; the fore wings edged with the same color. The cell of the hind wing with three more or less distinct bars.

Under side of fore wings pale yellowish brown, the apical space yellowish and enclosing a bright brown costal patch; the lines and dots the same as above, but near the apex more brown. The apical five or six of the spaces enclosed within the submarginal crescents are wholly or partly silver, with three silver patches within this line.

The hind wings have the basal two-thirds reddish brown more or less mottled with yellow, the outer boundary of this color a row of seven silver spots. Outer margin brown, fading into yellow at the anal angle, and within this another row of seven large silver spots rounded within and edged with brown. Between these two rows is a bright yellow band without spots.

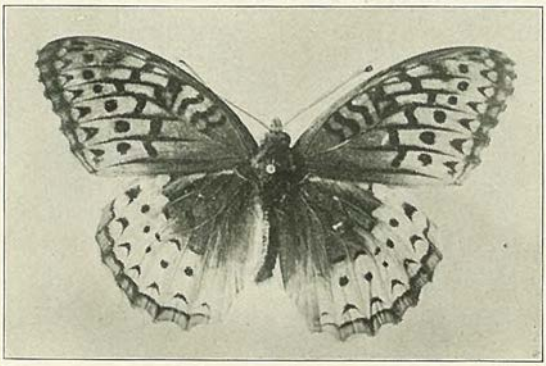


Fig. 42. Argynnis cybele.

Early Stages—The egg is short, conoidal, ribbed like those of other species, and honey-yellow. The larva in mature state is 1.8 to 2 inches long, velvety black, chocolate-brown underneath. The body has six rows of slender black spines, generally ornamented with orange red at the base, and beset with many short black bristles. The caterpillar is nocturnal, and feeds on violets. It hibernates immediately on hatching from the egg, feeding to maturity the following spring. The chrysalis is dark brown, mottled with reddish brown or slaty grey.

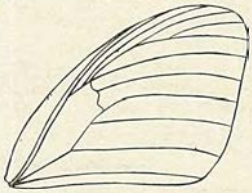


Fig. 43. Venation of Argynnis leto.

Distribution—It is from the Atlantic westward to Nebraska. Barber, 1894, reports it from the northwestern part of Nebraska. It has been taken at Edmonton, B. C., where it was found flying with **A. lais** by Captain Gamble Geddes, in 1883. A single specimen is in the Wiley collection from Miles City. taken June, 1900. It is a trifle less than three inches expanse, and placed side by side with specimens from Michigan, Ohio, and Illinois is indistinguishable from them. It has been taken at no other place in the state, and only the one specimen has been taken at the present writing.

THE LETO BUTTERFLY.

Argynnis leto, Edwards. Figs. 38, 43, 44, 45.

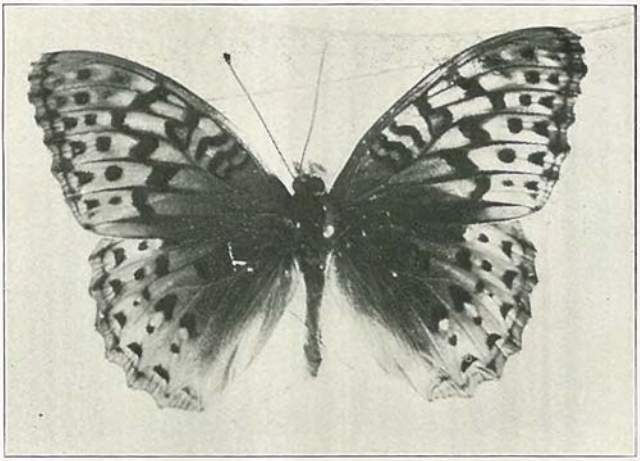


Fig. 44. **Argynnis leto**, male.

Butterfly—The male on the upper side is a dull fulvous with the characteristic black markings of the genus; the basal area is darker. The under side of the fore wings is plae fulvous upon which the markings of the upper side reappear. Both wings on the under side, are shaded with brown toward the base; the hind wings are traversed by a sub-marginal band of light straw yellow. The female is marked as the male, but the general color is pale straw yellow, and all the darker markings are deep blackish brown, those at the base of both wings being broad and running into one another, so that the inner half of the wings appear to be broadly brownish black. On the under side it is also marked the same as the male, but with the dark portions blacker and the lighter portions pale yellow. The marginal row of light spots on the hind wings appears on the under side as silver crescents; there are three rows of silver spots on the brown part of the wing. Expanse 2.50 to 3.25 inches, 64 to 83 mm.

Early Stages—Unknown.

Distribution—It occurs in California, Oregon and Montana. In Montana it is found on both sides of the mountains. In the western part it is abundant about Flathead lake. It is a beautiful insect, demanding the attention of the collector, frequenting the more open woods, skirting the bushes by the roadsides, or frequenting the sunny open places in the woods. It has been taken, in addition to that mentioned, at Mount Lolo, Missoula, the Mission Mountains, and the Yellowstone Park by Elrod, at New Chicago by Douglass, at Helena by Brandegee, and at Miles City by Elrod. A male was collected at Miles City in July, 1893, and a female in Yellowstone Park in September, 1894, both identified by Edwards. It is likely to be found in most parts of the state, and will ornnament any

collection. Allen reports a female **nokomis** from Dillon. I have not seen the specimen, but think it may be **leto.**

Fig. 45. **Argynnis leto,** female.

THE APHRODITE FRITILLARY.

Argynnis aphrodite, Fabricius. Figs. 46, 47.

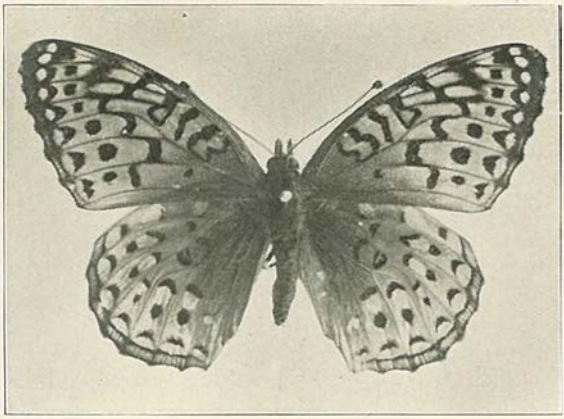


Fig. 46. **Argynnis aphrodite,** var **alcestis,** upper side.

Butterfly—Expanse 2.25 to 3 inches, 57-76 mm. Upper surface of wings bright reddish fulvous; the basal third of both wings washed with cinnamon brown. The black markings similar to **cybele** and **leto.** The median zigzag line is often broken. The two lines at the outer margin of the female are more or less blended, and the two are present on the hind wings of both sexes. The under side of the fore wings is pale reddish fulvous, the apical portion and along the costa buff, with pale brown markings; six marginal and three sub-marginal silver spots. The

hind wings are cinnamon brown with a narrow sub-marginal band. The silver spots are more or less edged with black.

Early Stages—The eggs are short, conoidal, honey yellow and ribbed. The caterpillar has a velvety black spot at the base of each spine, the chrysalis has the tubercles on the back short, and the basal segments are partly colored. The caterpillar feeds on violets.

Distribution—It is found in the northern and middle western states. Taken in the state by Wiley at Miles City, and by Elrod at Missoula. Cooley has one specimen from near Bozeman at 4,200 feet, July 20. Coubeaux reports it common in Bear Paw Mountains.

Var. **alcestis,** Edwards, Fig. 47, the Ruddy Silver-spot is very much like aphrodite, but distinguished from it by the fact that the hind wings are uniformly dark cinnamon brown, without any band of buff on the outer margin. It is of the same expanse as **aphrodite.** It is said to largely replace **aphrodite** in the western states. Indeed, there is likely to be difficulty in separating **alcestis** from the true form of **aphrodite.**

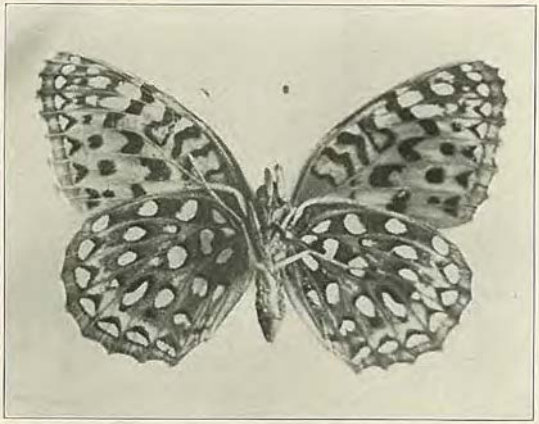


Fig. 47. **Argynnis aphrodite,** var. **alcestis,** lower side.

Alcestis has been taken by Elrod at Missoula and Flathead Lake, by Douglass in the Madison valley. The latter closely resemble **aphrodite** from Miles City. By far the greater number of specimens examined are **aphrodite,** and not var, **alcestis.**

EDWARDS FRITILLARY.

Argynnis edwardsii Reakirt, Fig. 48.

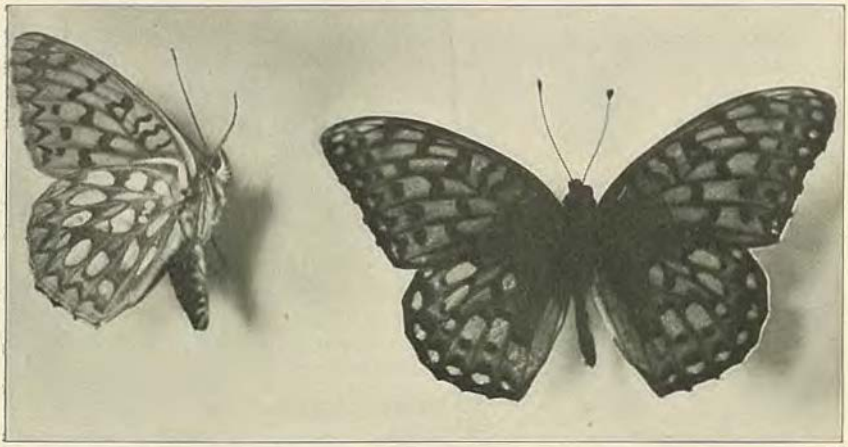


Fig. 48. **Argynnis edwardsii**, upper and lower surfaces.

Butterfly—Expanse of wings 2.30-3.00 inches, 55-75 mm. Ground color pale fulvous, but little obscured with fuscous at base; a heavy black border at base; at least heavier than in **nevadensis**; lighter buff than **nevadensis**, under side of hind wings with large silver spots, olive brown color; the olivaceous of the wings encroaches on the marginal band. It may be known by its large size, by the long and pointed fore wings, and by the great size of the silver spots that ornament its under side.

Distribution—According to Holland the species is not uncommon in Montana and Colorado. In Montana it has been taken by Wiley at Miles City, Douglass at New Chicago, and Fish Creek. Collected by Coues in 1874 on Chief Mountain.

Remarks—Attention was called in the introduction to specimens identified by Edwards. One specimen sent by Wiley and another by Elrod from Miles City in different years were identified respectively as **nevadensis** and **edwardsii**. When placed side by side they are indistinguishable either in size or markings. Larger specimens from low elevation are likely to be called **edwardsii**, smaller ones from higher elevation **nevadensis**. We believe that experiments in breeding will show the two species to be one.

THE NEVADA FRITILLARY.

Argynnis nevadensis, Edwards, Figs. 49, 50.

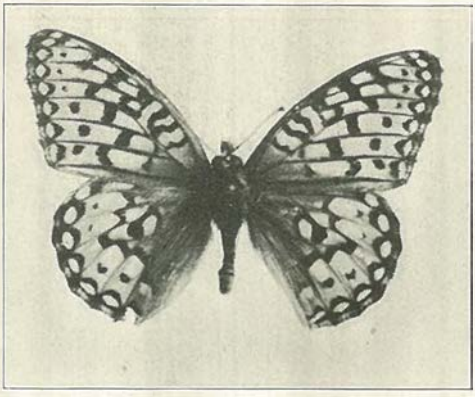


Fig. 49. **Argynnis nevadensis,** upper side.

Butterfly—Expanse of wings, male, 2.50-3.00 inches, 63-75 mm.; female, 3.00-3.50 inches, 75-88 mm.

The ground color is pale fulvous, but little obscured with fuscous at the base. The outer margins are heavily bordered with black. The dark markings of the discal area are not heavy. The fore wings on the under side are pale buff, the spots well slivered; the hind wings are greenish; the belt is narrow and clear, and the spots are large and well slivered. The female is much like the male, but larger and paler. The outer margin of the fore wings in the female are more heavily marked with black and marginal spots are light buff in color.

"It is allied to Edwardsii in shape, and forms a sub-group with it. It is brighter colored, smaller sized, and beneath the ground color is yellow and buff, mottled in the male with pale olive-green, and in the female with darker buff" (Edwards).

Distribution—This species is found in the Rocky Mountains of Utah, Nevada, Montana, and British America. Specimens have been taken from Tobacco Root range by Douglass; Missoula by Elrod; Swan Range, 7,600 feet, by Elrod; Lolo Hot Springs by Elrod; Mount Ascension near Helena, by Brandegee; Shields river, 9,000 feet, Gallatin Valley, East Flathead, Park county, by Cooley. It thus ranges from 3,200 feet to 9,000 feet altitude. Collected by Coues in 1874 at Three Buttes, August 8

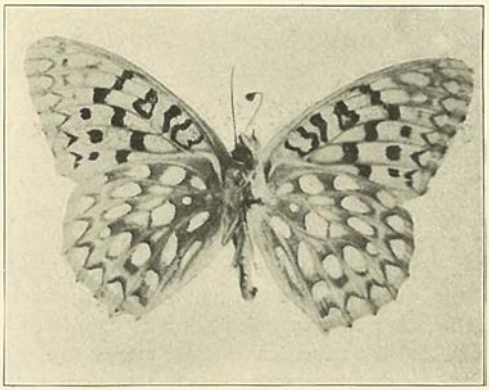


Fig. 50. **Argynnis nevadensis,** lower side.

THE HESPERIS FRITILLARY.

Argynnis hesperis, Edwards. Fig. 51.

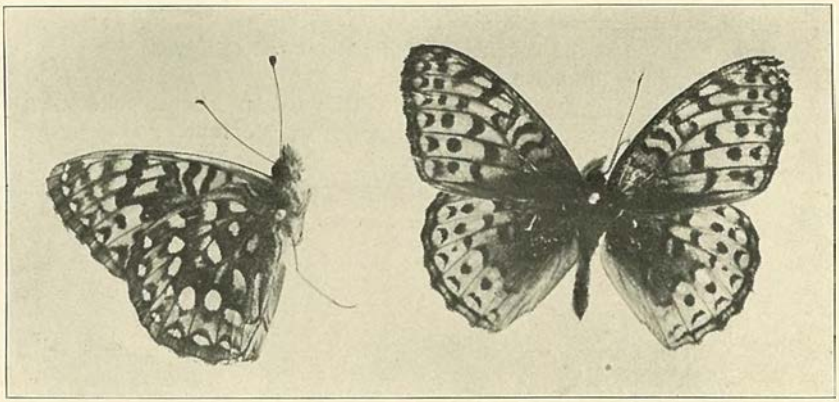


Fig. 51. **Argynnis hesperis,** upper and lower surfaces.

Butterfly—The male on the upper side of the wings is fulvous, shaded with dark fuscous for a short distance from the base. The black spots of the median band are rather broad, and seem to coalesce through dark markings along the nervules. The under side of the fore wings is pale ferruginous, tinged with a little buff at the tips. The under side of the hind wing is dark ferruginous with a narrow buff sub-marginal band. Ground color of the female is paler than the male. In neither are the light spots marked with silver; they are opaque, yellowish white. Expanse, 2.25-2.40 inches, 57-61 mm.

Early Stages—The life history remains to be learned.

Distribution—The butterfly is found among the mountains of Colorado and Montana.

It has been taken by Elrod in the National Park, at Missoula, in the Swan Range, and on Mount Lolo near Missoula. Cooley has a specimen from Bozeman at 4,800 feet. Brandegee collected it near Helena, and Barnes at Aldridge. Rare in the Bear Paw Mountains, according to Coubeaux.

THE RHODOPE SILVER-SPOT, Argynnis rhodope, Edwards.

Butterfly—Expanse, male, 2.20 inches, 55 mm.; female, 2.40 inches, 60 mm. The upper side of the male is bright fulvous, both wings on the inner half heavily clouded with dark fuscous. The black markings are very heavy and confluent. The outer border is solid black, very slightly, if at all, interrupted by a narrow marginal brown line, in this respect resembling **atlantis.** On the under side the fore wings are dark ferruginous, on the outer margin rich dark brown. Between the spots at the end of the cell and the nervules below the apex are some clear, bright straw-yellow spots. The upper spots of the marginal series are silvered. The hind wings are dark reddish-brown, very slightly paler on the line of the marginal band. The spots are pale straw-yellow, except those of the marginal series, which are distinctly silvered. The female on the upper side is of a lighter and brighter red, with the markings dark and heavy as in the male sex. On the under side the markings in the female do not differ from those in the male, except that the primaries on the inner half and at the base are bright pinkish-red (Holland).

Early Stages—Unknown.

Distribution—The insect flies in British Columbia. Coues collected a single female August 8, 1874, near Three Buttes, Montana. This is the only record of its capture in the state.

BREMNER'S SILVER-SPOT.
Argynnis bremneri, Edwards. Fig. 52.

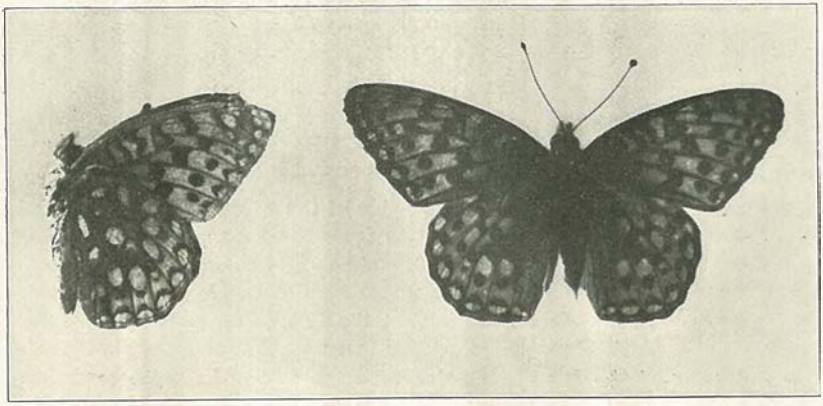


Fig. 52. **Argynnis bremneri.**

Butterfly—Expanse, 2.4 to 2.7 inches, 60 to 70 mm. The male on the upper side is bright fulvous. The black markings, especially those about the middle of the wings, are heavy. Both wings at the base are

clouded with fuscous, the under side of a primaries red toward the base, buff on the apical area; the sub-apical and the upper marginal spots well silvered; the hind wings with the inner two-thirds more or less deeply ferruginous, a little mottled with buff, very rarely encroached upon by the dark color of the inner area, except occasionally near the angle (Holland).

Early Stages—Undescribed.

Distribution—Found in Oregon, Washington, Montana, southern portions of British Columbia and VanCouver's Island. Specimens in the University of Montana collection from Flathead lake by Elrod, and from Tobacco Root Mountains by Douglass. The specimens show the under side of lighter color than from Vancouver, but with the characteristic heavy black markings.

THE ELECTA SILVER-SPOT.

Argynnis electa, Edwards.

Butterfly—Expanse, 2.00 to 2.25 inches, 51 to 64 mm. The male is dull-reddish fulvous on the upper side. The black markings are narrow. The base of both wings is slightly obscured. On the under side the fore wings are pale cinnamon-red, mottled on the disk with a little buff. The sub-marginal band is buff, quite narrow, and often invaded by the ground color of the inner area. The silvery spots are usually very well marked and distinct, though in a few instances the silvery color is somewhat obscured. The female has the black markings a little heavier than the male; otherwise there is but little difference in the sexes (Holland).

Early Stages—Unknown.

Distribution—Among the mountains of Montana and Colorado. Holland says it is often confounded with atlantis, but is wholly distinct, smaller in size, the fore wings relatively broader, and the markings not so dark on the upper surface. We have not taken it.

THE MOUNTAIN SILVER-SPOT.

Argynnis atlantis, Edwards. Fig. 53.

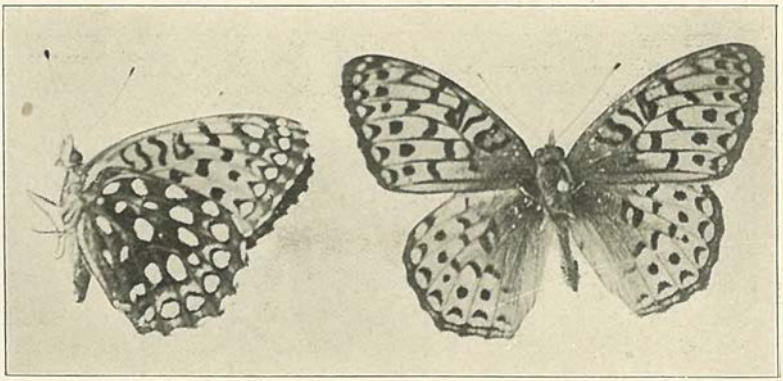


Fig. 53. **Argynnis atlantis,** upper and lower surfaces.

Butterfly—Expanse of wings, 2.25-2.50 inches, 55-65 mm. Upper surface fulvous, obscured by brown scales on the fore wings from the second bar in the cell obliquely to below the median zigzag line on the hind margin; the two marginal lines so blended that not much of the ground color is left. Marks as in **A. aphrodite.** Under side of fore wings reddish fulvous, costa and apex light buff, the apical patch and outer margin brown, with the apical silver spots, six marginal, three sub-marginal; hind wings dark red brown, much mottled with greenish gray or drab, the sub-marginal band pale yellow, usually pure from margin to margin. Silver spots as in **aphrodite.**

This insect resembles **aphrodite;** it is distinguished from that species by its smaller size, its somewhat narrower wings, the deeper color of the base of the wings on the upper side and their darker color on the under side. The sub-marginal band is pale yellow, narrow, but distinct and always present.

Early Stages—The egg is conoidal, with twelve to fourteen ribs, honey yellow. The caterpillars are hatched in the fall and hibernate without feeding until the following spring.

Caterpillar—The head is dark blackish brown. The body is velvety-purple above, a little paler on the underside. The usual spines occur on the body, and are black, grayish at the base. The larva feeds on violets.

Crysalis—Light brown, speckled, except on the abdominal segments, with black.

Distribution—The species has a wide distribution. It ranges from Maine to the mountains of western Pennsylvania, thence southward along the central ridge of the Alleghanies into West Virginia. It is found in Canada, extending westward into the Rocky Mountains.

In the state it has been taken at Missoula, Mount Lolo, and Flathead Lake by Elrod, and at Bozeman by Cooley. It does not seem to be represented in Wiley's collections. According to Coubeaux it is common in the Bear Paw Mountains.

THE EURYNOME FRITILLARY.

Argynnis Eurynome, Edwards. Fig. 54.

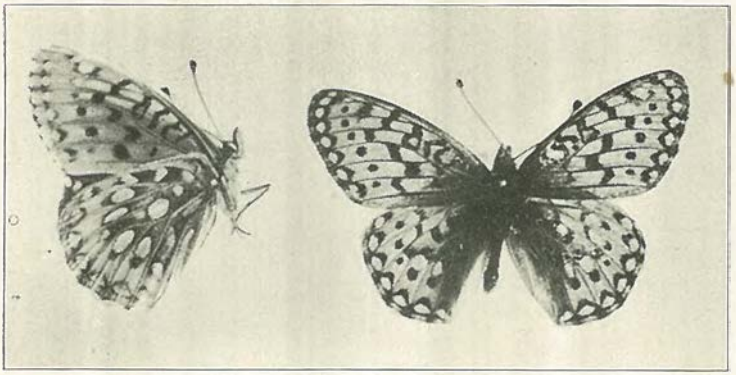


Fig. 54. **Argynnis eurynome.**

Butterfly—Expanse, male, 1.70-2.00 inches, 45-50 mm.; female, 2.00 inches, 50 mm. The wings on the upper side of the male are bright yellowish fulvous, but little obscured at the base. The outer margins are edged by two fine lines which are occasionally confluent. The under side of the fore wings is pale buff, laved with cinnamon brown at the base and along the nervules; the spots on the margin and in the apical area are well silvered. The hind wings on the under side are buff, with the basal and discal areas mottled with pale brown or pale olive-green. The marginal belt is broad and clear buff; all the spots are well silvered.

The female is like the male, but paler, with the dark markings, especially those of the margin, heavier; the marginal spots inclosed by the lunules are much paler than the ground-color, and in many specimens almost white. On the under side the wings in this sex are like those of the male, but the fore wings are more heavily laved with ciannamon-brown at the base.

Early Stages—The egg has been figured by Edwards, otherwise we must say unknown.

Distribution—Common in Colorado, Montana, and British America, showing much variation. Dyar calls **erinna, bischoffi, artonis, clio, arge** and **cunninghami** varieties of the species. Eurynome has been taken in the state by Cooley at Bozeman, 4,800 feet, and 9,500 feet; by Elrod in the Swan Range at 6,500 feet, Flathead at 3,000 feet, and Mount Lolo; by Douglass in the Tobacco Root Mountains 8,000 feet, Madison valley, Ruby Mountains; by Brandegee on Mount Ascension and near Helena, and by Barnes at Aldrich. Coubeaux says it is rather common in the Bear Paw Mountains. Allen has collected it at Dillon.

Var. **Clio**, the Clio Fritillary. The spots on the underside are without silver. Otherwise like the type.

Taken by Cooley in Gallatin County at 6,800 feet elevation, and at Shields river at 6,700 feet. A specimen with very little silver was taken by Elrod in the Swan range at 6,700. A female taken by Dr. Coues at Chief Mountain August 21, 1874.

Holland says "The female very closely resembles the female of **artonis**, and in fact I am unable to distinguish the types of the two species by any marks which seem to be satisfactory."

Var. **bischoffi**, Bischoff's Fritillary, is like the type, but the upper side is heavily obscured by black, concealing the basal wing markings. The female has the spots within the lunules pale and almost white. It is a boreal form.

Taken by Cooley. Three specimens, one from Shields river, 6,700 feet, two from Gallatin county, one at 8,300 and one at 9,400 feet.

Var. **artonis**, the Artonis Fritillary, may be distinguished "by the entire absence of silvery scales upon the under side of the hind wings, and also by the fact that the silver spots on the under side of the hind wings are not compressed and elongated as much as eurynome, and by the further fact that all the dark marginal markings of the under side are obliterated. In the female the dark markings underneath are heavier. It has been found in Colorado, Nevada, Utah and Arizona. We have one specimen from the Yellowstone Park.

Butterflies at Miles City, Montana.

A barren country surrounds Miles City, the center of the great grazing territory of eastern Montana, a country of prairie and badlands with little verdure other than that on the immediate border of the rivers and in the creek bottoms.

Here a lover of groves and forests must be content with a variety of trees that might easily be enumerated on his ten fingers, and but few of even these.

Cottonwoods, broken and scrawny, are the only trees of large size near the city, but as one penetrates the country to the heads of the Yellowstone's many tributaries, he meets with ash, elm, box-elder and willows, all native varieties, and differing somewhat from the same trees of the eastern states.

In the badlands and in the hilly sections are pines and cedars also, but the majority of our country is a vast prairie, grass clothed, but bare of tree or shrub (the ever-present sage-brush excepted) and parched by the sun from July until winter.

What limited amount of shrubbery does occur is also confined to the water-courses. We have our native choke-cherry, wild rose, plum, willow, snowberry, buffaloberry, greasewood and sagebrush, a meagre list indeed, when compared to the hundreds of shrubs and brushes abounding in most eastern localities. All vegetation without it may be grasses, and wild flowers occur with us, but in the most limited variety. We have no woods, no swamps, no hedges. What wonder then that the entomologist's hopes are saddened as he realizes that a corresponding dearth exists among his favored and busy tribes.

I wonder who can recount the exact number of Papilios he has seen during three years past? It is my good (?) fortune to have seen just fourteen during that period. In the season of 1891 I saw but one, it was one of the **Turnus** group, probably **rutulus** or **daunus,** its rapid flight however, baffled detection. In May of this year while returning from our ranch, on horseback, a distance of about one hundred miles, I saw another of this same group, but was unable to capture it. During this trip, also, I counted nine **zolicoan,** only one of which was not in rapid flight across country; this one, a female, was depositing her eggs on our native wild parsnips, and I caught her easily, and obtained some twenty eggs, which I reared on cultivated parsnips in my garden. The only other Papilio seen this year was one related to **zolicaon,** but had none of the prominent show of yellow so characteristic of that species when on the wing. What it may have been I cannot say.

Finally, two specimens of **zolicaon** taken on the summit of Signal Butte, near this city, on May 30, 1892, complete the number. I cite my experience with the **Papilios** to give a general idea of the scarcity of species occurring here.

A few species of **Colias, Pieris, Euptoieta, Phyciodes, and Lycaena** occur here, however in sufficient abundance not to be called rare. There exists an unusually localized distribution among most species here, which doubtless results from a similar localization of the foodplants, many of which are to be found only near flowing springs or other sources of moisture. The **Satyrids, Pamphila,** and other prairie varieties, however, may be met with in country of almost any character, as also may such species as the **Argynnids, Pyrameis cardui** or **Danias archippus.**

This season has proven an unusually productive one, and fully twice the number of butterflies were on the wing this year than appeared in either 1891 or 1892.

Our climate and soil are so dry that no agriculture is successful without irrigation, and I attribute this season's productiveness in the Lepidoptera of this immediate vicinity to systems of artificial irrigation, which has been successfully operated here only the last two seasons, and no doubt all insect life so dependent upon vegetation, will steadily increase as the amount and variety of plant-life is multiplied year by year by the introduction of agriculture under our irrigation systems along the Tongue and Yellowstone River bottoms.

In the interest of the readers of the Entomologist News I append a list of the species of diurnals that I have taken about Miles City during a three years' residence here:

Papilio zolicaon, rare.
Pieris rapae, common.
Pieris protodice.
Anthrocharis olympia, not rare.
Colias eurytheme, common.
Colias eriphyle, common.
Danias archippus, rare.
Argynnis idalia, one differing a little from eastern species.
Argynnis edwardsii, not common.
Argynnis nevadensis, not common.
Argynnis cypris, rare.
Argynnis sp., one.
Euptoieta claudia, one of the most common (averaging small in size).
Melitaea, three species; not common and local.
Phyciodes tharos, rather common.
Phyciodes carlota, quite common.
Grapta zephyrus, one.
Vannessa antiopa, not common.
Vanessa californica, one.
Vanessa milberti, rare.
Pyrameis cardui, not rare.
Pyrameis ? sp. nov. sp., possibly Hy. Edy. Hybrid **caryae et atlanta.**
Limenitis weidmeyerii, rare and local.
Limenitis disippus, rare and local.
Coenonympha ochracea, rather common.
Satyrus alope-olympus, rare.

Satyrus oetus, rare.

Satyrus charon, rather common.

Chionobas varuna, several specimens taken at ranch in July, 100 miles east of Miles City.

Thecla niphon, rare and local.

Chrysophanus hypophlaeas, not rare.

Chrysophanus rubidus.

Lycaena melissa, common.

Pamphila, two or three species, all rare.

Pyrgus tessellata, common.

Pyrgus sp., not common.

Pholisora catullus, common.

Eudamus tityrus, one.

Eudamus sp. one.

—C. A. Wiley in Entomological News for February, 1899.

Genus BRENTHIS, Hubner.

Butterfly—Small or medium size; in form and color very much like Argynnis.

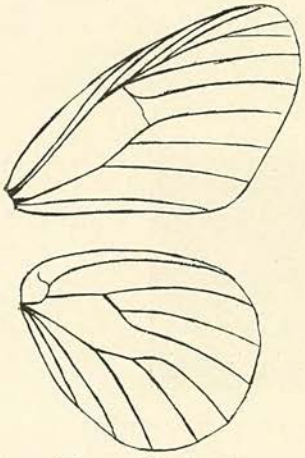


Fig. 55, Venation of Brenthis myrina.

Egg—The eggs are subconical, almost twice as high as wide, truncated at the top, and marked with thirteen or fourteen raised longitudinal ridges connected by a multitude of small cross ridges.

Larva—Smaller and not as dark in color as the larva of **Argynnis.** They feed upon violets.

Chrysalis—It is pendant, about six-tenths of an inch long, and having two rows of sharp conical tubercles on the back.

GENUS BRENTHIS.

Key to Species.

1. Basal part of wings not differing from the rest, 2.
   Basal part of wings black, 3.
2. Under side of wings with silver spots; ocellus at base of hind wings myrina
3. Under side of wings without silver spots and ocellus; a purplish ferrugenous color at the apex, bellona.
   Cinnamon brown at the apex of fore wings; hind wing crossed by a yellow band formed of star-like spots; black ocellus at base of wings, helena.

THE SILVER BORDERED FRITILLARY.

Brenthis myrina, Cramer. Figs. 55, 56.

Butterfly—The upper side of the wings is fulvous; the black markings are light; the borders heavy. The fore wings on the under side are yellowish fulvous, ferruginous at the tip, with the marginal spots lightly silvered. The hind wings are ferruginous, mottled with buff. The spots are small and well silvered. Expanse male, 1.40 inches; female, 1.70 inches, 43 mm.

Egg—The egg is conoidal, about one-third higher than wide, marked by seventeen vertical ribs, between which are a number of delicate cross ribs. It is pale greenish yellow in color.

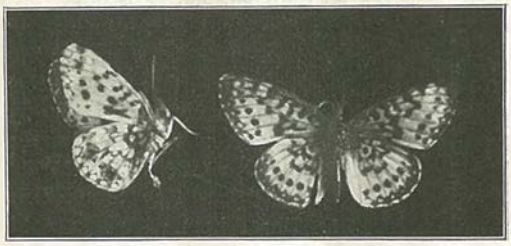
Caterpillar—In its final stage it is about seven-eighths of an inch long, dark olive brown, marked with green; the segments being adorned with fleshy tubercles armed with needle-shaped projections.

Chrysalis—It is brownish yellow, spotted with dark brown spots, those of the thoracic and first and second abdominal segments having the luster of mother of pearl.

Distribution—It has a wide range, extending from New England to

Montana, from Nova Scotia to Alaska, and southward along the ridges of the Alleghanies into Virginia and the mountains of North Carolina. It has been taken rather abundantly at Crow Creek, Flathead Indian Reservation; at Missoula; at Rimini, 5,500 feet, near Helena, by Brandegee. Taken by Barnes at Aldridge.

One day in July, while camped at Crow Creek along the main wagon road between Selish and Polson Brenthis myrina was found abundantly in the grassy creek bottoms. Almost invariably they were taken on the large blue **Erigeron macranthus,** common in the western part of the state. The afternoon was warm, and was spent almost entirely in butterfly collecting. Nearly all the specimens taken were of this species.



Figs. 55 and 56. **Brenthis myrina,** upper and lower surfaces.

August 8, 1904, an afternoon was spent at the upper end of Swan Lake after insects. **Brenthis myrina** was the only common species, resting occasionally on the blue Erigeron or white Achillea. Several dozen were secured, the return to camp revealing two deer in the marsh.

One morning during the last week in August, 1903, as I was wading through the tall wet grass, at the upper end of Swan Lake, just after sunrise, a butterfly was rather abundant above the tops of the grass. The dew was wet and heavy, and no net was at hand. Batting down an insect with my old hat it proved to be of this species. It may be called common west of the range.

THE MEADOW FRITILLARY.

Brenthis bellona, Fabricius. Fig. 57.

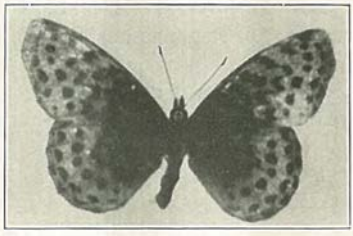


Fig. 57. **Brenthis bellona.**

Butterfly—Pale fulvous on the upper side, with the dark markings on the inner half of the wing narrow, but more or less confluent. The

dark markings on the outer margin are slighter. On the under side the fore wings are pale fulvous, spotted with purple at the tip and outer margin. The hind wings below are ferruginous, mottled with purple. Expanse, 1.65-1.80 inches, 41-46 mm.

Early Stages—Similar to that of **B. myrina,** but the caterpillar in its mature form differs in not having the spines on the second segment of the body lengthened as in that species. Chrysalis, bluish gray in color, marked with dark spots.

Distribution—The butterfly is very common in the whole of the northern United States, as far south as Virginia. It occurs throughout Quebec, Ontario, and British America, as far west as the foothills of the Rocky Mountains. In the state taken by Elrod at Missoula and at Swan Lake; by Brandegee at Rimini, near Helena.

THE HELENA FRITILLARY.

Brenthis helena, Edwards, Fig. 58.

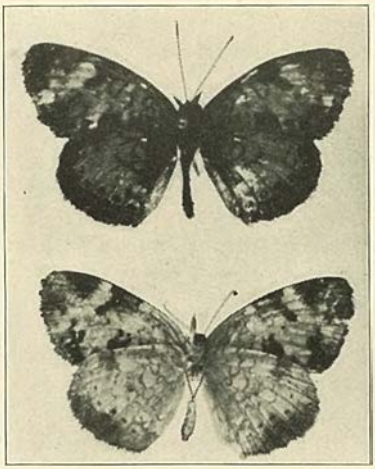


Fig. 58. **Brenthis helena.**

Butterfly—The wings on the upper side are fulvous, greatly obscured by brown at the base of the fore wings and along the inner margin of the hind wings. The usual markings are light, and the marginal border is also not so heavily marked as in **B. myrina.** The fore wings on the under side are pale fulvous laved with ferruginous at the tip. The hind wing brightly ferruginous, with small yellow marginal spots and paler spots inclining to buff on the costal border and at the end of the cell, about the region of the median nervules.

The female is very much like the male on the upper side, but the ground color is paler. On the under side the markings are more conspicuous. Expanse, 1.40 inches, 35 mm.

Early Stages—Unknown.

Distribution—**Helena** appears to be a common species in Colorado, Montana and New Mexico. It is subject to considerable variation, both

in the intensity of the coloring of the under side of the wings and in the distinctness of the maculation.

The collection contains two from Missoula and three from Flathead Lake. Cooley has specimens from near Bozeman June 27, 1900, at 6,800 feet, and July 12, 1900, at 8,000 feet.

THE CHECKER-SPOTS.

Genus Lemonias, Fabricius.

This group includes some of the smaller members of the **Nyphalinae.** The color of the wings is sometimes black, with red and yellow spots; but it is usually fulvous, with the fore wings broadly margined, especially at the apex, with black, and crossed by many irregular lines of black. About fifty species occur in this country.

Key to Species.

1. General color black, with a terminal border of red spots; spotted with red and yellow 2.
   General color red or fulvous, very little black 3.
   General color brownish black 4.
2. Under side brick red with the yellow repeated, size 1.75 to 2.50 inches, 45-64 mm. chalcedon.
   Under side brick red, the yellow wanting cooperi.
   Under side with small spots. brucei
   Smaller, about 1.50 inches, 38 mm., more red and yellow anicia.
   Black above, a row of small, marginal, brick-red spots, size small taylori.
3. Under side of fore wings fulvous, with a little yellow at the apex; hind wings with a great deal of yellow whitneyi.
   Basal area black hoffmanni.
   Under side red, often one row of yellow spots nubigena.
   Under side of hind wings heavily and regularly banded with yellowish white spots, possessing pearly luster acastus.
4. Both wings with marginal rows of red spots leanira.

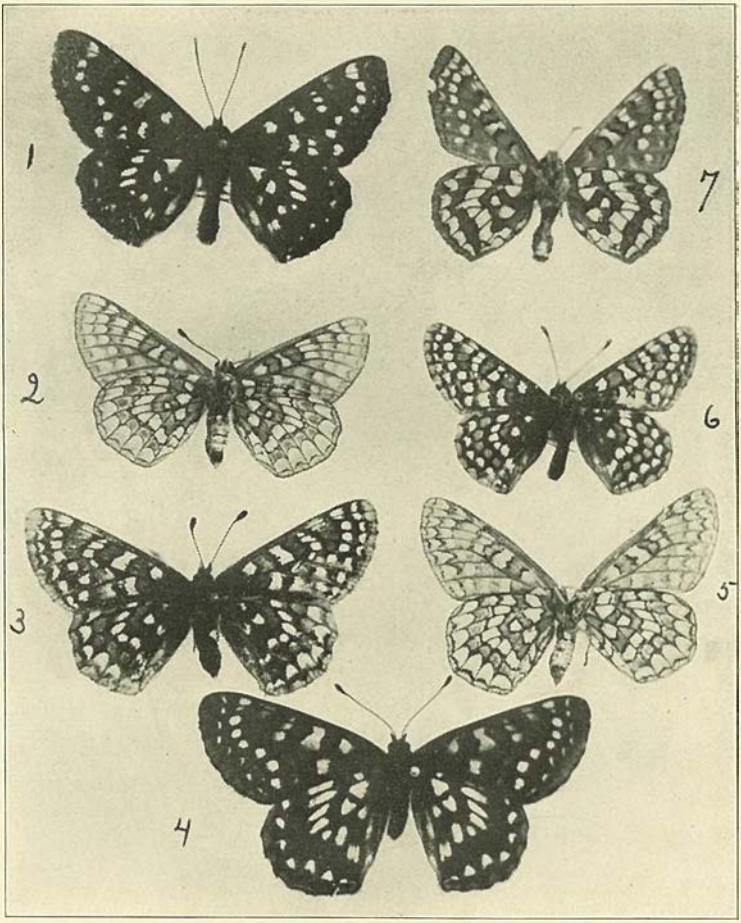
THE CHALCEDON CHECKER-SPOT.

Lemonias chalcedon, Doubleday and Hewitson. Plate IV, Plate I.

Butterfly—Male and female are much alike. The wings are black, spotted with red and ochreous yellow. On the under side they are brick-red with the spots of the upper side repeated, and in addition at the base a number of large and distinct yellow spots. Expanse, male, 1.75-2.00 inches, 45-51 mm.; female, 2.50 inches, 64 mm.

Early Stages—The egg is pale yellowish when first laid, pitted at the base, and ribbed vertically above. The caterpillar is black, with the bristles projecting on the segments quite long. The chrysalis is pale gray, blotched with brown. The food plants are Mimulus and Castilleia.

Distribution—It is common in northern California. In Montana is has been taken abundantly at Missoula. One was captured at Geyser Basin, National Park.



Lemonias chalcedon, upper surface 1 and 4; lower surface, 7; Lemonias anicia, upper surface, 3 and 6; lower surface, 2 and 5.

THE ANICIA CHECKER-SPOT.

Lemonias anicia, Doubleday and Hewitson. Plate IV.

Butterfly—Smaller than chalcedon, with a great deal of red on the basal and discal areas of both wings upon the upper side. Expanse 1.50 inches, 38 mm.

Early Stages—These are unknown.

Distribution—L. anicia is found in Colorado, Montana, Washington, and British America. The University of Montana collection embraces specimens from Geyser Basin (13), Missoula (3), Aldridge (1). Coubeaux calls it tolerably common in the mountains near Big Sandy.

TAYLOR'S CHECKER-SPOT.

Lemonias taylori, Edwards. Fig. 58.

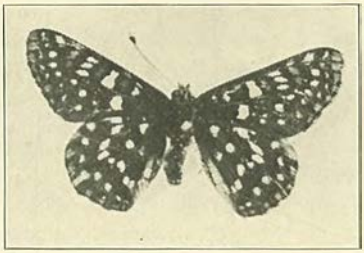


Fig. 58. **Lemonias taylori.**

Butterfly—Expanse of male, 1.25 to 1.50 inches, 32-38 mm.; female, 1.50 to 1.75 inches, 38-45 mm. Ground color black above; a row of small marginal brick-red spots, largest at the apex; two rows of small light yellow or almost quite white spots across fore and hind wings, the outer row on fore wings sometimes reduced to mere specks; on the hind wing there is usually a row of brick-red spots between the rows of yellow spots; within these rows there are about three or four basal yellow spots no larger than the largest spots in the rows; the cell of the fore wings has a small basal yellow spot, then a larger red bar sometimes broken, followed by three yellow dashes making a bar, a large yellow spot, about the middle of the wing below the cell; costa of fore wings brick red, heaviest at the base; the under side is brick-red, the spots above repeated and much larger; on the fore wings the yellow spots are washed over by red, and almost lacking on hinder part of wing; legs, palpi, sides of abdomen brick-red; under side of abdomen same color as yellow spots.

Early Stages—The food is said to be the ribwort plantain (Plantago lanceolata Linn.)

Distribution—It is reported from Vancouver's Island. Prof. Cooley has one specimen from Cascade, on the Missouri river, one from Gallatin County, and one from Missoula; Barnes has several from Aldridge.

BRUCE'S CHECKER-SPOT, Lemonias brucei, Edwards.

Butterfly—Male: Expands from 1.5 to 1.7 inch 38 to 40 mm. Upper side brown-black, marked with spots of red and yellow in transverse bands; there are three well-marked varieties, in one of which red pre-

dominates, sometimes almost to the exclusion of yellow; in another red and yellow, much as in other allied species; on the third much yellow, very little red; so that the black surface is more exposed than in many species.

1. The red form. The spots dull; the common marginal row wholly red, the submarginal row sometimes red on primaries, sometimes red partly replaced by yellow, and secondaries always red and yellow; the the third row is red and yellow on primaries, red on secondaries, the fourth row just the reverse of this; at end of cell on primaries a short red and yellow band, in the cell four spots, red and yellow alternately, from the arc, the yellow ones very small; on secondaries, a red stripe along upper side of cell, two small yellow spots in cell; fringes black at ends of the nervules, yellow in the interspaces.

2. The spots of the second row red and yellow on primaries, yellow on secondaries; the two next costa sometimes red on the posterior side; the yellow spots in cell of primaries large, and a large yellow patch below cell.

3. Nearly all spots yellow; the marginal red; no other red on secondaries, or a mere trace of it indicating the spots of the third row, which are otherwise suppressed; the submarginal row of primaries represented by a few scales only, as are also the spots in cell.

On the under side all three forms agree; primaries dull red, almost without black; the marginal spots a deeper red, the next two rows yellow, the submarginal obsolete on lower half; a yellow patch subapical on costa, another outside arc of cell ;the two cellular spots yellow, dusted red.

Secondaries have all the spots clearly defined; the marginal row red, the second row of yellow lunules; the third wholly red; the fourth yellow, the spots of upper half elongated and cut unequally by a black line from costa to lower discoidal nervule; beyond to base red, with a straight row of four confluent spots from costa to sumedian, and a fifth at end of cell.

Female—Expands 1.7 to 1.8 inch, 40 to 42 mm. Varies as the male, but some examples still more widely, the yellow spots being very large. On the under side as in the male, except that some examples have the red submarginal spots of secondaries slightly edged with yellow; in the more yellow upper side examples the yellow edging to these spots is broader, and even sometimes extends along the marginal side.

This small Melitaea has long been known in collections, but till recently I myself have seen few of them, and knew nothing of its localities or habits. Mr. Bruce, who took great numbers of examples, says: "I found it only on high mountain tops (in Colorado); this was strictly the rule. These tops are in most cases extensive plains covered with flowers, chiefly yellow compositae, and the Melitaeas in question sit on every blossom in numbers, and are very sluggish—or rather I may say, they sit and cling tightly to the flowers to prevent the brisk wind, that is generally blowing at this elevation, from taking them away. I have never seen them down the slope lower than a few hundred yards. It is an abundant species on the Snowy Range at not lower than 12,000 feet, and

must appear early in June, as many of my specimens taken early in July are rather worse for wear."

The species comes also from Montana, Washington Ter., and British America, in the Rocky Mountains. (The above is the original description in Can. Ent.)

THE ACASTUS CHECKER-SPOT.

Lemonias acastus, Edwards.

Butterfly—Expanse, 1.50 to 1.60 inches, 38-41 mm. Prevalently fulvous upon the upper side, and on the under side of the hind wings heavily and somewhat regularly banded with yellowish-white spots, possessing some pearly lustre.

Early Stages—Unknown

Distribution—Nevada, Utah, Montana. We have not taken it.

HOFFMANN'S CHECKER-SPOT.

Lemonias hoffmanni, Behr.

Butterfly—Expanse, 1.35 to 1.45 inches, 35 to 37 mm. General style of marking similar to **L. whitneyi,** but with the basal area black, and the black markings toward the outer margin not so heavy, giving it here a more fulvous appearance. Under side much as in **whitneyi,** but the yellow markings are more prominent. Subject to much variation.

Early Stages—Unknown.

Distribution—Found in California, Oregon, Nevada, Colorado, Montana. We have not taken it.

THE LEANIRA CHECKER-SPOT.

Lemonias learnira, Boisduval.

Butterfly—Expanse, 1.50 to 1.75 inches, 38 to 45 mm. Ground color brownish-black, fulvous on the costa, with submerged median, and basal rows of yellow spots. Both the primaries and secondaries have a marginal row of red spots, and the former have in addition a sub-marginal row of such spots. The under side of the primaries is reddish fulvous, with the markings of the upper side reproduced. The secondaries have a marginal row of crescents, then a black band inclosing yellow spots, then a median band of long yellow crescents. The remainder of the wing to its insertion is black, spotted with yellow.

Early Stages—Unknown.

Distribution—California, Arizona, Nevada, Montana, British America. We have not taken it, nor is it in any of the collections.

THE CLOUDED CHECKER-SPOT.

Lemonias nubigena Behr. Fig. 60.

Butterfly—Expanse, 1.20-1.50 inches, 30-38 mm. Small, characterized by the red ground color of the upper side of the wings. The species is susceptible of great variations. The markings are quite similar to those of other species, but the size is small. In the variety Wheeleri the black ground-color is greatly reduced and almost wholly obliterated on parts of the primaries.

Distribution—Found in Nevada. Collected by Cooley at Bozeman.

Fig. 60. **Lemonias nubigena,** from Colorado.

WHITNEY'S CHECKER-SPOT.

Lemonias whitneyi, Behr. Figs. 61 and 62.

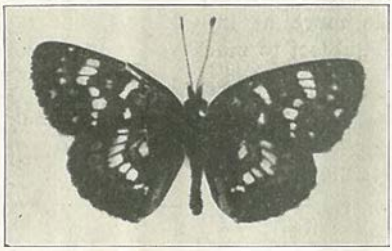


Fig. 61. **Lemonias whitneyi.**

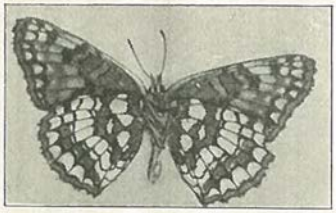


Fig. 62. **Lemonias whitneyi,** under side.

Butterfly—Fulvous upon the upper side. Prominent yellow bands on under side of hind wings. The yellow is more prominent in the male than in the female. Expanse male, 1.50 inches, 38 mm.; female 1.70 inches, 44 mm.

Early Stages—Altogether unknown.

Distribution—It ranges from California into Nevada, north to Montana.

Taken at Sinyaleamin lake in the Mission Mountains by Elrod; near Helena by Brandegee; in Bridger canyon and Gallatin county, elevation 7,500 feet by Cooley; Miles City by Wiley.

COOPER'S CHECKER-SPOT, Lemonias cooperi Behr.

Butterfly and Early Stages—This species is very similar to **chalcedon,** but the want of the yellowish halo around the lunulae of the brown band on the under side, is a very positive diagnostic character. The brown color of the bands also is always of the same somber hue as that of the under side of the fore wings, and never of the fiery brick red that colors this fascia on the under side of **chalcedon,** forming a perceptible contrast to the somber coloring of the under side of the fore wings, which is the

same in **chalcedon** and **cooperi.** With all these well marked differences, the two species look so much alike, that it would have been a long time before **cooperi** would have been recognized as a distinct species, if it had not been for the striking difference of its caterpillar, which was discovered by Mr. Lorquin near Clear Lake on a species of **Scrophularia.** This caterpillar is much more elongated than that of **chalcedon.** It is nearly of the shape and coloration of that of the European **artemis,** brimstone yellow, with a dorsal and a lateral black stripe. We were quite justified in expecting from such a caterpillar something strikingly different from the very common type of **chalcedon.** But to our surprise our chrysalids gave us a series of crippled butterflies, which could scarcely be distinguished from **chalcedon.** Since that time I have received a well developed specimen through the kindness of Baron Koels, who caught it with several other insects on an excursion to Mount Tamal Pais.

It is pretty certain that **cooperi** will be found in many other localities, as it is only its similarity to our most common vernal butterfly, the **chalcedon,** that makes it escape our attention."

(The above was kindly copied by M. E. Hyde, Asst. Sec. Calif. Acad. Sci., from Behr's original description as given in the Proceedings for 1863-68, Vol. 3, p. 90.)

Distribution—Found in Washington, Vancouver's Island, and the Big Horn Mountains, Montana.

THE CRESCENT SPOTS.

Genus PHYCIODES, Doubleday. Fig. 63.

Butterfly—Generally quite small. Their wings on the upper side are fulvous, or brown, with black margins, spots and lines, and with the under side of the wings reproducing the spots of the upper side. Of the spots of the under side of the wings one of the most characteristic is the pale crescent situated on the outer margin of the hind wings. In the neuration of the wings these butterflies are much like Lemonias.

Fig. 63. Venation of Phyciodes.

Eggs—The eggs are always higher than broad, having a thimble-like appearance.

Caterpillar—The caterpillar is cylindrical, marked with longitudinal stripes, and adorned with tubercles. They do not so far as known weave webs.

Chrysalis—It is pendant, with the head slightly bifid. The color is generally some shade of pale gray, spotted with black or brown.

They are found in South and Central America, the United States and Canada.

GENUS PHYCIODES.

Key to Species.

1. Broad central band of white or light buff on under side 2.
   Central band of under side narrow or wanting, sub-marginal row of spots small 3.
2. Sub-marginal row of spots on under side with no more than one pupiled with white carlota.
3. Upper side of fore wings with fulvous bands 4.
   Upper side of fore wings with whitish bands 5.
4. Fulvous band broad, narrow black border tharos
   Fulvous band narrow, deep border pratensis
5. Spots on hind wings above pupiled with black camillus
   Hind wings with broad median and narrow sub-marginal whitish bars mylitta

THE PEARL CRESCENT.

Phyciodes tharos, Drury. Fig. 64.

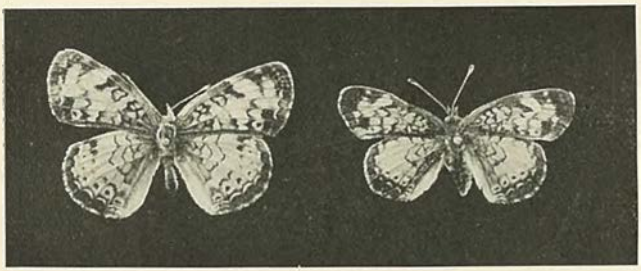


Fig. 64. **Phyciodes tharos,** slightly reduced.

Butterfly—Expanse, male, 1.25 inches, 32 mm.; female, 1.65 inches, 41 mm. Upper surface reddish fulvous marked with black; two rows of more or less coalescing circles near the base of the wing, the first of two circles, the second of four, and an ellipsoid at the end of the cell; a patch of black beyond the cell on the costa and one on the hind margin, sometimes the two being connected by a dentate line. The outer border is broad, black, and through it runs a crenated line with a yellowish or fulvous lunule in the middle, in some examples distinct, in others connected with the central color; black dot near the posterior angle.

Hind wings similar to front wings, the median black band narrower; both light bands are fulvous, and the outer contains a row of black spots.

The under side of fore wings yellowish fulvous, with yellow spots and four black patches, two on the costa before the apex, one at the posterior angle, and one on the hind margin.

The under side of hind wings pale buff washed with umber-brown, the basal half with more or less complete bands of pale spots edged with brown; the row of black spots same as above; a sub-marginal row of lunules, the middle large, silvery, the others more or less obscure. The terminal, costal, and middle brown patches are present in some examples, the wing being well suffused with brown.

Early Stages—The egg is light greenish yellow. The caterpillar, which feeds upon various species of aster and allied compositae, is dark brown after the third moult, its back dotted with yellowish and adorned with short black bristly spines, which are yellow at the base. The chrysalis is grayish white, mottled with dark spots and lines.

Distribution—This is one of the many dimorphic species. It ranges from southern Labrador to Florida, in fact all over North America, north of Texas and south of the region of Hudson Bay, except the Pacific coast of California. Found in Montana at Missoula, Fish Creek, Ruby Mountain, Crow Creek. Brandegee has it in his collection from Gold Creek. Wiley collected it at Miles City. It is abundant around the Biological laboratory at Bigfork. It is abundant in the Bear Paw Mountains, according to Coubeaux.[2] Dr. Elliott Coues collected it at Milk River July 25, 1874, called by Edwards **Marcia,** now recognized as a synonym for **tharos.**

THE CARLOTA CRESCENT.

Phyciodes carlota Reakirt. Fig. 65.

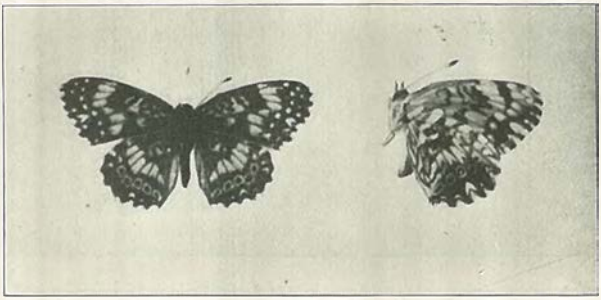


Fig. 65. **Phyciodes carlota.**

Butterfly—Upper surface black; some fulvous spots near the base of the fore wings; a fulvous band through the middle crossed by the black veins; a sub-terminal row of whitish dots in the broad black terminal border; and a white lunule in the middle of the border near the edge of the wing. In the females there are traces of other white lunules just within the margin. The hind wings similarly marked, except that there is a row of black sub-marginal spots circled with fulvous, and the lunules are faint in the males.

Under side of fore wings fulvous, with three or four not very prominent bars in the cell. a somewhat triangular patch beyond, and a terminal brown black border with the sub-terminal row of spots, between median venules one and two there is a large conical whitish spot, the base on the double terminal line; this double line running in zigzag to the apex, and the inner points silvered more broadly towards the apex, and the inner point sending a white ray to the margin. The same is repeated towards the posterior angle, but with less silver.

The hind wings dark brown washed with whitish, more towards the base, only two yellowish spots in the cell. Near the base is a broken silvery band, and through the middle a silver band crossed by the brown veins, the outer margin dentate. The sub-marginal row of black spots pupilled with white. The margin is similar to that of the fore wings, save that the large spot is silvery instead of whitish.

Distribution—It is found in the southern and western states, Rocky mountains, Montana to Arizona. Wiley has many specimens in his collection from Miles City and Sandstone. He bred specimens in 1890. It is not reported by the other collectors.

THE MYLITTA CRESCENT, Phyciodes Mylitta, Edwards.

Butterfly—Expanse of male, 1.15 inches, female larger. Broadly bright fulvous on the upper side, the dark markings slight; a narrow band of dark on outer edge of both pairs of wings, then a sub-marginal row of crescents, bordered with black; hind wings with a row of small black spots, a black spot on anterior edge and dark base; fore wings crossed by

two series of black markings like bands, in addition to the preceding; bases dark. Under side fulvous, fore wings with some black at posterior angle; behind this or hind wing, a large light patch; a light patch bordered with dark at middle of outer edge; many light spots on hind wing, making at least two rows.

Early Stages—The food plant is the thistle. The caterpillar is black, yellowish below, with a faint twinned yellow dorsal line and faint lines of the same color on the sides. The spines, which are arranged in six rows, are black. Those of segments four, five, and six, yellow. The chrysalis is dull wood-brown.

Distribution—Washington to Arizona, eastward to Colorado. In the state taken at Helena, July ,2 '03 (1), at Flathead lake, July, '04 (1), and in Yellowstone Park (1). Allen has collected it at Dillon.

THE MEADOW CRESCENT SPOT.

Phyciodes pratensis Behr. Fig. 66.

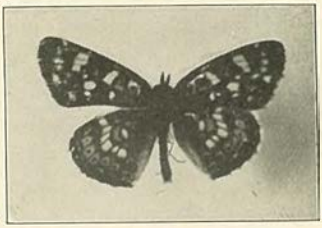


Fig. 66. **Phyciodes pratensis.**

Butterfly—Expanse, male, 1.15 inches, 30 mm.; female, 1.40 inches, 36 mm. Ground color black or dark brown; in the discal cell of the fore wing a prominent light bar; between this and base of wing several smaller light spots; beyond the bar and between it and the light band a small somewhat triangular fulvous bar; two rows of light fulvous or yellowish spots crossing the wing, the inner lighter and with larger spots, the anterior blending to make a broad bar crossed by the dark nerve lines; a sub-marginal row of lunules, the middle one much larger; border black, with a fringe of light hairs alternating with dark, making small light crescents.

Hind wings similar to the fore wings; the inner band is well marked, broad, crossed by the dark veins of the wing; outer band containing black spots, giving the appearance of fulvous spots pupilled with black, anal edge of the wing black, washed with fulvous; sub-marginal row of light yellow lunules, the third from the anal angle largest; these lunules sometimes almost lacking; border as in front wings.

Under side of fore wings yellowish fulvous with yellow spots and black patches; a rectangular black spot on the middle of the hinder edge; this joins a series of small black lunules and black patches, making a bar across the wing, behind which is a wider yellow bar made in the same manner; in some specimens these are reduced; almost disappearing; but there is always a dark irregular line across the center of the wing; a sub-terminal double black lunule touching the hinder

margin behind the large black spot; a small costal black dot; apex and base prevailing color of the light bands; a fine brown line a short distance from the outer edge, semicircular between the veins resembling a border of lunules.

Under side of hind wings pale buff washed with umber-brown, the light spots above appearing, usually much lighter than above, even silvery white, many fine brown lines crossing the wings or enclosing light spots; the row of black spots same as above; a sub-marginal row of lunules, the middle one large, silvery, the others more or less obscure, in good examples edged with brown within and without; border as in front wings.

Antennae black, ringed with white at the joints, knobs same color as upper surface; body above dark brown or black, legs color of under surface of wings, under side of abdomen light.

The female has the black markings of the upper side heavier than the male, and all the spots pale yellow. The markings on the under side are heavier than in the male sex. In the male the under side is pale fulvous, spotted with yellow.

Early Stages—Unknown..

Distribution—The range is along the Pacific coast from Oregon to Arizona. Dyar reports it from the Kootenai district of British Columbia. Brandegee has two from near Helena, July 6, 1902; one July 2, 1903. Elrod has one from Flathead lake, July 1904. Several specimens from the Bear Paw Mountains I take to belong to this species.

THE CAMILLUS CRESCENT.

Phyciodes camillus, Edwards, Fig. 67.

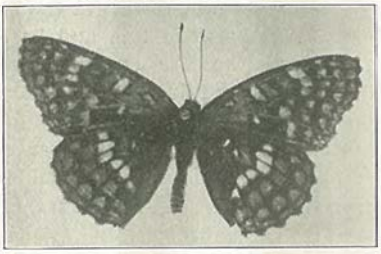


Fig. 67. **Phyciodes camillus.**

Butterfly—The light spots on the male are paler on the primaries, on the secondaries brighter fulvous. The dark markings on the under side are less pronounced. The female is much like the male. Expanse, male, 1.30 inches, 33 mm.; female, 1.50 inches, 38 mm.

Early Stages—Wholly unknown.

Distribution—The species is reported from British Columbia, Montana, Kansas and Texas. In Montana taken at Sinyaleamin Lake, Mission Mountains, Missoula, and at Helena (Brandegee). Cooley has collected it at Bozeman. Collected by Coubeaux at Big Sandy.