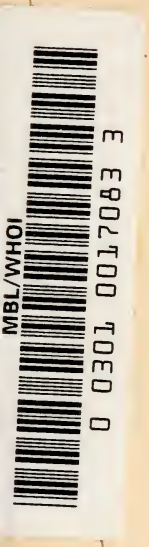

With the compliments of the Author.

THE

BUTTERFLIES

OF

MAINE.

Designed for the use of the students in the Maine State College, and the farmers of the State.

C. H. FERNALD, A. M.

Orono, February, 1884.

AUGUSTA:
SPRAGUE & SON, PRINTERS TO THE STATE.
1884.

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INTRODUCTION.

The following paper contains an account of all the species of butterflies occurring in Maine, so far as known to me. If there are other species within our limits, they must be rare, or very local in their distribution; and if any should hereafter be found in the State, which are not here described, I shall be very glad to know of the fact, and to see specimens of them. We are still ignorant of the insect fauna of certain parts of the State, yet it is hardly probable that many species of butterflies will be added to the list herein described. *Chionobas semidea* Say, and *Argynnis montinus* Scud. occur on the White Mountains in New Hampshire, and may yet be discovered on Mt. Katahdin when that region is fully explored by entomologists.

Quite a number of the butterflies feed on plants which are of no special value to our people, but those which are destructive to our more valuable plants should be well known in all their stages, and the best means of destroying them should be understood. I have therefore given all the facts known to me, which can be of value in holding the injurious insects in check.

It should be a part of the education of a farmer, to discover his friends and enemies among the insect tribes, and to do this, there is no better way than to raise those which trouble his crops, carrying them through all their transformations, in order to enable him to recognize them in any stage of their existence, and to discover the most vulnerable stage in their lives, or the one in which they may be most easily destroyed.

CLASSIFICATION.

Insects have been divided by naturalists into the following orders:

HYMENOPTERA, which include the bees, wasps, ants, ichneumon flies, sawflies, etc.

LEPIDOPTERA, which include the butterflies and moths.

DIPTERA, which include the true flies.

COLEOPTERA, or beetles.

HEMIPTERA, or the true bugs.

ORTHOPTERA, which include the crickets, grasshoppers, locusts etc.

NEUROPTERA, which include the dragon flies, darning needles etc.

The LEPIDOPTERA are characterized by having four ample wings covered on both sides with minute overlapping scales which are easily rubbed off, and appear like a fine powder. They are naturally divided into the butterflies (*Rhopalocera*) and moths (*Heterocera*).

The butterflies have two thread-like antennæ, or feelers, on the head, each of which is enlarged, at the outer end, into a knob or club. They fly in the day time, and keep their wings elevated when at rest, at least the fore wings.

The moths have the antennæ variable in form, but never enlarged at the outer end. They fly mostly by night, and when they alight they spread their wings out more or less horizontally, or close them around their bodies.

TRANSFORMATIONS.

There are four distinct periods in the existence of butterflies: The EGG, the LARVA, the PUPA or CHRYSALIS and the IMAGO OR PERFECT INSECT.

The eggs of butterflies are more or less globular, conoid or spindle shaped, with their surfaces smooth, or marked with a variety of regular sculpture in the different species, and of different colors, among which, white, green and

yellow are the prevailing tints. They are deposited here and there upon the leaves of the plants on which the young feed. A few species deposit their eggs in clusters within which they are arranged regularly.

The term *larva* or caterpillar is applied to the insect as soon as it hatches from the egg, and is the voracious period of life. In some species it is the longest period of their existence, since they pass the winter hibernating in this stage, while in others, this period is comparatively short. The larva sheds its skin (molts) several times before it reaches its full growth, and often changes its color with each molt.

EXTERNAL ANATOMY OF THE CATERPILLAR.

The body of the caterpillar is elongated, cylindrical, and composed of thirteen joints or segments. Some caterpillars are naked, others have a few scattered hairs scarcely visible, while others are more or less covered with spines. The first segment forms the head which has the mouth organs on the lower side. The second, third and fourth segments have each a pair of short legs, the rudiments of the future legs; and the seventh, eighth, ninth, tenth and thirteenth, have each a pair of soft membranaceous ones which disappear when the larva changes to a chrysalis. On each side of the body there are nine oval apertures, the spiracles or stigmata (breathing holes). These are situated in the second, fifth, sixth and following segments to the twelfth.

The head is of a rounded or oval form, and of a harder texture than the other parts of the body. On its lower side are situated the organs of the mouth, and at the sides, the rudiments of the eyes and the antennæ. The head is divided into two halves by an indented line or suture which extends down the middle of the front, from the vertex or *epicranium* to the face, the front of which is formed by a convex plate, the *clypeus*. Immediately below this is another plate, the *labrum* or upper lip which forms the upper boundary of the mouth. Beneath this is a pair of strong horny jaws or

mandibles attached one on each side of the mouth, which work laterally. Beneath these are the *maxillæ* or lesser jaws placed in a similar manner, which with the *mandibles* form the sides of the mouth. The *maxillæ* are used to hold the food rather than for chewing, and are furnished with a pair of jointed organs called the *maxillary palpi* which are used as organs of touch.

Below the *maxillæ* is situated another plate called the *labium* or lower lip which forms the lower boundary of the mouth. This is also furnished with a pair of jointed organs called the *labial palpi*. There is also a soft, conical, horny tube called the *spinneret*, on the soft membrane of the *labium*. It is the common excretory duct of those glands which secrete the silken threads by means of which the chrysalis is suspended and leaves are drawn together by those species which conceal themselves, and also the cocoons are formed by those species which transform in them. The antennæ, though but slightly developed, are situated a little above the base of the mandibles on each side of the clypeus, and are of a conical form and jointed. There are six very minute simple eyes at a little distance from each other, near the base of the mandibles.

EXTERNAL ANATOMY OF THE PUPA.

The pupa state in butterflies is a very peculiar and characteristic period of their existence. Externally a perfect standstill appears in the process of development, for the pupa is quiet and does not take the least nourishment; but internally, great changes are in progress.

Those pupae which hang freely from one end, or are supported by a loop of silken threads, are called naked pupae, while those which rest in cases of silk spun by the larvæ just before transforming into pupæ, are called incased pupæ, and their cases are called cocoons. The outside covering of a pupa is of a fine, horny texture, and shows the parts of the future insect more or less plainly. The pupa shows the

division of the insect into head, thorax and abdomen, much more plainly than the larva. The parts of the covering take special names according to their uses; as the head-case, eye-cases, tongue-case, leg-cases, antennæ-cases, trunk-case, wing-cases and the abdomen-case which consists of nine more or less distinctly separated segments with the future spiracles along the side, and the anal orifice indicated on the last segment. The apex of the last segment is called the cremaster which varies greatly in form in the different species, but is always armed with hooks or spines by means of which the pupa secures itself to the threads of silk spun for that purpose.

Some pupæ have spines along the abdomen or on other parts of the body, and there are other angles and protuberances, as two in front, which are the palpi-cases, several along the edges of the wing-cases, and in some species, there is a process upon the top of the thorax in the form of a long thin pyramid or resembling a man's nose. The majority of butterfly pupæ have a greenish, or yellowish grey, or brown color, and some have metallic spots on them.

EXTERNAL ANATOMY OF THE IMAGO.

The term imago is applied to the insect as soon as it emerges from the pupa case. It has three principal divisions; head, thorax and abdomen. The head is more or less globose in form, and has on each side a globular or ovate compound eye. On the top of the head, between the eyes, are two long jointed antennæ which have the outer end enlarged into what is called the club. In some species the club terminates quite abruptly, while in others (some of the *Hesperidæ*), it tapers more or less to a fine point and is curved or hooked. On the under side of the head are situated the mouth parts which consist of a pair of three-jointed palpi covered with hair-like scales, which curve up in front more or less closely against the head. Near the base of the palpi, and between them, is situated the proboscis or tongue; a long, tapering, horny

tube through which they draw up the nectar from the flowers, and which they coil up like a watch spring when not in use. The head, as well as the palpi, is densely clothed with hair-like scales, and in some species the compound eyes are clothed with minute hairs starting out from between the facet, in which case they are said to be hairy, otherwise naked.

The thorax is joined to the head by means of the neck, and bears the legs and wings. There are three pairs of legs, each of which comprises a basal joint called the coxa, at the end of which is a minute piece called the trochanter, followed by the longest joint of the leg, which is called the femur, followed by the tibia, after which comes the tarsus which is composed of five joints gradually decreasing in size to the last, which usually has a pair of curved claws. The middle and hind tibiæ usually have a pair of scaly spurs at the end, and sometimes are more or less armed with spines; and the hind tibiæ sometimes have a second pair of spurs near the middle. The fore tibiæ, in some species, have an appendage on the inside called the tibial epiphysis.

The fore legs of some of the butterflies are so small and aborted as to be of no service in walking. The scales arising from the upper side of the first segment of the thorax form the collar, and there are small scaly pieces over the bases of the fore wings called the shoulder lappets or pterygodes.

The wings, of which there are two pairs, are composed of membranes supported by a frame work of round, tapering, branching, tubular rods which are between the membranes. These membranes are quite concealed beneath the covering of minute variously colored scales which overlap one another, like shingles on the roof of a house. This covering has gained for these insects the scientific name of Lepidoptera, derived from two Greek words which signify scaly-wings.

The arrangement of these supporting rods, veins or nervures, as they are sometimes called, is of value in the classification of the insects. The part of the wings attached to the body is called the base; the edge in front, when they

are extended, is called the costa or anterior margin; the angle at the outer end of the costa is called the apex, and the side which follows, being the most remote from the body when the wings are extended, is called the outer margin (hinder margin of some authors); the angle which follows is called the anal angle, and the side of the wing extending from the anal angle to the body, is called the hinder margin (inner margin of some authors).

Those veins of the wings, usually four in number, which go out from the base may be called nervures. The one nearest the costa is called the costal nervure; the next behind this, the subcostal nervure; the next in order extending approximately through the middle of the wing, and dividing it into two more or less equal parts, is called the median nervure; the one behind this last is called the submedian nervure; and a short one, occurring in some species behind the submedian is the internal nervure.

The first and last two of these extend to the margin of the wing, but the subcostal and medium nervures extend out to near the middle of the wing where they are joined by a vein which is called the transverse nervure. The remaining veins are branches of the subcostal and median nervures, or extend out from the transverse nervure, and are called nervules. We make use of the term veins when we wish to use a word to include either or both nervures and nervules, and we call the whole veiny structure of the wing the venation.

The system of numbering the veins adopted very generally by European entomologists, and to some extent in this country, is to number them in order at their terminations along the margins of the wing, whether nervures or nervules and without regard to their length. The vein going out from the base of the wing below the median, is called number 1. If, however, there are two, as the internal nervure and the submedian, then the first is called 1 a, and the second 1 b. The first branch of the median is number 2, the second, number 3, and so on around the outer margin and costa to the costal

nervure which will be the last or highest number. The same system is observed in the hind wings, but in some moths there are three separate veins behind the median which are numbered, 1 a, 1 b, and 1 c, in order going out from the hinder border. The portion of the wing included between the subcostal, median and the transverse nervures is called the discoidal cell, and this is sometimes divided by what are called cellular nervules, and are distinguished as superior and inferior according to their position.

COMMON NAMES.

The common names of the butterflies have been omitted in the body of this paper, and it would be as well to omit them entirely since they are only local, the same insect being called by different common names in different places, while the scientific names, when established, hold everywhere without change, and I should advise all to use them in preference to the common names.

The scientific names in this paper are divided into syllables, and the syllable which should be accented in pronunciation is marked by an ′ mark following it. As some may greatly desire the common names, they are given in the following list against the scientific names.

The scientific name of an insect consists of two words, the first being the generic name or the name of the genus (surname), and should always begin with a capital letter; the second is the specific name and should begin with a small letter, though writers differ on this point. The specific name is followed by the name of the entomologist who described the insect originally, and gave the name to it, though the initial letter or the abbreviation of his name is generally used.

The arrangement and nomenclature adopted is that of Mr. W. H. Edwards, soon to appear in his Catalogue of the Butterflies of North America. I have also availed myself freely of the published writings of Messrs. Edwards and

Saunders on the preparatory stages of some of our butterflies. I am under obligations to Mr. William Saunders, Editor of the Canadian Entomologist and to Henry Holt & Co. for electrotypes to illustrate this paper.

SCIENTIFIC AND COMMON NAMES OF THE BUTTERFLIES OF MAINE.

The following artificial key may be of service in determining the Maine butterflies:

1 { Distance between the insertion of the antennæ more than half the vertical diameter of the eye. .. Family Hesperidæ 38
Distance between the insertion of the antennæ less than half the vertical diameter of the eye..... 2

2 { Fore legs small and rudimentary; not used in walking, Family, Nymphalidæ 10
Fore legs well developed, and used in walking..... 3

3 { Large butterflies with wings generally expanding two inches or more. Colors, sulphur yellow, white, or black and yellow .....Family, Papilionidæ 4
Small butterflies, with wings generally expanding less than two inches. Colors, dark brown, blue, copper-red or orange .....Family, Lycaenidæ 29

NO.

4 { Hind wings with lobes or tails .. Sub-Family, PAPILIONINÆ, 5
Hind wings entire; without lobes or tails,
Sub-Family, PIERINÆ, 6

5 { Wings black, with yellow and blue spots .. PAPILIO ASTERIAS.
Wings yellow, with black markings ..... PAPILIO TURNUS.

6 { Upper side of the wings white; sometimes very pale yellow,
PIERIS, 9
Upper side of the wings bright lemon or sulphur yellow ... 7

7 { Fore wings with a prominent black spot near the middle .. 8
Fore wings without a prominent black spot near the middle,
TERIAS LISA.

8 { Under side of the wings with a row of dark points within the outer border .... COLIAS PHILODICE.
Underside of the wing without any dark points within the outer border .... COLIAS INTERIOR

9 { Under side of the fore wings with one or two dark brown spots beyond the middle ... .PIERIS RAPÆ.
Under side of fore wings unspotted; veins of hind wings heavily marked ....PIERIS OLERACEA

10 { Ground color of the fore wings above, tawny yellow or orange..... 11
Ground color of the fore wings above, not tawny yellow or orange 13

11 { Veins and borders of all the wings black; the outer borders with white spots on them 12
Without these characters; at least without the white spots on the outer border..... 16

12 { Hind wing with a narrow, curved black band across it a little beyond the middle . .... . LIMENITIS DISIPPUS.
Hind wing without any band across the middle,
DANAIS ARCHIPPUS.

13 { Wings black or brown without eye spots 14
Wings black or brown with eye-spots..... 15

14 { A terminal row of red spots preceded by two or three rows of white spots .. .. MELITÆA PHAETON.
A terminal yellow band preceded by a row of blue spots,
VANESSA ANTIOPA.
A tawny orange or yellow band crossing all the wings a little before the outer border . .. ...VANESSA MILBERTI.
An orange red band crossing the fore wings obliquely, and some white spots before the apex..PYRAMEIS ATALANTA.
A white band crossing the middle of all the wings,
LIMENITIS ARTHEMIS.

NO.

15 Fore wings dark brown, with a bright yellow band enclosing two eye spots .... SATYRUS ALOPE.
Fore wings dark brown, with a yellow band, or with only a trace of it. Eye spots as in S. alope . SATYRUS NEPHELE.
Fore wings wood brown, with five eye-spots on the notched hind wing, and three or four on the fore wing, DEBIS PORTLANDIA.
Pale wood brown, with five eye-spots on the entire hind wing, and three or four on the fore wing, NEONYMPHA CANTHUS.
Wood brown with two eye-spots on each wing, NEONYMPHA EURYTRIS.
Wood brown with several imperfect eye-spots surrounded with yellow, on each wing... ..... CHIONOBAS JUTTA.
Two large, unequal eye-spots on the hind wing, and one or two on the fore wing, with a whitish, oblique band, JUNONIA COENIA.

16 Hind wings with a prominent tooth or lobe near the middle of the outer margin. 17
Hind wings entire, or with the middle tooth no larger than the others..... 18

17 Outer edge of the wings touched with lead-blue, GRAPTA INTERROGATIONIS.
Hind wings with a white spot a little beyond the middle of the costa... .....GRAPTA J-ALBUM.
Under side of wings coarsely marked with olive green on the outer part .. ..GRAPTA FAUNUS.
Under side of the wings coarsely marbled with light and dark brown..... ....GRAPTA COMMA.
Under side of the wings dark gray, with fine, blackish cross streaks ....GRAPTA PROGNE.

18 Fore wings without white spots on the upper side 19
Fore wings with several white spots on the upper side near the apex..... 28

19 Upper side of hind wings blue-black, with two rows of light colored spots..... .... ARGYNNIS IDALIA.
Upper side of hind wings tawny or yellowish, with black spots or marks..... 20

20 Under side of hind wings with numerous silvery or white spots. 23
Under side of hind wings without silvery or white spots.... 21

21 Basal half of hind wings beneath, much darker brown than outer half.. .... EUPTOIETA CLAUDIA.
Basal half of hind wings not darker than outer half..... 22

NO.

22 { All the wings bordered with black.....Phyciodes tharos.
Wings not bordered with black.....Argynnis bellona.

23 { Spots on the under side of the hind wings, clear white, ringed with dark brown.....Phyciodes harrisii.
Spots on the under side of the hind wings, silvery or pearly white 24

24 { Costa and outer border of hind wings above, black, Phyciodes nycteis.
Costa and outer border of hind wings not black above.... 25

25 { Expanse of wings less than two inches, Argynnis myrina.
Expanse of wings more than two inches..... 26

26 { Extreme outer border of all the wings black, Argynnis atlantis.
Extreme outer border of the wings not black..... 27

27 { Subterminal pale yellow band of hind wings beneath, very narrow.....Argynnis aphrodite.
Subterminal pale yellow band of hind wings beneath, wide and clear.....Argynnis cybele.

28 { Hind wing with two large, unequal sized eye-spots beneath, Pyrameis huntera.
Hind wing with a row of four or five small eye-spots beneath, Pyrameis cardui.

29 { Hind wings with thread-like tails on the outer margin 30
Hind wings without thread-like tails on the outer margin... 33

30 { Hind wing regularly rounded, with one tail; color blue or brown..... Lycæna comyntas.
Hind wing triangular; a short tail outside of the thread-like one 31

31 { Hind wing with an orange or red spot enclosing a black one near anal angle above.....Thecla humuli.
Hind wing unspotted above..... 32

32 { Under side of fore wings crossed by two whitish lines beyond the middle.....Thecla calanus.
Under side of fore wings crossed by four whitish lines beyond the middle.....Thecla strigosa.

33 { Ground color above, dark brown..... 35
Ground color above, more or less blue 34
Ground color above, orange with black markings, Feniseca tarquinius.
Fore wings above, copper red with black spots and dark outer border..... Chrysophanus americana.
Fore wings above, brown or purplish brown with small black spots.....Chrysophanus epixanthe.

NO.

34 { Under side of fore wing with one or more rows of red spots, THECLA LAETA.
Underside of fore wing without red spots.
Forms of LYCÆNA PSEUDARGIOLUS.

35 { Under side of hind wings with a row of red spots along the outer border . . . . . THECLA TITUS.
Under side of hind wings without red spots 36

36 { Under side of hind wings, pale rust brown with an irregular white line across the middle . . . . . THECLA NIPHON.
Under side of hind wings. dark brown at the base, with a lighter band on the middle shaded into a rusty border, and with purplish reflections over the whole surface, THECLA AUGUSTUS.
Under side of hind wings, dark brown or blackish brown and washed with whitish beyond 37

37 { The first tooth outside of the anal angle, curving outward, THECLA IRUS var. ARSACE.
The first tooth outside of the anal angle, not curving outward . . . . . THECLA HENRICI.

38 { Dark brown, marked more or less with tawny yellow 39
Dark brown, without tawny yellow markings 53

40 { Under side of hind wings with white spots ringed with brownish . . . . . CARTEROCEPHALUS MANDAN.
Under side of hind wings not marked as above 40

40 { Hind wings spotted more or less with tawny yellow above . . 41
Hind wings not spotted with tawny yellow above 47

41 { Under side of hind wings bright yellow, with no trace of spots or band . . . . . ANCYLOXYPHA NUMITOR.
Under side of hind wings more or less spotted or banded . . 42

42 { The larger part of the surface of the wings above, bright tawny yellow 43
The larger part of the surface of the wings above, dark brown 45

43 { Outer margin of the wings beneath. brown, overlaid with whitish scales. . . . . PAMPHILA ZABULON.
Outer margins of the wings beneath, yellowish, scarcely darker than the middle part 44

44 { A large tawny spot on the upper side of the hind wings, PAMPHILA SASSACUS.
A small tawny spot and band beyond, on upper side of hind wings . . . . . Male of PAMPHILA MYSTIC.

NO.

45 { Pale spots on the under side of the hind wings, covering half the surface or more ..... PAMPHILA PECKIUS.
Pale spots on the under side of the hind wings covering much less than half the surface 46

46 { Bright reddish brown beneath, with a row of seven small cream-colored spots across the middle of the hind wing, and one on the cell ... . PAMPHILA LEONARDUS.
Reddish-yellow beneath, with a row of seven large ochre spots across the middle of the hind wing, and one on the cell ..... Female of PAMPHILA MYSTIC.

47 { Fringes white .. .. PAMPHILA BIMACULA.
Fringes brown or yellowish brown 48

48 { Upper side of the fore wings unspotted, but with a tinge of tawny .... Male of PAMPHILA METACOMET.
Upper side of the fore wings, with whitish or tawny spots or markings 49

49 { Under side of hind wings, purplish brown, Female of PAMPHILA METACOMET.
Under side of hind wings yellowish, or greenish brown .. 50

50 { Under side of hind wings greenish brown, PAMPHILA CERNES.
Under side of hind wings yellowish brown or dusky ochre yellow 51

51 { Upper side of fore wings, with a large brassy yellow spot along the costa ..... Male of PAMPHILA MANATAAQUA.
Upper side of fore wings, without a large, brassy spot along the costa 52

52 { Under side of the fore wings tawny yellow, dusky towards the outer margin ..... Female of PAMPHILA MANATAAQUA.
Under side of the fore wings, brown with a few tawny scales overlaid .. .. PAMPHILA OTHO var. EGEREMET.

53 { Club of antennæ doubled up into a hook .. EUDAMUS PYLADES
Club of antennæ curved only 54

54 { Under side of wings unspotted, Male of PAMPHILA METACOMET.
Under side of wings marked more or less with light spots .. 55

55 { Hind wings with two rows of pale yellowish dots near the outer margin 58
Hind wings without two rows of pale yellowish dots near the outer margin 56

56 { Under side of hind wings unspotted, but with purple reflections .... AMBLYSCIRTES VIALIS.
Under side of hind wings, with a row of pale spots across the middle 57

NO.

57 { Under side of all the wings, yellowish brown, AMBLYSCIRTES SAMOSET.
Under side of all the wings, purplish brown, Female of PAMPHILA METACOMET.

58 { Upper side of the fore wings with a row of four whitish dots from the outer fourth of the costa downwards, THANAOS PERSIUS.
Upper side of the fore wings without above named row of white dots 59

59 { Upper side of the fore wings heavily overlaid with pale bluish scales on the outer part..... THANAOS ICELUS.
Upper side of the fore wings not overlaid with pale bluish scales..... THANAOS BRIZO.

RHOPALOCERA.

Family—PAPILIONIDÆ.

Sub-Family—PAPILIONINÆ.

1. PAPILIO ASTERIAS, Cram.

Pa-pil'-i-o as-te'-ri-as.

Expanse of wings, from 3.5 to 4 inches.

Upper side of body and wings, black; the fore wings with two rows of yellow spots across them, eight in each row, the one near the outer margin composed of round spots, the second is within and parallel to the last and composed of wedge-shaped spots. There is also a yellow dash across the end of the cell, and a yellow spot a little above and beyond this.

The hind wings have a row of seven yellow spots across the middle, and a series of six lunules of the same color along the outer margin, and an orange or red eye-spot containing a black pupil at the anal angle with a yellow edge on the outside. Between the rows of yellow spots is a series of blue spots or shades. Nervule 4, of the hind wing extends out into a lobe or tail, and the outer margin is excavated between the veins, and edged with yellow.

The ground color on the under side of the wings is lighter than above, and the spots are repeated but touched more or less with orange.

The abdomen has two rows of small yellow spots on each side.

The females do not have the yellow spots as large, and are not as brightly colored as the males.

The larva of this insect feeds on carrot, parsnip, celery, caraway etc., of the gardens, and on various wild umbelliferous plants.

The eggs, which are deposited singly on the leaves of the plants, are smooth, nearly globular, and of a delicate light yellow color.

The larva, when first hatched, is nearly black with a broad white band across the middle and another on the tail, but when fully grown is about an inch and a half long, of a bright green color, lighter beneath, and with a transverse black band on each segment, and a row of yellow spots on it. When disturbed they thrust out from a slit in the top of the second segment, a pair of soft yellow organs joined at the bottom, somewhat like the letter Y in form. These are supposed to be scent organs which serve to drive off the insects and birds which prey upon them.

The pupa is an inch and a quarter long, of a pale green, ochre-yellow or ash-gray color, with two short ear-like projections above the head, just below which on the upper part of the back, is a little prominence. The pupa is attached by the tail to a button of silk, and is supported by a loop of silk around the middle of the body.

This butterfly has never been abundant enough to cause a very great amount of injury, but should it attack the garden plants in such numbers as to cause much damage, they can be reduced by hand picking, and the chickens, if allowed to run in the garden, will destroy them. They are generally kept down by the birds, and their insect enemies.

Fig. 1. *Papilio turnus* (nat. size.)

2. Papilio turnus, L.

Pa-pil'-i-o tur'-nus.

Expanse of wings, from 3.5 to 4.5 inches.

Upper side of the wings, pale lemon yellow with the outer borders of all the wings, costal borders of the fore wings, and hinder border of hind wings, black. The base of the fore wings and four bands starting at equal distances apart from the costa. the inner one extending across the wing, the others decreasing in length, all black. The black outer border of the fore wings has a row of about eight yellow spots through the middle, while that on the hind wings has six lunate spots, the first and last of which are orange, the others yellow with more or less bluish scales before them, and a more prominent orange spot occurs near the anal angle. Vein 4 of the hind wings extends into a lobe or tail; and the outer margin is excavated between the veins, and edged with yellow, while a narrow black band crosses the middle of the hind wings.

Under side of the wings marked as above, but paler in color.

Body, black, with a yellow stripe along each side.

The larva feeds on the leaves of apple, plum, wild and cultivated cherry, thorn and basswood.

The eggs are deposited singly on the leaves, and are nearly globular, smooth, dark green when first laid, but soon changing to greenish yellow, and speckled with reddish brown. In a little less than two weeks, the eggs hatch and the young are about one-tenth of an inch long, cylindrical, largest towards the head, of a brownish color, mottled with black, and with a large whitish spot on the middle of the back.

Fig. 2. Larva of *Papilio turnus* (nat. size).

The full grown larva is about one inch and a half long, of a deep green color and paler beneath. The head is small, compared with the segments following, and of a reddish brown color. The front edge of the second segment, and also the hinder edge of the fifth, is yellow; and the front edge of the sixth is velvety black. On the side of the fourth segment is a yellow eye-spot with a black center. As the larva approaches maturity, the green color grows dull, and gradually changes to a dark reddish brown mottled with grayish on the sides. The larva then seeks some place of shelter, where it spins a button of silk in which the hind feet are secured and a loop of silk to support the forward part of the body, and after a short time casts off its skin and discloses a dull brownish pupa, in which state it passes the winter, and emerges the following June.

These insects have been quite abundant for a few years past, but their insect enemies and the birds hold them pretty well in check.

As each female lays about 200 eggs, they would soon multiply to such an alarming extent as to destroy the trees upon which they feed, were it not for these natural remedies. There is no doubt that spiders destroy the eggs and young larvæ to a much greater extent than has generally been supposed.

Sub-Family—PIERINÆ.

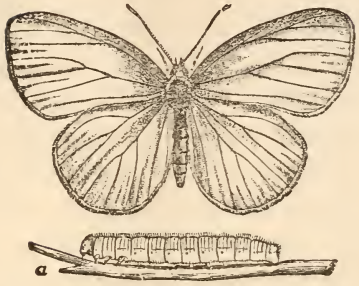

Fig. 3. *Pieris oleracea* (*a*, larva, nat. size).

3. PIERIS OLERACEA, Har. Fig. 3.

Pī'-e-ris ol-e-ra'-ce-a.

Expanse of wings, nearly two inches.

Upper side of the wings white, a little dusky at the base. Under side white, dusted along the veins more or less with brown scales which are prominent on the veins of the hind wings.

Body black above, and whitish beneath.

The larva feeds on the leaves of cabbage, turnip, radish, mustard and other plants of the order *Cruciferæ*.

The eggs, one or two of which are deposited on the under side of a leaf, are somewhat pear-shaped, of a pale greenish white color, about one-twentieth of an inch long, and not more than a third as much in diameter. They are marked with about fifteen sharp ridges running lengthwise with cross lines between, and hatch in about ten days.

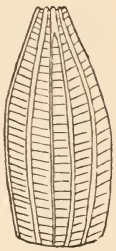

Fig. 4. Egg of *Pieris oleracea*. x 27.

The newly hatched larva is of a glassy, watery-white color, thinly clothed with fine shortish hairs. They first eat the egg shells from which they escaped, and then begin upon the leaf, eating round holes through it, soon changing their color to green. They feed

mostly by night and rest by day, along in the groove of the midrib on the upper side of the leaf, with their heads towards the base of the leaf. The mature larva (Fig. 3, *a*), is about an inch and a quarter long, of a pale green color, similar to that of the leaves of the cabbage, with a darker line along the middle of the back. The entire surface is covered with fine, short, white hairs. When they are done feeding they wander off in search of some protected place, as the under side of a board or fence-rail, in which to change to a pupa. Here the larva spins a button of silk, to which the anal feet are attached, and a loop in which to support the forward part of the body. In a short time the skin is shed, disclosing the pupa, which is about seven-tenths of an inch long, of a pale green or whitish color, and finely speckled with black.

In summer the insect remains in this stage about a week or ten days, but the fall brood passes the winter in the pupa state.

This species does not appear to be common in Maine, its place being taken by *Pieris rapæ*. For remedies, see under *Pieris rapæ*.

Fig. 5. *Pieris rapæ*, male (nat. size).

Fig. 6. *Pieris rapæ*, female (nat. size).

4. Pieris rapæ, L.

Pī'-e-ris ra'-pæ.

Expanse of wings, about two inches.

Upper side of the wings white, dusky at the base and on the apex of the fore wings. A black spot rests on the costa of the hind wing a little beyond the middle. Fore wing with a black spot a little beyond the middle, and in the female there is another below it. These dark markings are sometimes quite faint.

Under side of the fore wings white, yellowish towards the apex, and with two black spots in both sexes corresponding to the two on the upper side of the female. Under side of the hind wings pale lemon yellow, without marks, but sprinkled more or less with dark atoms.

Body, black above, white beneath.

A male variety of this species, with the ground color of the wings sulphur yellow, has been described by Mr. Scudder, under the name *novangliæ*.

The larva of this insect feeds on the leaves of the cabbage, turnip, mignonette and some other plants, but is especially injurious to cabbages, boring into the interior of the head, beyond the reach of insecticides.

The eggs are scattered here and there on the under side of the leaves of the food plant, but sometimes they are found on the upper side, or even on the leaf-stalk. They are somewhat pear-shaped, flattened at the base, and the apex is cut squarely off. They are yellowish white in color, and marked with twelve longitudinal ribs with very fine cross lines be-

tween them. They measure about one twenty-fifth of an inch in length, and about one-fourth as much in diameter. The eggs hatch in about a week, and the young larva, which is then very pale yellow, first eats the shell from which it has escaped, and next it spins a carpet of silk upon which it remains, except when feeding. At some point outside of the mat upon which it rests, it eats a round hole through the leaf, and very soon changes its color to a pale green, or near to that of the leaf upon which it feeds. Dr. Fitch states that it sheds its skin three times before it reaches maturity. At this time they are about an inch long or a trifle more (Fig. 7, *a*), of a pale grass green color, with a pale yellow line along the back, and a row of small yellow spots along the side.

Fig. 7. *Pieris rapæ*. *a*, larva. *b*, pupa.

Having reached its full growth, the larva wanders off to some sheltered place, as under a board, fence-rail, or even under the edge of a clapboard on the side of a building, where it spins a button of silk in which to secure its anal legs, then the loop of silk to support the forward part of the body, after which the skin is molted and the pupa appears.

The pupa (Fig. 7, *b*), is about three-fourths of an inch long, quite rough and uneven, with projecting ridges and angular points on the back, and the head is prolonged into a tapering horn. In color they are very variable; some are pale green, others flesh colored or pale ashy gray and sprinkled with numerous black dots. There are two broods a year in Maine; the first butterflies are on the wing during the early part of June, and the next brood in September. The winter is passed in the pupa state.

A minute insect (*Pteromalus puparum*, L.) frequently attacks the pupa, boring through the outside and depositing its eggs within. These hatch before the time for the butterfly to emerge, and feeding on the contents, destroy the life of the pupa. I have bred over forty of these minute parasites from a single pupa.

Birds and spiders are of great service in destroying these insects, and poultry may also be made available to lessen their numbers if allowed to run among the cabbages. Children should be encouraged to capture and destroy the butterflies, and the pupæ should also be collected and destroyed, unless they are found to be infested with parasites, which can easily be determined by observing whether the joints of the abdomen can be moved easily or not. If they are flexible, they should be destroyed, otherwise they may contain parasites and should be preserved, that the parasites may escape to attack others.

Experiments with hot water, tobacco smoke, sulphur, bisulphide of carbon, saltpetre and salt, lime, tar-water, pyrethrum and kerosene emulsion were tried by Prof. S. A. Forbes on this insect to ascertain what was the value of each respectively as an insecticide, and it was found that the last two alone would destroy the larvæ without injury to the plants, but these were of value only while the larvæ were on the exposed parts of the cabbage, or before they had made their way into the interior of the head. As these butterflies lay their eggs continuously for some time, any application, to be entirely successful, must be repeated several times.

The method of preparing the kerosene emulsion, as published by Prof. Riley, is substantially as follows. Kerosene oil is mixed with milk, either sweet or sour, and at a temperature of 75° F., they are churned together vigorously for fifteen minutes or more, when they form an emulsion, or curdle and suddenly thicken to form a white and glistening butter, perfectly homogeneous in texture. The whole amount of both ingredients solidifies together and there is no whey or other residue. The emulsion may be made of any desired strength, as the quantity of milk required to hold the oil does not exceed ten per cent. After the emulsion is made, it can be diluted with water to any extent required by adding a little at a time and stirring it up well. Prof. Forbes obtained good results with an emulsion diluted so that the kerosene was five or six per cent of the whole mixture, and sprinkled on to the plants.

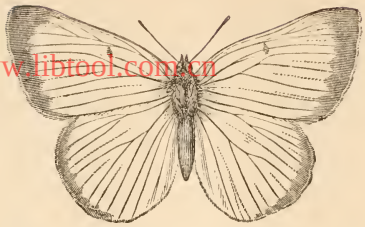

Fig. 8. *Colias philodice*, male (nat. size).

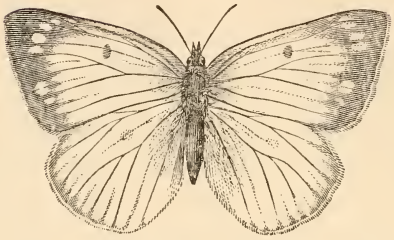

Fig. 9. *Colias philodice*, female (nat. size).

5. Colias philodice, Godt.

Co'-li-as phil-od'-i-ce.

Expanse of wings—male, 2.25 inches; female, 2.5 inches.

Upper side of the wings sulphur yellow, with a black border on the outer margin, which, in the females, is quite broad on the fore wings, and spotted with yellow. A black discoidal spot, larger in the females than in the males, rests on the end of the cell near the middle of the fore wings, and a pale orange spot occurs in the same position on the hind wings.

Antennæ, head, collar, costal edge of the fore wings and all the fringes, light purplish red.

Under side of the fore wings are the same color as above, with the costal and outer margins and the whole under side of the hind wings sprinkled with brown scales. Discal spot on the under side of the fore wings, black with a white center, while on the hind wings it consists of two small silvery

spots near together, one smaller than the other, surrounded by a rust-colored ring. There is a row of dark points more or less evident, within, and parallel to the outer margin, on the under side of all the wings.

A female variety is sometimes found with wings nearly white.

The larva of this insect feeds on clover, *medicago*, lucerne, buffalo pea, and sometimes on the leaves of peas.

The eggs are deposited on the upper side of the leaves, one only on each plant, and are pale yellow when first deposited, but change in a few hours to a dark crimson color. They are spindle-shaped, .06 of an inch long, attached by one end, ribbed lengthwise and crossed by numerous striæ. The eggs hatch in six or seven days, and the brownish green larvæ at first eat round holes through the leaf, but later eat the entire leaf from the outside.

Fig. 10. Egg of *Colias philodice* x 10.

The larvæ molt their skins four times before they reach maturity, when they are a little over an inch long, cylindrical, slightly tapering towards the last segment, downy, of a dark green color, somewhat lighter underneath, with a creamy white stripe on each side, through the middle of which runs a broken crimson line, below which there is sometimes a series of black spots. After they are done feeding, they seek some protected place where they spin a button of silk, to which the anal feet are attached, and a loop in which the body is supported; and after a little time the old skin is cast off, and the pupa appears, which is one inch long, of a yellowish green color, with a yellow line along each side.

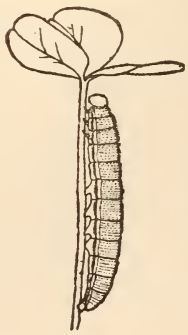

Fig. 11 *Colias philodice*. Lava (nat. size).

From the laying of the egg to the emergence of the butterfly in the warmest part of the season is about forty days, and as they are to be seen on the wing from the last of May till the last of September, it is probable that we have three broods in Maine. This insect is extremely abundant in this

State, and does a vast amount of damage, feeding as it does on clover, one of our prominent and valuable forage plants. A few years ago I made as careful an estimate as I could of the number on the college farm, their progeny and the amount they would eat, and was led to conclude that they destroyed not less than twenty-five per cent of all the clover growing in the field. The opinion prevails that they do little or no harm, but this is a very grave error.

Parasites play an important part in holding them in check, and our insect-feeding birds, as the robins and sparrows, are extremely useful in destroying them, and should be fully protected from men, boys, cats, shrikes, kingbirds and all other tyrants.

6. Colias interior, Scud.

Co'-li-as in-te'-ri-or.

Expanse of wings, 2.25 inches.

This species was described from specimens taken at Cape Breton island, and one from Waterville, as *Colias philodice*, var. *laurentina*, but Mr. W. H. Edwards considers it to be identical with *Colias interior*.

The males closely resemble those of *C. philodice*, except that the sub-marginal row of dots on the under side of the wings is entirely wanting in both sexes, and the terminal black band of the fore wings does not reach the hinder margin, and is almost wholly wanting on the hind wings of the females.

7. Terias lisa, Bd-Lec.

Te'-ri-as li'-sa.

Expanse of wings, about one inch and a quarter.

Upper surface of the wings sulphur yellow, the fore wings sprinkled with black atoms at the base and along the costa, and a small black discal point rests on the end of the cell. There is also a large dark brown apical patch on the fore

wings, and a smaller one on the hind wings, followed by about four small brown spots, decreasing in size, on the ends of the veins.

Under side of the wings inclining more to orange yellow, and sprinkled with dark atoms except on the middle of the fore wings. A small discal point occurs at the end of the cell on all the wings. Costal edge of the fore wings, all the fringes, a small spot towards the apex of the fore wings, and a patch on the apex of the hind wings, all reddish.

This is a southern butterfly and must be extremely rare in Maine. One example was taken at the Isles of Shoals by Mr. Roland Thaxter.

The larva, which is green with four longitudinal whitish lines, is said to feed on clover and some other leguminous plants.

Family—NYMPHALIDÆ.

Sub-Family—DANAINÆ.

Fig. 12. *Danais archippus* (nat. size).

8. DANAIS ARCHIPPUS, F.

Dan'-a-is ar-chip'-pus.

Expanse of wings, from three and three-fourths to four and a half inches.

Upper side of the wings tawny orange red, with the veins heavily marked with black, and the borders black spotted with white. Under side somewhat paler, but the white spots are more prominent.

Body black, more or less spotted and marked with white.

The males have a black spot by the side of vein 2, near the middle of the hind wing.

The larva of this insect feeds on the different species of milk-weed (*Asclepias*), and bitter root (*Apocynum androsæmifolium*).

The eggs are deposited singly on the under side of the leaves. When first laid they are white, but in two or three days they turn yellow, and just before hatching they change to dull gray. They are somewhat conical in form, one twenty-fifth of an inch long, and marked with about twenty-five longi-

tudinal ribs, and between each of these are about the same number of cross lines, giving the surface a reticulated appearance. These eggs hatch in about a week, and the young larva, which is about one-tenth of an inch long, with a yellowish white body and a large black head, first eats the egg shell, after which it attacks the leaves. They molt three times before reaching maturity, after which they are about one inch and three-fourths long and have a yellowish head marked

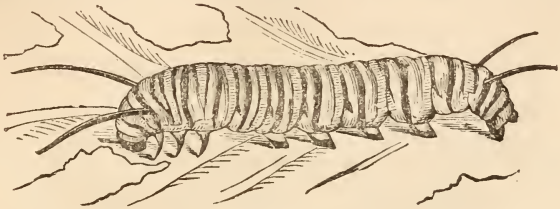

Fig. 13. Larva of *Danais archippus* (nat. size).

with two triangular black stripes. the upper surface of the body is ornamented with transverse stripes of black, yellow and white, this last color covering the greater part of each segment. On the third segment are two long black fleshy horns, and on the twelfth there are two similar but smaller ones. The under side is black, with greenish between the segments.

The larva spins a button of silk on some convenient object, attaching the hind feet to it, and in this suspended position, with no supporting loop of silk, it changes to the pupa.

The pupa is about an inch long, of a bright green color dotted with gold, and with a band of golden dots extending more than half way round the body above the middle. This band is shaded with black, and the part by which it is suspended is black also.

Fig. 14. Pupa of *Danais archippus*. (nat. size.)

The insect remains in the pupa state from ten to twelve days, when it emerges and remains quietly hanging to some object to give time for its wings to develop and harden, after which it flies away. They are said to hibernate in the butterfly state, and to deposit their eggs the next spring.

As their food plants are of little or no value, we pay but little attention to them save as objects of scientific interest or curiosity.

Sub-Family—NYMPHALINÆ.

9. Argynnis idalia, Drury.

Ar-gyn'-nis i-da'-li-a.

Expanse of wings, from three and a half to four inches.

Upper side of the wings, tawny orange red, with a series of four sinuous black bars across the cell, the outer one being double; an irregular black line composed of curved bars crosses the middle of the wing beyond which is a row of small round spots parallel to the outer border. The costal edge and outer border are black, and in the female there is a row of white spots in the black outer border, and a few white dashes towards the apex.

The hind wings are bluish black with a rusty tinge on the base, and a row of cream colored spots across the middle, and another along the outer border, which is cream colored in the female, but orange red in the male.

Under side of the fore wings marked as above, but slightly paler. Under side of the hind wings, dull brown with three rows of pearly white spots across them, one along the outer border, the second just outside of the middle, and the third, inside of the middle of the wing. There are also four spots near the base, and the inner edges are marked with the same color.

Body black, with yellowish hairs on the thorax.

The larva of this insect feeds on violets and pansies.

The egg is in the form of an irregular truncated cone with the top slightly depressed, marked with 18 vertical, wavy

ribs, half of which reach the top, while the rest extend not more than three-fourths of the way up. Between these ribs are numerous cross striæ.

The eggs hatch in about twenty-five days, and the young larva is about one-twelfth of an inch long, of a pale yellowish brown color, with a brown head. All the segments except the first two and the last have a row of eight dark spots, from each of which arises one or two long, black, curved hairs. These insects, as soon as hatched, crawl under some protecting object, as a stick or stone, where they hibernate during the winter. In the spring they revive from this state of lethargy, crawl to the growing violets and at once begin to feed. They molt five times before reaching maturity, changing their appearance at each molt.

The mature larva is one and three-fourths inches long, velvety black, banded and striped with ochrey yellow, changing to dull orange or red, and furnished with six rows of tapering fleshy spines each of which has several small black bristles. The two rows along the back are silvery white with black tips, those at each end of the rows somewhat smaller. The spines of the rows along the sides are smaller and yellowish or orange at the base. The head is reddish above and black beneath. They now seek some suitable place and change to a pupa about an inch long, suspended by the end. In this stage they remain about seventeen days.

This is not a common insect in Maine and is confined to the western part. I have not heard of its occurrence east of the Kennebec river. It has been taken at Waterville, Brunswick, Norway and Portland.

10. Argynnis cybele, F.

Ar-gyn'-nis cyb'-e-le.

Expanse of wings, from three to three and a half inches.

Upper side of the wings, fulvous or reddish yellow, brownish at the base; the whole surface marked and spotted with black. The cell is crossed by three sinuous black bars fol lowed by one resembling an inverted P. A heavy zigzag black band crosses the wing a little beyond the middle, beyond which is a row of round black spots between the veins, followed by a series of black lunules, which is followed by two parallel black lines, heaviest on the veins, one on the outer margin, and the other a little within. The veins are black, and in the females the lunules towards the apex are expanded so as to join the sub-terminal black line, leaving the ground color of the wing as a series of round spots.

The hind wings have the subterminal line only, heaviest in the females, the terminal line being almost entirely obliterated, preceded by a series of crescents before which is a row of black, circular spots; while across the middle of the wing is a band of irregular spots not reaching to the abdominal margin, but expanding near the costa, and extending in a broad band toward the base of the wing. Under side of the fore wings pale yellowish marked with yellowish brown on the apical portion; while the rest of the wing is marked with black like the upper side. Under side of hind wings reddish brown, more or less mottled with yellow; the space between the two outer rows of silvery white spots, bright yellow, forming a conspicuous band characteristic of this species. There are about ten silvery white spots on the basal part of the wing, while the two outer rows have seven each.

This species feeds on the different species of wild violet, and also on pansies.

11. Argynnis aphrodite, F.

Ar-gyn'-nis aph-ro-di'-te.

Expanse of wings, from two and a half to three inches.

Upper surface of the wings, bright reddish fulvous, paler in the female, cinnamon brown on the base. The black markings are similar to those of *Argynnis cybele*, but not quite as heavy. The irregular spots of the median band on the hind wings are smaller, and are not expanded on the costa towards the base as in *cybele*.

Under side of fore wings reddish except on the costa and apex, which are buff with pale brown markings. The black markings of the upper side are re-produced except on the costa and outer margin. Under side of hind wings cinnamon brown with silvery white spots much as in *cybele*, but smaller. The band between the two outer rows of silver spots is buff colored, and very narrow, especially at the extremities.

This species may be distinguished from *cybele* by the band between the two outer rows of silver spots on the under side of the hind wings, which is very narrow and much encroached upon by the ground color of the basal part of the wing; and also by the absence of the broad black patch near the middle of the costa of the hind wings, which is present in *cybele*.

The early stages of this species closely resemble those of *Argynnis cybele*, and like that species it feeds upon wild violet.

The butterfly is on the wing in Orono during the month of July.

12. Argynnis atlantis, Edw.

Ar-gyn'-nis at-lan'-tis.

Expanse of wings, about two and one-half inches.

Upper side of wings fulvous, obscure at the base. All the wings have black outer margins with only a trace of the ground color on them towards the anal angles. In other respects the fore wings are marked as in *aphrodite*, and the hind wings like *cybele*.

Under side of the wings much as in *aphrodite*.

This species is easily distinguished from *cybele* and *aphrodite* by its smaller size, and black outer borders of the upper side of the wings, and its general darker color.

The larva of *Argynnis atlantis* feeds on wild violets, and the early stages are similar to those of *cybele* and *aphrodite*.

This is a common species in Maine, and is on the wing from the middle of June to the early part of July.

13. Argynnis myrina, Cram.

Ar-gyn'-nis my-ri'-na.

Expanse of wings, one inch and three-fourths.

Upper side of the wings fulvous or reddish yellow with black markings arranged somewhat like *A. atlantis*. Outer borders of the wings black enclosing a row of fulvous spots nearly obliterated. Under side of the fore wings paler, except on the apex, which has an irregular patch of reddish brown, with a row of silvery white spots along the outer border, and one or two others on the apical patch. The black markings of the upper side are repeated on the rest of the wing. Under side of the hind wings reddish brown, marked in places with pale yellow and with several rows of silvery white spots. Between the two outer rows is one of small, round, black spots. Across the middle of the

wing is a row of about four large silvery white spots; and on the base of the wing are about five more of the same color.

This species feeds on wild violets, and is common in Maine.

Fig. 15. Egg of *Argynnis myrina*. x 24.

The eggs are pale green, somewhat acorn-shaped, with the top cut off, and marked with about fourteen vertical ridges with fine cross lines between them. The young larvæ are about one-twelfth of an inch long, of a pale green color with brownish black head. Brown patches nearly cover the fifth, seventh, ninth and eleventh segments. Black hairs arise from tubercles on all the segments, and curve forward. They molt four times before reaching maturity, when they are one inch long, ashy brown, mottled with velvety black, with six rows of fleshy spines beset with black bristles; those on the second segment three and one-half times as long as any others, and projected forward. Legs and feet, black; head, bronze colored. Pupa, three-fifths of an inch long, suspended by the tail; light brown streaked with darker, and armed with two rows of sharp, conical tubercles on the back. The perfect insect flies from the last of June to the middle of July.

14. Argynnis bellona, F.

Ar-gyn'-nis bel-lo'-na.

Expanse of wings, about one and seven-eighths of an inch.

Upper surface of the wings fulvous or reddish yellow, marked with black, after the general pattern of the other species of this genus. Two rows of black spots on the outer margin preceded by another a little distance within, while the basal half of the wings is marked with black dashes running together, more or less.

Under side of the fore wings marked like the upper side, except the outer part, which, like the under side of the hind wings, is brownish, and glossed with purplish white, with darker spots and irregular lines.

This species may be distinguished from *Argynnis myrina* by the absence of black outer borders to the wings, and of silvery white spots on the under side of the hind wings.

This species feeds upon violets, and is not uncommon in Maine. The eggs are similar to those of the *myrina* in form, size, color and markings; and it closely resembles that species in all the early stages. The mature larva, however, does not have the spines of the second segment lengthened. The perfect insect flies in Orono from the middle of May to the first of June, and again in the early part of September.

15. Euptoieta claudia, Cram.

Eup-toi-e'-ta clau'-di-a.

Expanse of wings, nearly three inches.

Upper side of the wings, bright fulvous, paler in the females, and somewhat dusky on the base and along the costa. The veins, terminal, and sub-terminal lines, are blackish brown. The lines are slightly enlarged where they cross the veins. Within these, in the interspaces, is a row of irregular round spots, followed by two zigzag lines, the inner one heavier and more strongly angulated, its angles extending out to the other line. These two lines also cross the hind wings, but are not as heavy nor as angular as on the fore wings. There is a circle on the end of the cell of the fore wing, and a half-circle near the middle. Below these is a sinuous mark extending from the origin of nervule 2, down to nervure 1. The hind wing also has a curved line across the end of the cell. Fringes, whitish, and marked with blackish brown at the end of the veins.

Under side of fore wings, bright reddish fulvous, from the base to the heavy zigzag line which is repeated from above. The marks on the cell, and the three black spots above the anal angle, are also the same as on the upper side. The outer half of the wing is pale with a reddish wash on the lower part; a pale ashy triangle on the costa; the apex and the outer margin marked with light brownish.

Under side of the hind wings, pale brown on the basal half, beyond which is a whitish band shaded off into a pale brown, followed by a terminal pale band. The veins are whitish, and the round spots of the upper side are faintly re-produced with greenish pupils.

Mr. Lyman wrote me that he "saw and took several specimens of this insect; beginning of August, 1882, near Portland." I am not aware that it has been taken anywhere else in the State.

Mr. W. H. Edwards states that the mature larva is an inch and a half long, of a yellowish brown color, and glossy, with six rows of steel blue, fleshy spines. Between these spines, in the dorsal rows are white tuberculated spots; the head is furnished with two long black jointed spurs, like antennae, and clubbed at the end.

The pupa much resembles that of *Melitaea phaeton* in shape; the surface clear pearly color, partly iridescent, and covered with metallic bronze tubercles.

The food plants of this species are violets, mandrake (*Podophyllum peltatum*), passion-flower (*Passiflora incarnata*), Sedum, Desmodium and Portulacca.

16. Melitæa phaeton, Drury.

Mel-i-tae'-a pha'-e-ton.

Expanse of wings, from two to two and one-fourth inches.

Upper surface of the wings, black with a row of red spots along the outer margin, and two red spots on the cell of the fore wing, the outer one being double. One red spot occurs on the cell of the hind wings. These cellular red spots are sometimes wanting. There are two or three rows of cream-colored spots within the outer row of red. Under surface of wings, black, and marked like the upper side, except that the spots are enlarged; and there are several red and also yellow spots on the basal half of the under side of the hind wings, not represented above.

This species is rare, at least, in the vicinity of Orono.

The larvæ feed on *Chelone glabra*, L., Fly Honeysuckle, (*Lonicera ciliata*), and Arrow-wood, (*Viburnum dentatum*). The eggs are laid in large clusters of from two hundred to four hundred, upon the under side of the leaves. They are somewhat in the form of a truncated cone, ribbed on the upper half, yellow when laid, but soon turn to crimson, and just before hatching they change to black. Duration of this stage, nineteen or twenty days. The young larvæ at once begin to construct a web, drawing together the upper leaves of the stem, and feeding upon those which are enclosed, extending the web as more food is required. The first molt takes place in six days, and the second about six days later; while the third occurs in nine or ten days after the second. Before the third molt, they construct a substantial web, in which, after molting, they become lethargic, and hibernate till the following spring, when they revive and crawl about in search of other plants to feed upon. After molting twice more, they reach maturity, and are a little over an inch in length, with the first three and last two segments black; the others red with tranverse black lines, and seven rows of long, tapering, fleshy, black spines, bristling with stout, black hairs. These spines arise from round, shining, blue tubercles.

Fig. 16. Egg of *Melitaea phaeton*. x 10.

The pupa is four-fifths of an inch long, suspended by the tail, whitish, with red and black dots over the surface.

Duration of this stage, from fourteen to eighteen days.

The imago is on the wing from the first to the middle of July.

17. Phyciodes harrisii, Scud.

Phy-ci-o'-des har-ris'-i-i.

Expanse of wings, one inch and three-fourths.

Upper surface of the wings, orange red with black markings; the black so extended as to leave only a sinuous red band across the wing outside of the cell, beyond which is a row of small red spots; also about three on the cell and two below. The sinuous band is so extended, as to fuse, more or less, with the red spots beyond, and is divided by the black veins of the wing.

The hind wings have a broad orange band, also cut by the black veins, and sometimes divided by a black line across the wing. Along the outer edge of this band, is a row of small black spots, two of which sometimes have pale yellow centers.

Under side of the fore wings, with very much less black than the upper side, and with two rows of white spots inside of the outer margin.

Under side of hind wings, dull orange, with the base edged with white, and with about five white spots ringed with black. Across the middle is a band composed of three rows of irregular white spots, on a ground of black; and near the outer border, is a series of pearly white lunules also on a ground of black, within which is a row of small black spots, some of which have white centers.

Body, above, black with reddish hairs; whitish beneath, with red legs. The eggs, and larvæ in their different molts, much resemble those of *Melitaea phaeton*; and they hibernate, some before the second, and others after the third molt. They make no web over their food-plant.

This common insect feeds on Aster and *Diplopappus umbellatus*, and has but one generation in a year.

The imago flies in Orono, through the middle of June.

18. Phyciodes nycteis, Doub.

Phy-ci-ó-des nyc'-te-is.

Expanse of wings, one and three-fourths inches.

Upper side of the wings very much like those of *Phyciodes harrisii*. Under side of fore wings, pale orange, faintly showing the black markings of the upper side. A pale yellow line runs along the outer margin, bordered on each side by a fine brown line, and preceded on the apex, and near the middle of the outer border, by a few white lunules. Under side of hind wings, dark brown, broken somewhat by whitish and pale yellow. A row of large, silvery white spots across the wing near the base, a similarly colored band across the middle of the wing, broken by the brown veins, and edged on the outside by a scalloped brown line. Between this and the outer border, on the brown shade, is a row of round black spots, re-produced from the upper side. A terminal yellow line, with brown edges similar to those of the fore wings, is continued along the outer border of the hind wings, within which is a series of unequal, silvery white lunules, the middle one being much the largest.

Body, above, blackish; beneath, white.

The larvæ feed on *Diplopappus umbellatus*, *Aster*, *Helianthus* and *Actinomeris*. As these wild plants are of no value, the insect has but little economic importance.

The eggs are laid in clusters of about a hundred, on the under side of the leaves. The eggs are whitish green, somewhat in the form of a truncated cone, the lower third of the outside smooth; the middle part marked with hexagonal, irregular, very shallow cells, and the remainder, by vertical ribs, terminating at the rim of the top. Duration of this stage, nine to thirteen days.

The larva passes four molts before reaching maturity, when it is an inch in length, of a blackish brown color above, and greenish brown beneath. Head, shining black, heart-shaped, with the sides high and rounded, and clothed with numerous

black hairs arising from black papillæ. A broad black band along the base, usually of a dull green color, with a yellow stripe in the line of the lower lateral spines, and a broken yellow line running with the spiracles; in some cases, this band is ochre yellow or reddish yellow. The back and sides are much dotted with white. The body is furnished with seven rows of long, tapering, black spines armed with short black hairs, one along the middle of the back, and three on each side, each arising from shining, black tubercles, except those of the lowest row, which has greenish or yellow tubercles. The pupa is .6 of an inch long, similar in shape, to *M. phaeton*, variously colored from greenish yellow to grayish brown. Abdomen armed with five rows of conical tubercles.

This butterfly is on the wing at Orono, about the middle of June.

19. Phyciodes tharos, Drury.

Phy-ci-o'-des tha'-ros

Expanse of wings, one inch and a half to one and seven-eighths.

Upper side of the wings, reddish fulvous, banded and reticulated with black. Borders of the wings black. Three or four spots of the ground color on the cell of the fore wing, with as many more beyond it. A sinuous band across the wing beyond the cell, followed by a series of spots, the lower one of which has a black center, and a lunule beyond this near the middle of the wing, all reddish fulvous. These run into each other more or less in the males.

Hind wings, with a pale, crenate line in the black border, sometimes scarcely perceptible, within which is a row of seven fulvous spots with black centers, the upper ones nearly or quite lost on the black ground. The basal part of the wing is marked by irregular, curved, black lines. Under side of fore wings, fulvous, pale yellow or buff along the costa and outer margin, with a brownish spot near the middle

of the outer margin, and another on the anal angle, preceded by a black spot. Another black spot rests on the middle of the hinder margin; one on the middle of the costa, and another between this last and the end of the wing. Under side of hind wings, pale yellow or buff, with a brown blotch on the outer margin, and a scarcely visible, dull, silvery lunule near the middle. Inside of this is a row of brownish points, corresponding to the black spots above. Across the middle and basal parts of the wings are several irregular, rusty lines. Body blackish above, white underneath.

This species feeds on different species of Asters, both wild and cultivated. There are two broods in a year; the one described above is known as the form *morpheus*, and the one appearing in the early part of the season is the form *marcia*, and scarcely differs on the upper side, but has the under side of the hind wings more or less silvery on the basal part, and the terminal lunules silvery, with a pale, lilac tint.

The eggs are laid in clusters of two hundred or more, sometimes in three tiers, usually on the under side of the leaves. They are pale green, conoidal, depressed at the top, and rounded at the base; the lower half indented like the surface of a thimble, the upper half with about fifteen vertical ribs or flutings. Duration of this stage, four to seven days. The young larva is .06 of an inch long, with a dark brown head, and a yellowish green body clouded with brown, with scattered black hairs, those on the forward segments directed forward.

The first brood passes four molts before reaching maturity, when it is .85 of an inch long, with a heart-shaped, shining, bronze-colored head, with two oblique white stripes on each side, and a spot of the same color above the mouth. The body is dark brown dotted with yellow, and has seven rows of tapering, fleshy spines armed with blackish bristles.

The larvæ of the second brood feed, and pass three molts, when they become lethargic, and hibernate during the winter; and in the spring they revive, go to feeding, and molt twice more, after which, they change to pupæ; and in from one to

two weeks, the butterfly emerges. This is the form *marcia*; while those arising from the first brood mentioned above, are the form *morpheus*.

20. Grapta interrogationis, F.

Grap'-ta in-ter-ro-ga-ti-o'-nis.

Expanse of wings, two and three-fourths inches.

Upper side of the wings, tawny orange, with brown spots running together on the outer part, and with an oblique black spot extending from the middle of the costa across the end of the cell. Two more small ones in the cell, and three or four somewhat larger, resting on the interspaces below. Hind wings, above, of the same color as the fore wings, with two small black spots near the middle, and one on the costa, which is double in the female. The outer borders of all the wings, including the angles and tails, are lilac. Under side of the wings, pale brown, more or less clouded with darker brown, with an irregular, sharply angulated band across the middle of both wings; the surface more or less washed with lilac. At the end of the cell, near the middle of the under side of the hind wings, is an interrupted C, usually silvery, but sometimes golden-colored.

There are two forms of this insect; the one described above is known as the form *fabricii;* and the other, which is known as the form *umbrosa*, differs from the above in having the outer half of the hind wings quite black, and the under side of the fore wings of the males, lighter, and coarsely marbled.

The larvæ of this species live on the leaves of the hop, elm, nettle, false nettle and basswood. The eggs are pale green, conoidal in form, with the base flattened; the sides are rounded, and marked by eight or nine vertical ribs, which are low near the base, but higher above, and terminate abruptly around a small, flat space at the top. Duration of this stage, from three to ten days. The caterpillars pass four

molts before they reach maturity, when they are about an inch and a half long, pale yellow, variegated with brown, with a yellowish line on each side of the body. The head is rust red, with two blackish, branched spines at the top. The spines of the body are arranged in seven rows, one along the middle of the back, from the fourth to the eleventh segment, inclusive, and three rows on each side arranged as in *Grapta comma*.

The pupa is one inch long, variable in color from light yellowish to dark brown, with the head deeply notched; a thin prominence on the thorax, and eight silvery spots on the back.

21. Grapta comma, Harr.

Grap'-ta com'-ma.

Expanse of wings, from two and one-fourth to two and one-half inches.

Upper side of wings, tawny orange. Outer border of fore wings, black, edged within by a series of pale yellow spots. A rusty brown patch rests on the hind margin against the black border, and an oblique patch of the same color, on the costa before the apex. An oblique patch from the middle of the costa across the end of the cell; two spots, one above the other, on the middle of the cell; and three spots, the first one below these, the other two beyond, in the interspaces, all black. Upper side of the hind wings, more or less washed with brown; the outer borders, dark brown, with a row of yellowish red spots before it; and three black spots, one on the costa, one on the cell, and one below.

Under side of the wings, marbled with light and dark brown; the hind wings, with a silvery C on the middle. The males have the under side more or less washed with pink.

The eggs are green, similar in form to those of *interrogationis*, and marked by ten vertical ribs, with fine cross striæ

between them. Duration of this stage, four or five days. The larva passes four molts before maturity, and is then one inch long, armed with seven rows of long, tapering spines; one along the middle of the back, from the third to the twelfth segment, inclusive, and three along each side; the upper row on each side running from the third to the twelfth segment; the next row from the third to the thirteenth, but the spine on the fourth, is below the row and in line with the spiracles; the lower row extends from the fifth to the twelfth segment. A little below the summit of each spine, from three to five branches start out, each branch and spine ending in a bristle. The color varies greatly; some are black with yellow bases to the spines and a yellow lateral line; others are nearly white, with red spots along the sides.

The pupa is about four-fifths of an inch long, of various shades of gray or brown, with golden protuberances on the abdomen, and a flattened prominence on the back.

The larva of this species feeds on hop, nettle, false nettle and elm; and after the second molt, they conceal themselves among the leaves drawn together with silk. There are two broods in a year; the last one hibernates in the perfect state, and the females revive in the spring and lay their eggs for the next brood. The form which appears in the fall, and hibernates during the winter is called *harrisii*, and is the one described above. The next generation is the form called *dryas*, and differs from the above in having the upper side of the hind wings nearly black.

This species has been taken in Orono, on the tenth of August.

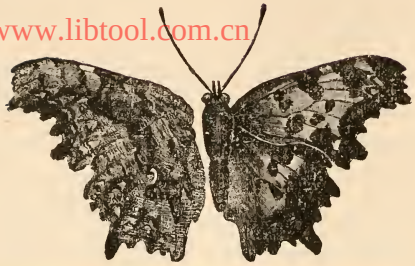

Fig. 17. *Grapta faunus* (nat. size; under surface on left).

22. Grapta faunus, Edw.

Grap'-ta fau'-nus.

Expanse of wings, from two and one-fourth to two and three-fourths inches.

Upper side of wings, deep orange fulvous, marked with brown and black, as in *G. comma*, only the markings are clearer and heavier.

Under side of both wings, dark brown on the base, with an irregular, common, blackish band across the middle, darkest on its outer edge, and within the abdominal margin, where its outline is obliquely serrated; beyond this band, the color is pale brown, mottled with grayish white, which is clearest on the costa of the fore wings; the whole surface clouded with wine color, and more or less crossed by fine abbreviated streaks of dark brown; apex of fore wings, yellowish brown, with three small, lanceolate, rusty spots, the lower one enclosing a blue or green point; the outer margin of both wings below these, bordered by a series of confluent blue-black, sometimes olive-green spots, following the outline of the wing; a little before this, another series of rounded spots of the same color, those on the hind wings largest and sometimes having black centers. A white G, varying in form, in the middle of the under side of the hind wing.

This species feeds on wild gooseberry, cultivated currant, willow and *Betula lenta*.

The mature larva is an inch and one-fourth long, head black, furnished with two branching horns, and a few scattered white hairs. Upper side of second to sixth segments, brick red, striped transversely with blue, yellow and black lines; a few white hairs on the second segment; four branching, yellow spines, with black tips, on the third and fourth segments; six on the fifth and sixth. Segments seven to twelve are white, with a faintly-marked black stripe along the back, each with three transverse yellow bands and two oblique black spots. These segments have each seven branching spines, all white except the one next to the lowest, which is brown. Last two segments black, twelfth, with seven spines like the eleventh, and the thirteenth has four white spines. Sides red, with two black bands, the lower spotted with blue.

Under side gray, striped transversely with black. Feet and prolegs black.

Fig. 18. Pupa of *Grapta faunus*. (nat. size.)

The pupa is well represented in Fig. 18.

The perfect insect flies in Orono about the middle of August.

23. Grapta progne, Cram.

Grap'-ta prog'-ne.

Expanse of wings, about two and one-half inches.

Upper side of wings, tawny orange, marked and bordered with black as in *G. comma*. Under side of wings, brown, crossed with fine black streaks, and a paler band on the outer part, leaving the darker basal part strongly angulated on the middle.

Hind wings with a silvery mark, somewhat in the form of the letter L, on the middle of the under side.

The larva of this insect feeds on currant and gooseberry,

both wild and cultivated, and also on the leaves of elm, hibernating in the perfect state.

The eggs are similar to those of *G. interrogationis*, and the mature larva is about one inch long, buff-colored, and armed with branching spines as in *G. comma*. Head, subcordate, with a large, compound, spinous process on each vertex, the main stem black, the branches black and yellow, the face and sides of the head thickly covered with simple, conical, yellowish spines of various sizes. The surface of the body varies greatly in color and markings.

The pupa is .7 of an inch long, suspended by the tail; the head-case, high, with a short, stout, conical projection at each vertex, the space between being rounded, the back with a thin prominence. There are several rows of tubercles on the abdomen, mostly small, some of which are gilded; colors, dull green, brown and pinkish white.

The butterfly is on the wing in Orono, about the middle of August, and hibernated specimens, early in the spring.

24. Grapta j album, Bd-Lec.

Grap'-ta j al'-bum.

Expanse of wings, about three inches.

Upper side of the wings, dull yellowish, washed more or ess with dull, rusty brown, which is darker and more dense on the base of the wings. The outer margin of the fore wings is black, with a double crenate line, more or less obscured by black atoms along the edge; two oblique black bars on the costa, one on the middle, the other between this and the apex, and separated from the black border by a white costal spot. There is also a black spot on the middle of the cell, with another below, and three beyond, between the veins. The upper side of the hind wings has a heavy, angulated brown line a little within the outer margin, and a black costa broken by a white spot. Under side of wings brown from the base to the middle, with light and dark waves, then

grayish-white with fine reticulations, and a scarcely perceptible row of dark points; and near the outer margin, is a wavy, dark line, followed by a narrow, ashy-blue shade.

The larva is two inches long, light green; head with black markings on the sides, thickly set with bristles and short spines, of which the lateral ones are each tipped with a long bristle, and armed with two shining, black, thick spines, whorled near the tip. The three upper rows of spines on the body are shining black, except at the base, which is reddish, with long branches, those of the forward segments more numerously branched than the others, and having each point tipped with a bristle. The remaining spines are reddish, tipped with black.

The pupa is one inch long, of a beautiful green color, delicately reticulated, with six golden spots on the back; spines and projections similar to those in *G. comma*.

The food-plant is not known, but it may be willow. The above description of the larva and pupa was taken from Prof. Lintner's account of one which he found crawling on the ground in a dense grove of varied timber. The butterfly hibernates and appears on the wing early in the spring, and again about the middle of August.

25. Vanessa antiopa, L.

Va-nes'-sa an-ti'-o-pa.

Expanse of wings, two and one-half to three inches.

Upper side of wings, purplish or dark reddish brown, with the outer edge of the wings pale yellow, somewhat sprinkled with black, and preceded by a black band, on which is a row of violet-blue spots. The costa of the fore wings is black, with cross streaks of yellowish, and two oblique yellow dashes beyond the middle. Under side of the wings, very dark brown, with numerous wavy cross lines of black, and the outer margins and discal points, dull white, sprinkled with brown.

Fig. 19. Clusters of Eggs of *Vanessa antiopa*, encircling the twig of an elm. x 2.

This species hibernates in the perfect state during the winter, and appears in the spring with the wings much worn and faded. The females deposit a dozen or more pale yellow, ribbed eggs in a girdle around the twigs of willow, elm, or poplar, near the petiole of a springing leaf, upon which the young larvæ may feed. The mature larvæ are two inches long, black, minutely dotted with white, which gives them a grayish look. There is a row of bright, brick-red spots along the top of the back. Head black, and roughened with small, black tubercles. The spines on the body are black, rather long, and slightly branching; four each on the second and third segments, six on the fourth and fifth, and seven on each, from the sixth to the twelfth, inclusive. The last segment has two pairs of short spines, one behind the other.

The pupa is dark brown or gray, with two rows of conical spines along the back of the abdomen, two on the head in front, three on the edge of the wing-covers on each side, and a thin prominence on the middle of the thorax.

Hibernated specimens of this butterfly are on the wing in the spring, and fresh specimens of the next brood are out about the middle of August.

26. Vanessa milberti, Godt.

Va-nes'-sa mil-ber'-ti.

Expanse of wings, two and-one-fourth inches.

Upper side of wings, blackish brown, with a wide, fulvous band across both wings, between the middle and the outer margin, slightly wavy, and of a paler tint on its inner edge, followed on the outer border of the hind wings, with a row of violet crescents. The fore wings have two fulvous spots on the cell, a black spot in the band on the costa, with a white

spot on each side of it. Under side, dark brown, with wavy cross lines of darker color, and a band of a paler tint corresponding to that above.

This species feeds on nettle, and is rather rare at this place.

It hibernates in the perfect stage, emerging in the spring.

The mature larva is a little more than an inch long, with a black head sprinkled with minute, whitish dots, from which spring pale hairs. The body is nearly black above, with small, white dots and pale hairs, which give it a grayish color. The spines are arranged as in *V. antiopa*, and are black and branching. A greenish yellow, lateral line low on the side, above which is a broken line of a brighter orange yellow shade.

Hibernated specimens of this butterfly are on the wing in the spring, and fresh specimens of the next brood are out in the last of July.

27. Pyrameis atalanta, L.

Py-ra-me'-is at-a-lan'-ta.

Expanse of wings, two and a half to three inches.

Upper side of wings, black, with an oblique, orange red band across the middle, and marked with six white spots towards the apex, the inner one of which is a broad, oblique dash on the costa. Hind wings, with an orange red band on the outer margin, on which is a row of black dots, the two nearest the anal angle having blue centers. Under side of fore wings, paler, especially so on the apex.

Under side of hind wings, slightly marbled with gray, a whitish spot resting upon the middle of the costa.

This species feeds on the nettle and hop.

Fig. 20 Egg of *Pyrameis atalanta.* x 20.

The eggs are green, barrel-shaped, with nine vertical ribs, highest at the top. Duration of this stage, five days.

The larva draws together the edges of a leaf, within which it remains and feeds until forced to leave for another, which it draws together in the same manner. The mature larva is nearly an inch and half long, of various tints, from yellowish green to violet, powdered with gray, and armed with spines arranged as in *Vanessa*.

28. Pyrameis huntera, F.

Py-ra-mé'-is hun'-te-ra.

Expanse of wings, from two and one-fourth to two and one-half inches.

Upper side of wings, tawny, variegated and spotted with black and white. Hind wings, marbled and streaked, with two large eye-like spots near the outer margins. The spots on the under side corresponding to these are black, with violet centers.

This insect feeds on *Gnaphalium polycephalum*, drawing the leaves together into a rude case, within which it lives, feeding on the inner surface of the leaves, especially near the summit. The mature larva is one inch and a fifth long, with a black head. The body above is alternately banded with rich blackish purple and yellowish green. The purple bands occupy the middle portion of each segment, and on these arise transverse rows of black, branching spines, as follows: —four each on the third, fourth and last, and seven on each of those between.

On each side of the back, from the sixth to the twelfth segments, inclusive, is a round, silvery white spot.

29. Pyrameis cardui, L.

Py-ra-me'-is car'-du-i.

Expanse of wings, two and three-fourths inches.

Upper side of wings, with color and markings very much like *P. huntera*. Under side of hind wings, marbled, a white spot on the middle of the wing, and a row of four or five eye-like spots near the outer margin.

This insect is double-brooded, and hibernates in the perfect state, reviving in May, and depositing its eggs on the leaves of thistles, burdock and sunflower, hatching in six or eight days, when the young conceals itself in a curled leaf. The mature larva is an inch and one-fourth long, with a black head, or reddish in some examples, sprinkled with fine whitish hairs, and a few small black tubercles. The body is grayish brown, variegated with yellow and black. The second, third, fourth, fifth, and last segments are black, with many whitish dots. A broken stripe along the back, white in front, yellow behind. The second segment is without spines, but is covered with fine, whitish hairs. The third and fourth segments have four spines each; the others have seven each, except the last, which has two pairs, placed one behind the other. The spines are much branched, and vary in color from yellowish to brownish white, tipped with black; base of spines along the sides of the body, from fifth to twelfth segments, of a reddish orange color. Body thickly sprinkled with fine whitish hairs, arising from minute white or yellow dots; a pale yellowish broken stripe on each side close to the under surface.

30. Junonia coenia, Hub.

Ju-no'-ni-a, co'-ni-a.

Expanse of wings, from two to two and a half inches.

Upper side of wings, dark brown, each with a large and a small eye-like spot on both sides. The fore wings have two orange red bars, edged with black, in the cell, and a large whitish oblique band across the outer part of the wing, enclosing the hinder eye-like spots. This band is broken by the brown veins which cross it, and is stained with reddish in the females, with a branch extending up towards the apex. Hind wings, with a narrow reddish band between the eye spots and the outer margin.

This butterfly, though common in the Southern States, is exceedingly rare in Maine; one specimen was taken in the summer of 1883, near Bangor.

The caterpillars feed on plantain, snapdragon and Gerardia. They are blackish, pointed with white, and reddish underneath; and have two lateral white lines, of which the upper is marked with a row of fulvous spots.

Pupa, like those of *P. cardui* and *huntera*, but blackish, varied with whitish, without any metallic spot.

31. Limenitis arthemis, Drury.

Li-men-i'-tis ar'-the-mis.

Expanse of wings, two and one-half to three inches.

Upper side of wings, brownish black, with a common white band a little beyond the middle, and a double series of blue crescents along the outer margin of the hind wings, and only a single row on the fore wings, inside of which, there is sometimes a short row of fulvous spots. Two or three white spots before the apex of the fore wings. The males have a row of seven round reddish spots between the band and the blue crescents on the hind wings.

Under side of wings lighter than above, and washed more or less with rust red. Two red spots surrounded with black, and some bluish atoms are on the cell of the fore wing, and three spots of the same color on the basal part of the hind wing.

There are two forms of this butterfly, which were originally thought to be distinct species, but Mr. W. H. Edwards has raised both from eggs laid by one individual. The description given above is of the form *lamina*, F, and is the most common one in this State. The other form is called *proserpina*, Edw., and was taken by Mr. Lyman, near Portland, in July. He states that there is sometimes a second brood of this form towards the end of August or beginning of September.

The form *proserpina* is of the same size and form as *lamina*, but the white band across the middle of the wings is wanting, or at most, there is only a whitish stripe occupying some part of the position of the band. Intermediate examples connecting the two forms have occasionally been taken.

This species is very common in Maine, and feeds on the leaves of willow, aspen, basswood, and probably thorn. The eggs, which are laid one on each leaf, near the tip, are grayish green, dome-shaped with the whole surface covered with six-sided reticulations, from each angle of which arises a short, tapering, white spine. The egg hatches in from seven to nine days, and the young larva is about one-tenth of an inch long, yellowish brown, covered with fine tubercles, each giving out a fine, club-shaped hair. The newly hatched larva eats away the end of the leaf on both sides of the midrib. When at rest it is found on the stripped portion of the rib, and is easily discovered by this habit. The end of the rib is no sooner laid bare than it is coated and wound with silk, and to the extremity are fixed pellets of excrement, two or three at first placed in line. These are bound together and to the rib. As the larva grows and consumes the sides of the leaf, this perch is increased considerably in size. The larva molts in eight days, after which it is about one-fifth of

an inch long, and blackish brown. On the top of the eighth segment is a light brown patch extending down on each side. The tubercles of the back are larger than the others. The head is now somewhat warty and depressed in the middle above. In six days more it molts again, after which it is one-fourth of an inch long, and much the same in form and markings as before. Five days after this molt, the larva is four-tenths of an inch long, and begins to construct a winter residence. This is accomplished by cutting away the sides and outer end of the leaf, leaving a fiddle-shaped piece with the midrib through the center. It next draws up the edges by silken threads until the two edges are brought together, and the seam woven together with a close mat of silk, and the entire inside of the domicile lined with silk. The stem of the leaf is also firmly secured to the branch from which it grows so as to prevent its falling to the ground, as it otherwise would do. In this silk-lined house or *hibernaculum* it now retires, closing the door, and hibernates for the winter. In the spring it revives, and emerges after the new leaves are put forth, and feeds a little, and then molts its skin for the third time. It is now nearly half an inch long, of a reddish brown color, somewhat speckled and mottled with black, segments two to four yellowish. On the third segment is a pair of irregular, knobbed appendages of a red color. The yellow patch on the eighth and ninth segments is extended down the sides. In six days more it passes the fourth and last molt, being three-fifths of an inch long, and much as in the last molt. Two days later the colors begin to change somewhat, and at maturity the larva is one inch and one-fifth long. In about ten days from the last molt it spins a button of silk on the under side of a branch to which it attaches itself and changes to a pupa nearly an inch in length, silvery gray, with a prominent, rounded appendage near the middle of the back. Duration of this stage, about ten days.

The butterfly emerges and is on the wing at this place during the last of June and the first of July.

Fig. 21. *Limenitis disippus* (nat. size; under surface on the right).

32. Limenitis disippus, Godt.

Li-men-ī'-tis di-sip'-pus.

Expanse of wings, two and a half to three inches.

Upper side of wings, reddish fulvous, with black edges and veins. The outer borders of both wings have a row of white spots, and the fringes are white and black alternately. An oblique, triangular, black band extends nearly across the outer part of the fore wing, with a row of three white spots on it. A narrow black band across the hind wings a little beyond the middle.

Under side paler but marked like the upper side, except that there are two rows of white spots on the terminal band.

The larva of this common species feeds on the leaves of apple, plum, willow, poplar and oak.

The eggs (Fig. 22, *a*, greatly enlarged), of this insect, are similar in size and form to those of *L. arthemis*, pale yellow at first, but changing to gray. They are generally deposited singly, near the end

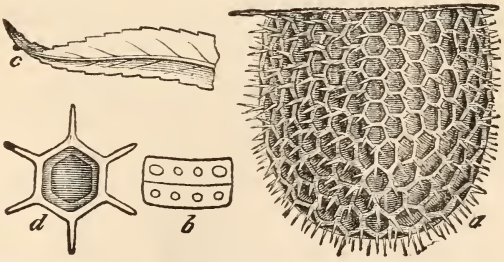

Fig. 22. *Limenitis disippus; a*, egg, greatly enlarged; *b*, one segment of the larva; *c*, egg on the leaf of a willow; *d*, one of the facets of the surface of the egg, very much enlarged.

of a leaf, on the under side, (Fig. 22, *c.*) Prof. Riley has described the early stages so admirably, that I give it in nearly his own language. The newly hatched larva is .9 of an inch in length, with a yellowish brown head, twice as large as the second segment, and distinctly bi-lobed. The second segment is also larger than the others. Each segment is divided by a transverse impressed line, and upon the top of each fold thus made, are four elevated spots, the forward ones being larger than the rest, (Fig. 22, *b*, enlarged.) There is a sub-dorsal and also a sub-stigmatal row of similar, rounded warts, and they all give rise to little pale bristles or spines. The general color is pale yellowish-brown, mottled with dark streaks, especially below the stigmata. The second period scarcely differs from the first, except in the somewhat greater length of the horns. In the third period, the horns acquire their mature proportions, and the whole surface of the larva becomes more granulated. In the fourth or last, the blue points appear and the lateral rows of tubercles lose their conspicuousness, to a great extent.

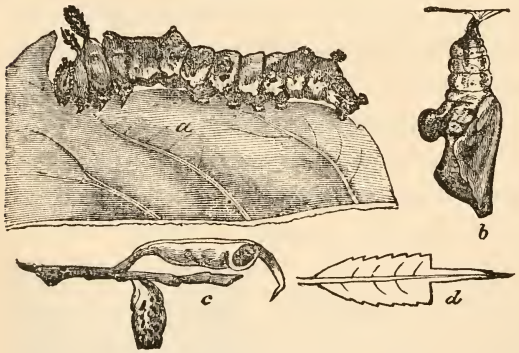

Fig. 23. *Limenitis disippus; a*, larva; *b*, pupa; *c*, hibernaculum; *d*, leaf of willow as cut by the larva.

The mature larva, (Fig. 23, *a*,) is one inch and one-fifth long. General color, either whitish or olive green. Body thickly granulated. Head, dull olive, with dense, minute prickles; its vertex, bifid, and terminating in a pair of prickly, cylindrical horns, transversely arranged, and each about .3 of an inch long. Back, speckled and mottled with olive of different shades above the line of spiracles, except segments three and nine, and the upper parts of eight and ten, but with a continuous, pure white line below the spiracles, beneath which line, on segments five to eleven,

is a large olive patch, extending on segments seven to ten to the external tip of the prolegs. A pair of black transversely arranged dorsal dots in the suture behind segment three, and a more or less obvious lateral one just above and behind the sixth and eighth pair of stigmata surrounding the lateral white line. Segments four to eight and ten to twelve, with more or less shining, elevated, blue dots. On segment three, a pair of prickly, cylindrical, black horns, transversely arranged, and .16 of an inch long. On segments four, eleven and twelve, a pair of large dorsal tubercles transversely arranged, each crowned by a little bunch of from eight to twelve robust prickles. On segment six, a pair of similar tubercles, but still larger, of a yellowish color. On segments five, seven, eight and ten, tubercles similar to those on segments four, eleven and twelve, but smaller. On segment thirteen, four black, prickly, dorsal horns, quadrangularly arranged, and each about .03 of an inch long. Stigmata and legs, blackish. Different examples vary greatly in the general depth of coloring, and in the proportion of the lighter and darker shades.

The pupa, (Fig. 23, *b*,) is similar in form to that of L. *arthemis*, and is marked with burnt-umber brown, ashy-gray, flesh-color and silvery white.

The winter is passed in a *hibernaculum* (Fig. 23, *c* and *d*), composed of a leaf, similar to *L. arthemis*.

The eggs of this species are destroyed by spiders, ants and a minute egg parasite belonging to the Hymenopterous family, *Chalcididæ*, and the larvæ, while small, are destroyed by spiders, a Tachina fly, a species of Microgaster and birds.

This species flies in Orono, from the middle of July to the middle of August.

Sub-Family—SATYRINÆ.

33. Neonympha eurytris, F.

Ne-o-nym'-pha eu'-ry-tris.

Expanse of wings, from one inch and a half to two inches.

Upper side of wings, dark wood-brown, with a slightly paler band across the ends, on which rest two eye-spots on each wing. These spots are black, with yellow rings, and a double metallic spot in the center. A triple line runs along the outer margin of the wings.

Under side of wings, lighter with a triple line along the outer margins and two wavy lines across the wings, one before, the other beyond the middle. The eye-spots of the upper side are repeated with two double silvery spots between. There are four eye-spots on the upper side of the hind wings, the upper and lower being the smallest.

This species has never been taken in this vicinity, but occurs in the western part of the State. The larva feeds on grass and hibernates in the winter, after which it completes its development, giving rise to the butterfly in June or July, thus having but one generation in a year. The eggs are pale yellowish green, nearly globular, flattened at the place of attachment, the surface covered by a fine net-work of slightly raised lines. They are deposited singly on the blades of grass, and hatch in about ten days. The young larva is .08 of an inch long, cylindrical, thickest in the middle, tapering each way, the last segment ending in two short tails; body covered with fine white hairs, slightly re-curved; color pinkish white, marked lengthwise by seven crimson lines, one of which is along the middle of the back and three on each side.

The head is dark brown, very large, and with a small conical process on each side above. They make their first molt in about seven days, after which they are .16 of an inch long, with a yellowish head, finely mottled with red, and with a small, rounded, red process on each vertex. The body is drab, with either a green or a red tint, and striped lengthwise with dull red, one stripe along the middle of the back and two more on each side. The whole surface is covered with fine tubercles of irregular size and shape, each of which gives rise to a short hair. In six days they molt their skins the second time, and are then one-fourth of an inch long; head shaped as before, yellow, with two arched rows of rounded brown patches across the upper part of the front. Body dull ochery yellow striped with brown, one broad dark stripe along the middle of the back and a similar one on the lower part of each side; two narrow stripes on the middle of each side, paler colored; tails reddish at the tips.

The larva passes the third molt in fourteen days from the last, and is .44 of an inch long, the middle segments stouter, the base broader than before; color, pale ochre yellow, somewhat mottled with reddish on the back, but variable; the lateral stripes sometimes nearly if not quite obsolete, and in place of the upper one is a dark point or spot on the hinder part of each segment from four to ten; basal ridge, buff; surface more roughened than before; head nearly as before, the spots on the face darker.

These larvæ are at all times very sluggish, and frequently pass days without eating. It is probable that they hibernate in this latitude after the third molt, and make the fourth and last in the spring, after their winter sleep.

The mature larva is one inch long, flat on the base, the back rounded, much arched on the middle segments, the sides flat and sloping, and there is a fleshy ridge along the sides over the feet; the second segment is much constricted, and the last is forked. Color above, yellowish brown, darker on the sides, a dark brown band running along the back, and on

each side of this on each segment from four to eleven is an indistinct patch. The basal ridge is yellowish, and the tails are tipped with red. The whole surface is covered with sharp tubercles of irregular size, from each of which arises a short brown hair. Head yellowish brown, finely tuberculated, the vertices a little produced, the face crossed by three rows of rounded brown patches.

The pupa is half an inch long, suspended by the tail only, cylindrical, the abdomen stout and larger than the remaining part. Color, pale yellowish brown. Duration of this stage, eleven days.

34. Neonympha canthus, L.

Ne-o-nym'-pha can'-thus.

Expanse of wings, two inches.

Upper side of wings, pale yellowish brown or wood brown; a scarcely perceptible pale band across the outer part of the wings, leaving an angle of the darker ground color apparent beyond the end of the cell. The outer margins of the wings have a pale narrow border, through the middle of which runs a dark line. The fore wings have four small black eye-spots on the pale band, and the hind wings have six.

Under side of wings lighter than above, and crossed by two irregular wavy lines, and the outer borders the same as above. Five eye-spots on the fore wings and six on the hind wings. These spots have a silvery white center on a black spot, which is ringed with pale yellow, followed by a ring of the general ground color, outside of which is a paler ring.

This is a common insect in Maine, feeding on grass, and passing the winter in the larval state.

The eggs are laid singly on the stems of grass, are greenish white, nearly globular, and with the surface slightly rough, but without definite markings. They hatch in about seven days, the young larva being .09 of an inch long, yellowish

white, but changing in a few hours to pale green. The head is light brown, nearly twice as broad as the second segment, and has on each vertex a small rounded prominence indented at the top, and from the middle of the hollow rises a little tubercle with a bristle. The last segment of the body ends in two tails. In eight days the larva molts, after which it is .26 of an inch long, slender, slightly thickest in the middle segments; the tails longer in proportion than at first, slender, somewhat conical, pink-tipped; rough, with white, pointed tubercles, and short bristles. Color, at first greenish yellow, afterwards changing to pale green. Along the middle of the back is a dark green stripe free from tubercles, and on either edge of this, is a line of white tubercles, another along the side, and a third along the base; between the last two, are two other white lines. The head is yellowish green, with the surface finely tuberculated. On each vertex is a long, tapering, rough horn, tipped with brown, and marked in front by a reddish stripe, which is extended down the side of the face. In about nine days it molts a second time, is .4 of an inch long, of the same form as before, and yellowish green, with the same tuberculated lines. The horns on the head are longer than before, nearer together, and the upper part pink. In about fifteen days it molts for the third time, after which it is .55 of an inch long, of the same form and color as before, but changes very soon to brown and buff. Along the middle of the back is a brown stripe, on either side of which is a reddish buff band, which changes to greenish on the outer side. Another buff band on the side, through the middle of which runs a brown line. The basal ridge is buff. In a few days the larvæ become lethargic, in which state they pass the winter. Soon after their revival in the spring, they molt for the fourth time, being .62 of an inch long, pale green, with a dark stripe along the back, and a yellowish white one just below; the two lines on the side and the basal stripe of the same color. Tails, green; head, emerald green, the horns reddish, the stripe down the face,

dark brown. In thirty days they pass the fifth and last molt. The mature larva is 1.2 inches in length, slender, the back arched, the last segment ending in two long, slender, rough, conical tails. The whole surface is finely tuberculated, each tubercle giving off a fine short hair. Color of body, green, a darker stripe along the back, and on either side of this, a pale green band, on the outer edge of which is a yellowish green stripe. On the side below the above, is a pale green band, through which runs a yellow line, and there is a yellow stripe along the base. Head, yellowish green, and the horns red with a brown stripe down the front, which extends down the side of the face. Pupa unknown.

The butterfly appears on the wing in Orono, about the middle of July.

35. Debis portlandia, F.

De'-bis Port-lan'-di-a.

Expanse of wings, two and one-fourth inches.

Upper side of wings, dark wood-brown, with three large black eye-spots on the fore wings, and five on the hind wings. These eye-spots have no pupils, but are surrounded by a yellow iris or ring. There is sometimes an intermediate small eye-spot on the fore wings between one and two, and the hind wings occasionally have a small eye-spot near the anal angle.

The fore wings have a paler shade beginning on the costa beyond the middle and extending across the wing so as to include the eye-spots, and having the inner side angulated and curved.

Under side of the wings lighter than above, and with violet reflections. Two brown lines cross the wings, one before the middle, nearly straight, the other beyond the middle, sinuous. The eye-spots are brighter and blacker than above, those on the fore wings enclosed in a pale, oblong ring; the first and last are usually pupilled with white, as are all the

spots on the hind wings which are preceded and followed by a pale sinuous line, and there is another of the same color just within the outer margins.

This species is not common in Maine, and is quite local, being a forest species, and not found in the open fields.

The larvae feed on grass, probably some of the wild grasses of the forest in a state of nature. The eggs are obovoid, greenish white, with a smooth surface. They hatch in about six days and the young larva is .13 of an inch long, cylindrical, head twice as wide as any other segment, body tapering from the second segment to the end. Color of the body, whitish yellow, changing in a few hours to pale green. Head yellow, somewhat tinted with brown. In eight days the larva molts the first time, after which it is .26 of an inch long, tapering as before, the last segment ending in two long, slender, blunt-tipped tails; color of body, bright green. much covered with whitish tubercles, mostly arranged in longitudinal rows, one being on either side of the middle line of the back, and two more on each side, with many separate tubercles in the intervening spaces; each tubercle bears a short, stiff, white hair. Head, dark green, with a rough horn on each vertex, the horns being green with a red tip.

In about eight days the larvæ molt the second time, after which they are .44 of an inch long, of the same form as before. Color, light green. The next molt is made in from nine to fifteen days, after which the larva is .52 of an inch long, and of the same form and color as before. At this time they go into the lethargic state, and hibernate during the winter. Soon after they revive in the spring they molt the fourth time, and are .6 of an inch long, of a yellowish green color. In from eleven to twenty days they molt the fifth time, and reach maturity in about ten days more.

The mature larva is 1.2 inches long, the middle of the back much arched, and sloping each way; the last segment ending in two small, short, slender tails, and the whole body is covered with fine whitish tubercles, mostly arranged in

longitudinal rows, each having a short stiff hair. Head, yellowish green, with many rather large, white, conical tubercles, and with a rough, red-tipped horn on each vertex. Body, also yellowish green, with a dark green band along the middle of the back, and on each side of this a yellow line, with a dark green line above it and another along the side, with a narrow yellow stripe along the base. Tails tipped with pink.

A few days later the larva attaches itself to some object and changes to a pupa, which is .6 of an inch long, cylindrical, the abdomen conical, the wing-covers raised considerably along the back side. The color is delicate green, sometimes bluish green, and the surface smooth and glossy.

The butterfly emerges from the pupa in about fourteen days, and appears on the wing in Orono, about the middle of July.

36. Satyrus alope, F.

Sat'-y-rus al'-o-pe.

Expanse of wings, from two and one-fourth to two and one-half inches.

Upper surface of wings, blackish brown, darkest on the basal portions; outer margins bordered by two fine, parallel lines, a little within which is a black stripe. The fore wings have a transverse yellow band beyond the disk; sometimes a little ochraceous, and often more or less encroached on by the brown ground; on this are two round black eye-spots of variable size, and with or without a white central point with blue scales.

The hind wings have a similar eye-spot near the anal angle.

Under side of the wings, yellowish brown; the band enlarged, and of a paler color; the eye-spots repeated and enlarged. The brown area is marked by numerous darker cross streaks. Under side of hind wings, marked like the

base of the fore wings; and the eye-spots are in two groups of three each, the middle one of each group being the largest; all black, rounded, in narrow yellow rings, and having white dots edged by blue scales.

This species is rare in Maine, at least in this part of the State, but the other form, *nephele*, is common. These two forms were originally described as two distinct species, and have been so considered until quite recently, when both forms were bred from eggs laid by a single female.

Form, NEPHELE, neph′-e-le, Kirby.

This form is of the same size and color as the form *alope*, but the yellow band on the fore wings is wholly wanting, or in some of the intergrades, with a little yellow shade around the eye-spots.

This species feeds on grass, the eggs being laid singly on the stems.

The eggs are lemon yellow, somewhat in the form of a truncated cone; about eighteen vertical ridges with rounded excavations between, crossed by fine striæ, spring from near the base, and extend to the edge of the top; this last is rounded, and covered with shallow cells. They hatch in from fourteen to twenty-eight days, according to the temperature.

The young larvæ are .1 of an inch long, with a head considerably larger than the other segments; light yellowish brown, speckled with brown, and with a few scattered hairs.

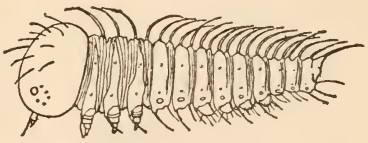

Fig. 24. Young larva of *Satyrus alope*. x 20.

The body is carnation with a crimson line along the middle of the back, and three of the same color near together along the sides. There are three rows of long, white bristles along each side. These all curve backward, except those of the middle row which curve forward. The larvæ hibernate at this stage. Soon after beginning to feed in the spring, they molt their skins for the first time, when they are .16 of

an inch long, cylindrical, thickest in front, the last segment terminating in two round, tapering sharp tails which are green with red tips.

Body, pale green with seven dark green longitudinal stripes, one along the middle of the back, and three on each side. Head nearly as before, light green with white papillæ, each sending out a blunt white hair. This occurs also on the surface of the body. After twenty-three days they molt a second time, being .3 of an inch long, and much as before.

The whole surface is one shade of yellowish green, with a dark stripe along the back, and a yellow ridge over the feet. In fourteen days they molt the third time, after which they are .44 of an inch long, and nearly as before. Head emerald green. In fourteen days more they molt the fourth time, and in twenty-eight days change to a pupa. The mature larvæ are a little over an inch long, largest in the middle, and tapering each way, of a dull yellowish green color, with a darker shade on the sides, a dark green stripe along the middle of the back, and a yellow stripe or line over the feet, and some have a yellow line along the middle of the side. The last segment ends in two sharp, conical reddish tails. Head larger than the second segment, emerald green, and both head and body are covered with pale, conical papillæ from each of which arises a fine white hair.

Fig. 25. Pupa of *Satyrus alope*. (nat. size.)

The pupa is .6 of an inch long, cylindrical, pale green, the abdomen evenly tapering; the wing-cases a little raised at the margins; a thin dorsal prominence with a depression behind it. Suspended by the tail only.

The butterflies emerge in fourteen days.

37. Chionobas jutta, Hueb.

Chi-on-o'-bas jut'-ta.

Expanse of wings, two and one-fourth inches.

Upper side of wings, dark brown with four small black spots ringed with yellowish, nearly parallel with the outer margin of the fore wings. The two middle ones are scarcely visible. An irregular black band along the lower side of the median nervure in the males. The hind wings have a series of yellowish spots inside of the outer border, the first of which has a small black eye-spot on it, with a whitish pupil.

Under side of hind wings costal and apical parts of fore wings marbled with grayish, dark brown and black. The rest of fore wings as above with the eye-spots reproduced.

All the fringes pure white interrupted with black at the ends of the nervules. Head, thorax and abdomen, black with brownish hairs.

This northern butterfly, which has never been taken elsewhere within the limits of the United States, has been taken for several years early in the month of June on a large bog in Orono. It occurs in the northern parts of both Europe and America, but its food plant has not yet been discovered.

Its near relative *Chionobas semidea*, Say, on the White Mountains of New Hampshire, feeds on *Carex rigida*, and, as there are many species of Carex on the above named bog, it is possible that the larva of our species feeds on some of them.

Family—LYCÆNIDÆ.

Sub-Family—THECLINÆ.

38. THECLA HUMULI, Har.

Thec'-la hu'-mu-li.

Expanse of wings, from one inch to one inch and a quarter.

Upper side of the wings, dusky brown with a bluish gray tint. The males have a dark oval spot a little above the middle. The hind wings have two short thread-like tails, the inner one longer than the outer, and tipped with white. The anal angle is touched with orange, and there is a large orange crescent resting on a black spot between the bases of the tails. Along the outer margin is an interrupted line of pale blue.

Under side of the wings, pale ashy gray with bluish reflections. A brown line, edged with white on the outside, starts from the outer fourth of the costa of the fore wings, and extends about two-thirds of the way across the wing. Another, similar but less prominent, scarcely touched with white on the inside, a little within and parallel to the outer border, extends from near the anal angle up near the costa.

The hind wings have two lines similar to those of the fore wings; the first, edged on the inside towards the costa with orange, runs across the wing to a point near the orange spot of the upper side repeated, where it forms a sharp angle and continues with one angle after another to the inner margin, something like the letter W. The outer line follows a little within the outer margin. Anal angle, black, preceded by an orange spot. The line at the base of the fringes is black.

The young of this species are "green, downy caterpillars," feeding on the heads of the common hop vine. This butterfly is on the wing during the middle of May.

39. Thecla strigosa, Har.

Thec'-la stri-go'-sa.

Expanse of wings, one inch and one-tenth.

Upper side of the wings, dark brown and unspotted in the males, but the females sometimes have a fulvous spot near the anal angle of the hind wing, and are paler in color. The under side of the wings is pale reddish brown. The outer part of both wings is crossed by four irregular, rather wavy, white lines, varying a little in individuals, but the two inner ones on the fore wings, approach each other towards the hinder margin. The third is shorter than the second, and the fourth or outer one, reaches only to the middle of the wing. The inner line on the hind wings extends nearly across, then bending, runs some way up the hinder margin, preceded in the last part of its course by another line nearly parallel to it. Above the termination of these two, there is a circlet of white on the margin. The outer line is short, and limited to the middle of the wing. The fore wings have a sub-marginal row of indistinct brown lunules edged on the inside with white, and the hind wings have a similar series which are bright red towards the anal angle, and edged on the inner side with black followed by white, and enclosing next to the anal angle, a large black space which is nearly covered with blue scales. Beyond this is a small black spot, and there is another at the angle surmounted by a red stripe edged like the lunules, and extending up the margin. The lunules next the apex usually exhibit a few scales of red. The margins of both wings are edged with a fine whitish line.

Body fuscous, beneath grayish white. Legs, white, annulated with brown. Palpi, white, the outer joint black tipped with white. Antennæ, annulated with black and white. Club, fuscous tipped with white.

The larva was taken by Mr. Saunders on a species of thorn (*Cratægus*), and his description is as follows: Length, half

an inch. Head, greenish brown. Body flattened, sloping abruptly at the sides. Color, velvet-green, with a darker colored dorsal stripe. The anterior edge of second segment, yellowish brown with a few darker dots; the middle segment laterally striped with two or three faint yellow oblique lines, and the last two segments have each a lateral yellow patch, and there is a faint yellow basal line from the fifth to the terminal segments. Under surface, bluish-green.

The larva is .37 of an inch long, nearly oval, and with the head case rounded. The body is dark reddish brown, with black markings, and thickly covered with fine hairs. The anterior segments have many black patches on them, and there is a dark ventral line from the sixth to the twelfth segments.

Prof. S. I. Smith, who very kindly sent me a list of the butterflies which he has taken at, or in the vicinity of Norway, Me., informs me that he captured a single specimen of this rare species in Norway.

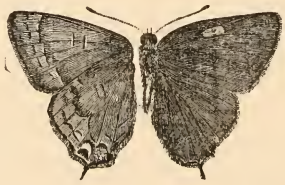

Fig. 26. *Thecla calanus* (nat. size; under surface on left).

40. Thecla calanus, Hueb.

Thec'-la cal'-a-nus.

Expanse of wings, one inch and a quarter.

Upper side of the wings, dark brown with brassy green reflections. Hind wings with two very unequal, thread-like tails, the lower one being longest and edged with white. Base of fringes, from anal angle to the lower tail, white, and

at this place there is also a narrow, white terminal line. Under side of the wings, somewhat paler than above. Two short, whitish, parallel lines occur on the disk of the fore wings, and a whitish crenate line crosses the wing about half way between the last and the outer border, shaded within by blackish; and there is another broken whitish line, shaded on the outside with blackish, between the last line and the outer border.

The hind wings have two short, whitish discal lines with a blackish shade between them. A series of blackish spots, edged on either side with whitish, crosses the wing beyond the disk; and outside of this is a series of lunate whitish spots shaded on the outside with blackish and faintly edged on the outside, below, with bluish white. Along the anal angle the black streak is followed with orange. At the very apex of the anal angle there is a black spot with white on its upper side. On the next interspace is a patch of powdery blue scales and in the next interspace to this is an orange crescent enclosing a black spot. The orange scales are also faintly visible in the next interspace.

The larva is said to feed on the leaves of oak.

This species is reported from Norway, Maine.

41. Thecla augustus, Kirby.

Thec'-la Au-gus'-tus.

Expanse of wings, one inch.

Upper side of the wings dark brown tinted with rusty brown on the disk and along the margin of the hind wing near the anal angle. The wings sometimes show greenish reflections.

Under side of the fore wings, lighter than above, with a scarcely perceptible line crossing the outer fourth, beyond which is a row of dark dots continued across the hind wings. The basal half of the hind wings underneath is nearly black

and overlaid with numerous purplish scales. The outer half is lighter, especially inside of the row of points.

This butterfly has been taken in Orono from the middle of May till the middle of June.

The early stages and food plant are unknown.

42. Thecla irus; variety, arsace, Bd-Lec.

Thec'-la i'-rus, ar'-sa-ce.

Expanse of wings, from an inch to an inch and a quarter.

Upper side of the wings, dark brown with greenish reflections. Under side of the wings blackish brown on the basal half and lighter beyond. The outer part of the wing is overlaid more or less with white scales. The tooth of the hind wing, next outside of the anal angle, curves outward, and there is a more or less prominent black spot within the margin between the base of the tooth mentioned and the one next outside.

The stigma on the fore wings of the males is three times as long as wide.

43. Thecla henrici, Gr-Rob.

Thec'-la hen'-ri-ci.

Expanse of wings, from seven-eighths of an inch to one inch and an eighth.

This species very closely resembles *Thecla irus* var. *arsace* in form and color as well as markings but differs in having the outer part of the hind wings somewhat rust colored, the teeth of the hind wing shorter and the first one beyond the anal angle, not curving outward, and in wanting the black spot on the under side of the hind wings between the bases of the first two teeth. The stigma on the fore wings of the males is shorter and wider than in *arsace*, being only twice

as long as wide. This species averages smaller than *arsace*.

This is a common species in Maine and is on the wing during the middle of May.

According to Mr. Edwards, the larva feeds on wild plum, resting on the side and eating into the fruit. The eggs are whitish green, rounded and flattened, with a reticulated surface. They are laid on the flower stem and hatch in five or six days, just at the right time for the young caterpillars to take the newly-formed plums.

When first hatched they are .04 of an inch long, brownish yellow, of an oval form, flattened on the base, the back high and sloping towards the hinder part, and on each side there is a row of long, re-curved, white hairs, with a similar one along the edge of the base. In five days they molt their skins, when they are .08 of an inch long, of the same shape as before. There is a reddish brown stripe along the middle of the back, on each side of this, dull yellowish green with a macular brown line next the outer edge and limiting the dorsal area. Sides sloping, with a broken yellowish line; a similar but continuous line along the basal ridge. Whole under side, yellowish green. Body much covered on the upper side with short, stiff hairs. Head, heart-shaped, smooth, yellowish green.

In three or four days they molt a second time, when they are .12 of an inch long and of the same shape as before. The back is considerably elevated and a tuberculous ridge crosses each segment from the fourth to the eleventh. Color, reddish brown and dull yellowish green. A red band runs along the back tapering to a point behind. A green line runs through the middle of the band. Outside of this band there is a green line containing a little reddish brown space on each segment. The sides are reddish brown with a green longitudinal line in the middle and the basal ridge is green.

In five days more they molt a third time when they are .3 of an inch long. The back from the fourth to the eleventh segments presents a series of elevated ridges, one to each

segment, narrow in front and broad behind. The summit of the back is flattened and a little concave and covered by a broad band which is cut by a paler line. The rest of the elevated ridges are yellowish green making two sub-dorsal macular bands. The sides are sloping, nearly flat, reddish brown, with an indistinct green line. The second segment is a broad, elevated rolled collar in which the head is concealed. The basal ridge is green and the head yellowish green. One day later the length is .4 of an inch, the color changed to port-wine red, the sub-dorsal area remains yellowish green but with a tint of red on the posterior part of each segment. The sides are the same color as before, and there is a pale red line along the basal ridge. Body covered with short brown hairs.

Two days later the length is .56 of an inch, when they stop feeding and in eight days from the third and last molt they pupate.

The pupa is .3 of an inch long, black or blackish brown with obscure red bands, there being on either side a narrow, black stripe in the middle of the abdomen. The winter is passed in this stage.

44. Thecla niphon, Hueb.

Thec'-la ni'-phon.

Expanse of wings, one inch and one fifth.

Upper side of the wings, dark brown with a rusty space on each in the females. The notches on the hind wings are white, and the teeth are blackish. Under side of the wings, light brown. Two black streaks cross the cell of the fore wing, one at the end and the other near the middle. A wavy black line, edged on the outer side with white, starts from the outer third of the costa, and extends two-thirds the way across the wing; and between this and the outer border, there is a row of more or less wedge-shaped, black spots. The hind wings have two tortuous black lines crossing them, one near the base with the inner edge white, the other a little

beyond the middle, and edged with white on the outside. Between this last and the outer border, is a row of black spots, which are more or less wedge-shaped. The outer space is somewhat sprinkled with whitish scales.

The larva of this species feeds on various kinds of pine, and is described as being green and pubescent, with three longitudinal stripes on the back, the middle one pale yellow, the other two white. Near the feet there is usually a small marginal white line. The head is brown.

The pupa is grayish, with four rows of small spots, of which the two middle ones are blackish and indistinct, and the others ferruginous.

The butterfly is on the wing in Orono during the middle of May.

45. Thecla laeta, Edw.

Thec'-la lae'-ta.

Expanse of wings, one inch.

Upper side of the wings in the males, black with a few metallic blue scales near the base of the fore wings, and a band of the same color on the hind wings, extending from the anal angle half way along the outer margin. Under side of the hind wings, apex and costal margin of the under side of the fore wings, slate blue with greenish reflections. Costal edge of the fore wings, red. Disk of the same, smoke color. A series of five small red spots, edged on the outside with white, starts from the outer fourth of the costa, on the under side, and extends a little more than half way across the wing.

The under side of the hind wings have two series of red spots parallel to the outer margin, those of the outer series being small, and more or less surrounded by a delicate white border in which are a few black scales. The inner series crosses the middle of the wing, and is somewhat sinuous, the spots larger, brighter red, and crescent shaped, bordered on the outside with white in which are a few black scales.

The upper side of the females is black, with the base of the fore wings and hind margin for two-thirds of its length, and the hind wings, except the costa, dark metallic blue. Under side, greenish gray. In addition to the five spots on the under side of the fore wings in the males, the females have two blackish, rather indistinct spots below the others, nearer the base. Thorax and abdomen, black above and white beneath. Legs and antennæ, black, with white rings. Palpi white. Club of antennæ, black, red at tip.

The early stages and food plant of this very rare species are unknown.

The perfect insect has been taken in Orono on the 18th of May.

46. Thecla titus, F.

Thec'-la ti'-tus.

Expanse of wings, from an inch and a quarter to an inch and a half.

Hind wings without tails or teeth, but the anal angle projects slightly.

Upper side of the wings, dark brown, with a row of seven or eight orange colored spots along the outer margin from the anal angle. These are sometimes wanting. Under side of the wings, grayish brown, with a row of small black spots touched on the outer side with vermillion, along the outer margin, within which is another row of larger black spots encircled with white. Corresponding rows cross the hind wings, but the terminal row has the vermillion spots increased in size; and there are two white edged black dashes placed end to end across the end of the cell. Body above, dark brown; beneath, clothed with whitish hairs.

This species is said to feed on the plum, cherry and oak.

The mature larva is .7 of an inch long, elliptical, and flat on the lower side, of a dull green color with a yellowish tint, especially on the forward segments, and it is thickly covered with very short, brown hairs.

There is a patch of rose color on the forward segments, and another larger one on the hinder extremity. Head very small, black and shining.

The pupa is .45 of an inch long, pale brown and glossy, with many small dark brown or blackish dots over the whole surface, thicker along the middle above, appearing as a faint imperfect stripe from the seventh to the eleventh segments.

Surface thickly covered with very short, brown hairs.

This insect has not been taken in Orono, but is reported from Portland and Norway, Maine.

Sub-Family—LYCÆNINÆ.

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47. Feniseca tarquinius, F.

Fen-is'-e-ca tar-quin'-i-us.

Expanse of wings, one inch and a fourth.

Upper side of the wings, bright orange yellow. The fore wings have a dark brown outer border with an irregular inner edge, which extends narrowly along the hinder margin. A black stripe extends along the upper part of the cell, which widens into a tooth-like process at the end, below which is a round spot. A black dash runs along in the inter-space below the cell from the base of the wing, out to a small spot nearly half the length of the hinder border.

The hind wings have about half their surface, on the costal side, dark brown with an irregular edge, and there are a few brown spots near the anal angle. Under side of the fore wings paler than above; the dark markings and the whole under surface of the hind wings, reddish yellow, washed more or less with white, with numerous white circles on the hind wings. This species is subject to much variation in the extent of the brown markings.

The larva is said to feed on alder, wild currant, *viburnum* and *vaccinium*.

This butterfly has been taken in Aroostook and at Orono in the early part of June, and also on the 12th and 13th of August. Prof. S. J. Smith took it at Norway in June, and also July 20th and 28th.

48. Chrysophanus, epixanthe, Bd-Lec.

Chrys-o-pha'-nus ep-ix-an'-the.

Expanse of wings, about one inch.

Upper side of the wings, dark brown, somewhat purplish in the males. The fore wings have a black spot at the end of the cell, a smaller one before it on the middle of the cell, and one below this last. The hind wings have a black mark at the end of the cell, and a row of spots beyond, scarcely visible, and one or two red spots at the anal angle. Under side of the wings, whitish, with a scalloped red line on the outer margin of the hind wing, from the anal angle upward. On the under side of the fore wing are three black spots on the cell, one near the base, one in the middle and one at the end, with one under each of the first two named. There is also a row of seven black spots across the wing beyond the cell, forming a somewhat sinuous line. There are also three spots just within the outer margin, from the anal angle upwards. Those on the hind wings are reduced to mere points, forming about two irregular rows across the wing. Body, blackish above and white beneath.

This pretty little species is quite common on certain bogs during the last of June and the early part of July. The food plant is not known, but Mr. Scudder suggests that it may be swamp dock (*Rumex verticillatus.*)

49. Chrysophanus americana, D'Urban.

Chrys-o-pha'nus a-mer-i-ca'-na.

Expanse of wings, from one inch to one inch and a quarter.

Upper side of fore wings, coppery red, with the costa and outer margin bordered with dusky brown; and there are eight black spots, one on the middle and one on the end of the cell, with a somewhat irregular row across the wing, between the end of the cell and the outer border.

Hind wings, above, dusky brown, with a few small black spots, one on the disk and the others beyond. There is also a terminal, coppery red band not reaching the costa, with four black spots on it.

The under side of the fore wings are paler than above, and the outer border and under side of the hind wings are pale ashy. The black spots of the upper side of the fore wings are re-produced beneath, circled with white, and there is an additional spot in the cell near the base, and three in the edge of the outer margin above the anal angle, not surrounded with white.

The hind wings have a crenated red line within the outer border, from the anal angle nearly to the costa; and two rows of small black spots of unequal size across the wing, with two or three on the cell.

This extremely common species may be taken on the wing during all the summer months. The larva, which feeds on sorrel (*Rumex acetosella*), is elliptical, flattened on the under side, dull rosy red with a diffused, yellowish tint on the sides, most distinct along the middle segments, and a line along the middle of the back of a deeper shade of red. The body is downy with minute yellowish hairs. This description of the larva was taken by Mr. Wil-

Fig. 27.
Larva of *Chrysophanus americana* (nat. size.)

liam Saunders, from one that had probably hibernated in this stage and was not fully grown. Dr. Harris states that the larva is of a greenish color.

The young larva, according to Mr. S. H. Scudder, "is provided with long hairs sweeping backward behind their bodies, most of them arranged in longitudinal series."

Fig. 28. Pupa of *Chrysophanus americana* (nat. size).

The pupa is attached by the end of the abdomen and is closely girt to the object to which it is attached.

Fig. 29. *Lycæna psendargiolus* (nat. size; under surface).

50. Lycæna pseudargiolus, Bd-Lec.

Ly-cae'-na pseu-dar-gi'-o-lus.

Fig. 30. *Lycæna violacea* (nat. size; under surface).

Form violacea, *vi-o-la'-ce-a.*

Form marginata, *mar-gi-na'-ta.*

Fig. 31. *Lycæna lucia* (nat. size; under surface).

Form LUCIA, *lu'-ci-a.*

Form NEGLECTA, *neg-lec'-ta.*

This remarkable species is very common in Maine, at least the forms *violacea*, *marginata* and *lucia*, while the form *neglecta* is less common, and *pseudargiolus* is confined to more southern latitudes. These little blue butterflies are found in abundance flitting along the roads and borders of the woods, from the middle of May to the middle of June.

Expanse of wings, about one inch.

Upper side of wings, deep azure blue with a delicate terminal black line. Fringes, black on the apical part of the fore wings, but white, barred with black, on the rest of the fore wings and all the hind wings.

The fore wings of the females have a broad blackish outer margin, sometimes extending along the costa; and the hind wings have a blackish costa, and a row of dark spots along the costal margin.

The under side of the wings is very pale silvery gray, with a silky lustre, and there are the following pale brown markings: a row of spots along the outer margin, each preceded by a crescent; a curved row of elongated spots across the fore wing between the end of the cell and the outer border; and several small spots on the base of the hind wing.

The form *lucia* has the terminal spots so enlarged and run together as to form a terminal band, and the spots on the basal part of the under side of the hind wing, enlarged and run together so as to form a more or less complete triangular discal patch.

The form *violacea* has dark points on the disk of the under side of the hind wings, and pale dusky spots and crescents along the outer margin, but not run together as in *lucia*.

The form *marginata* has the terminal band on the under side of the hind wing as in *lucia*, but has the disk as in *violacea*.

The form *neglecta* has the upper side of the hind wings paler than the fore wings; and the under side paler, and the the markings less distinct than in *violacea*.

From the studies of Mr. W. H. Edwards on this species, it seems probable that there are two generations in Maine, at least in the southern part, that the spring brood has three forms, *lucia*, *marginata* and *violacea* — while the summer brood consists only of the form *neglecta*. It is quite possible that there is only one generation in northern Maine and that *neglecta* does not occur there.

Mr. Edwards states that eggs laid by violacea on the flowers of dogwood (*Cornus*), in West Virginia, in April or early in May produce *neglecta* in June, but most of the pupæ hibernate.

The egg stage was five days, the larva twenty-four, and the pupa stage twenty-four. Mr. Edwards has strong reasons for believing that the hibernating pupæ produce *violacea* again in the spring. He also states that the form *pseudargiolus*, in West Virginia, lays eggs which produce the same form, but sometimes of a smaller size — the true *neglecta*; but most of the larvæ hibernate and produce *pseudargiolus* again the next spring, as he believes. The fall brood of *pseudargiolus* lays eggs which after hatching and passing to the pupa stage, hibernate and yield *violacea* the next spring. *Lucia* has been observed laying its eggs on *Cornus*, in the spring, but its transformations are unknown, as are those of *marginata* also.

The following food plants have been reported for the different forms:

Actinomeris squarrosa, *Actinomeris helianthoides*, *Apios tuberosa*, *Erythrina herbacea*, *Spiræa salicifolia*, *Ceanothus americanus*, *Cornus* and *Ilex*.

Fig. 32. *Lycæna comyntas* (nat. size; under surface on the left).

51. Lycæna comyntas, Godt.

Ly-cæ'-na co-myn'-tas.

Expanse of wings, one inch.

The hind wing is regularly rounded, with one fine, thread-like tail. The males are dark violet blue on the upper side, with blackish outer borders, while the females are blackish brown, sometimes dusted with bluish near the base, and the fringes are whitish. Along the outer margin of the hind wings are several black spots, and one or two orange crescents.

Under side of the wings, light gray with brownish spots encircled with white, and arranged as follows: a dash across the end of each cell, a row of spots between this and the outer margin, quite regular on the fore wing, but irregular on the hind wing; a double row of paler spots along the outer margins of both wings; the black spots and orange colored crescents of the upper side repeated below; the black spots encircled with metallic scales; a spot near the middle of the cell, and one near the basal third of the costa of the hind wing.

Body, black above, whitish beneath.

The larva of this species feeds on red clover and other species of the *Leguminosæ*.

The eggs are of a delicate green color, round, flattened, depressed at the top, and covered with a frost work of interlaced points. In three or four days, the eggs hatch and the young larvæ are .05 of an inch long, cylindrical, of a yellowish color except two rows of white points along

the back, and one near the base on each side. A long, curved, white hair arises from each of these points. Head, black and shining, nearly as large as the second segment. In three days they molt their skins, when they are .08 of an inch long, flat on the lower side, of an elliptical outline, the back flat at the top and sloping towards the base. The color is russet with the whole surface irregularly dotted with black, from which arise white hairs. Head black, long and narrow, smaller in proportion to the second segment than in the last stage, and partly concealed in the second segment. In three days more they molt the second time, after which they are .12 of an inch long, broader and flatter than before, russet, varying towards vinous, interspersed with green. On each side of the narrow ridge along the middle of the back, there is a slightly raised edge caused by the tubercles, and there is a fold along the side of the base of the body, and the hairs from this and the ridge are longer than elsewhere.

In three days more the third molt is made, when they are .20 of an inch long, pale green along the back with vinous on the sides, but varying in color. In five days they molt the fourth time, when they are .36 of an inch long and the greatest breadth is about one-fourth as much as the length. They are of the same general form as before, but highest in front and sloping backwards. Both ends are equally rounded when the head is drawn into the second segment, each segment rounded on the back, and the whole upper surface is covered with fine white hairs. Color, greenish with darker green lines, and oblique vinous lines on the sides. Head black. In about five days from the fourth molt, they attach themselves and change to the pupa stage. The pupa is .26 of an inch long by .10 wide, shaped much like the mature larva, of a greenish, brownish or sordid white color, with three rows of black dots, and sparingly clothed with whitish hairs.

In from nine to eleven days the butterflies emerge. This history of the early stages of this butterfly is from the

magnificent and very reliable work of Mr. W. H. Edwards of West Virginia; but in this latitude there may be some variation from the account given above.

This species has not been taken in this region, but I have a specimen taken at Auburn, and Mr. Lyman reports it from Portland, so it will doubtless be taken elsewhere in the western part of the State.

Family—HESPERIDÆ.

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52. Carterocephalus mandan, Edw.

Car-ter-o-ceph'-a-lus man'-dan.

Expanse of wings, one inch and an eighth.

Upper side of the wings dark brown, overlaid with a few yellowish scales, and marked with dull orange colored spots as follows: one row extends along the outer margin, often nearly obliterated, another across the wing between the outer border and the end of the cell, two of which are out of line and nearer the outer border. The cell is more or less filled with the orange yellow, and there is a small spot of the same color resting on the lower side of the cell near the middle.

The hind wings have a row of small orange yellow spots along the outer margin, a row of larger ones within this, and one near the base of the wing.

Under side of the fore wings much paler than above, the light marks much larger and running together. Under side of the hind wings are of the same yellowish as the fore wings, and the spots of the upper side are re-produced, but larger and of a white color, and ringed with brownish. The veins are also brownish.

The food plant of this rare species is unknown. It is on the wing through the middle of June.

53. Ancyloxypha numitor, F.

An-cy-lox'-y-pha nu'-mi-tor.

Expanse of wings, one inch.

Upper side of fore wings, dark brown, glossed more or less with tawny yellow. Hind wings, tawny yellow, with the costa and outer border dark brown. Under side of fore wings, dark brown, with tawny yellow costa and outer margin. Under side of hind wings, paler yellow than above, and without any brown.

Body, dark brown above with yellowish hairs, whitish beneath.

The early stages and food-plant of this rare butterfly are not known. It is taken on the wing in the early part of July.

54. Pamphila zabulon, Bd-Lec.

Pam'-phi-la zab'-u-lon.

Expanse of wings, from an inch and a quarter to an inch and a half.

Upper side of the wings, dark brown, with a large, tawny yellow spot covering the greater part of the fore wing, leaving the base, outer and hinder margins, brown. The veins are brown, and there is a heavy oblique brown line at the end of the cell beyond which the yellow is overlaid for a short distance with brown scales, leaving two square, tawny yellow spots in the edge of the outer border. The hind wings have a large, tawny yellow spot on the middle, crossed by the brown veins.

Under side of the wings as above, but paler. The outer borders are washed with purplish white scales in the females.

Body, dark brown, with greenish hairs above, paler beneath.

This common species feeds on grass.

The eggs are pale green, nearly globular, somewhat flattened, and under a strong lens they appear reticulated over the surface with fine six-sided markings.

Fig. 33. Egg of *Pamphila zabulon*, x 12.

They hatch in about ten days, and the young larva is one tenth of an inch long, with a large, prominent, shining black head and a creamy white body with a yellowish tinge towards the tail. The second segment is half encircled with a transverse line of black. Fig. 34, mature larva (Scudder).

Fig. 34. Larva of *Pamphila zabulon*, (nat. size).

They station themselves on the inside of the leaves, near the joints, drawing portions of the leaves together with silken threads, forming a rude case in which they secrete themselves.

This species is taken in Orono during the middle of June.

55. Pamphila leonardus, Har.

Pam'-phi-la le-o-nar'-dus.

Expanse of wings, nearly an inch and a half.

Upper side of the wings, dark brown, and, in the males, thickly overlaid with tawny scales from the base to the outer third of the fore wings, and terminating with a row of lighter, tawny spots, three below the costa, two beyond the end of the cell, a little out of line and separated from the cell by a broad dark brown dash, and two or three below, the lower ones of which shade off into the color of the base of the wing. There is an oblique, velvety black stripe on the middle of the fore wing, below the cell, in the males.

The hind wings have a curved, central, tawny band, not reaching either margin, but broken into about five spots by the dark brown veins. The part of the wing towards the abdomen, and the upper side of the body, more or less covered with dull tawny hairs.

Under side of the wings, bright reddish brown; the fore wings, blackish from the cell to the hinder margin, and

spotted as above, with the addition of a yellowish spot at the end of the cell, which shows very faintly on the upper side. The hind wings have a small yellow spot near the middle on the cell, and a curved row of six or seven pale yellow spots beyond it. Under side of the body, covered with pale yellowish hairs. The club of the antennæ is large, and has a minute, curved apex.

The females are without the tawny scales on the basal part of the fore wings above, and the oblique stripe below the cell.

Mr. H. H. Lyman, of Montreal, has kindly informed me that he found this species "common, end of August and first of September," on Cape Elizabeth, three miles from Portland. I have not heard of its being taken elsewhere in Maine. Mr. Scudder states that it feeds on grasses.

56. Pamphila sassacus, Har.

Pam'-phi-la sas'-sa-cus.

Expanse of wings, one inch and a quarter.

Upper side of the wings, dark brown, with a large, tawny yellow spot occupying a large part of the middle of each. A brown patch, more or less distinct, extends from the end of the cell of the fore wing, nearly out to the brown border, but leaving two small, square, tawny spots beyond it. The base of the wing is somewhat obscure, and in the females this covers the hinder margin; and a band of the same color extends from the base along the lower side of the cell, half its length or more. The males have an oblique, velvety black dash from near the base of the wing up to the end of the cell.

Under side of the wings, ochre-yellow, with small paler spots towards the apex corresponding to those above, while the basal portion, hinder border and the oblique stripe are brownish. The under side of the hind wings, in the female, has several square, paler spots, corresponding to the outer part of the tawny color above. Body, above, brown, with greenish hairs, lighter beneath.

The larva is said to feed on grass (*Panicum sanguinale.*) The butterfly is on the wing in the middle of June.

57. Pamphila otho, variety, egeremet, Scud.

Pam'-phi-la o'-tho. e-ger'-e-met.

Expanse of wings, one inch and a fourth.

Upper side of the wings, dark brown, with a dull tint on the hinder border of the fore wings, and the middle of the hind wings, caused by the presence of yellowish hairs. The fore wings have a small yellow spot below the end of the cell, and a smaller, divided one, of the same color, half way between this and the apex. The males have a velvety black spot below the middle of the cell, and another along the side of the cell towards the end, and a patch of large brown scales between them.

Under side of the wings, dark brown, dusted with yellow scales, and with the yellow marks of the upper side re-produced. The hind wings have a faint yellowish band a little beyond the middle, not reaching either border. Body, above, dark brown, with greenish hairs; lighter beneath.

This is a rare species in Maine.

58. Pamphila peckius, Kirby.

Pam'-phi-la peck'-i-us.

Expanse of wings, about one inch.

Upper side of the wings, dark brown, with tawny yellow markings. The males have the costa of the fore wing, from the base to a point two-thirds of the way to the apex, and extending across to the lower side of the cell; the hinder border; three spots separated by the veins, half way between the end of the cell and the apex; two minute spots beyond the end of the cell, nearer the outer margin than the last; a larger spot a little below the end of the cell, all tawny yellow. The hind wing has a spot of tawny yellow near the base, and a wide one a little beyond the middle, divided into five or six by the veins. The males have a somewhat sinu-

ous, velvety black stripe near the middle, below the cell.

Under side of the wings, light brown, with the yellow spots larger and lighter than above. The hind wings have the larger part of the middle covered by a large, irregular, pale yellow spot, nearly divided in the middle.

The females differ in having only a tinge of yellow on the costa; and the spots beyond the cell are larger and clearer than in the males; and the oblique velvety stripe is of course wanting.

This very common species feeds on grass. The eggs are pale greenish yellow, strongly convex above, and flattened at the base; and the surface is faintly reticulated. They hatch in fourteen days, and the young larva is one-tenth of an inch long, with a large, shining black head. The body is dull brownish yellow, dotted with black. The second segment has a ring of brownish black on it. Under side, paler than above, and the whole surface is clothed with fine hairs.

This butterfly is on the wing in Orono from the middle of June to the last of July.

59. Pamphila mystic, Edw.

Pam'-phi-la mys'-tic.

Expanse of wings, one inch and a quarter.

Upper side of the wings, tawny yellow, with a wide, dark brown outer border; and a dark brown patch nearly covers the space between the end of the cell and the brown border. The males have an oblique, velvety black stripe on the middle of the fore wing. Hind wings, with a large tawny yellow patch on the middle, which is divided by the brown veins, and a brown shade across the end of the cell.

Under side of the wings, paler than above. Body, dark brown, with greenish hairs above, and lighter beneath, with grayish yellow hairs.

The females have the upper side of the fore wings dark brown, with a sinuous row of square, tawny spots across the wing beyond the cell, and more or less of the same color on the cell.

The eggs of this grass-feeding species are of a pale yellowish green color, strongly convex above, and with the base flattened. The surface appears smooth under a lens, but faintly reticulated under a power of eighty diameters. They hatch in eight or ten days, and the young larva is one tenth of an inch long, with a large, shining black head, and a white body tinged with yellowish brown which is more apparent towards the hinder part.

The full grown larva is one inch long, of an oval outline something like a "wood louse" or "sow bug" in form. The head is not large in proportion to the size of the body, but prominent and much larger than the second segment; of a dull reddish brown color, edged with black on the hinder part, and clothed with minute whitish hairs. The body is dull brownish green, with hairs similar to those on the head, and a line along the middle of the back, and numerous dots over the surface of the body of a darker shade. The second segment is pale whitish, with a line of brownish black across the top. The last segments are paler than the rest, and the under side is paler than above.

This butterfly is on the wing in Orono from the middle of June to the last of July.

60. Pamphila cernes, Bd-Lec.

Pam'-phi-la cer'-nes.

Expanse of wings, one inch.

Upper side of the wings dark brown. Fore wings in the male tawny yellow on the costa, extending across the cell and out more than three-fourths of the distance to the apex, and ending in three small, wedge-shape spots. On the middle of the wing is an oblique, velvety black stripe; and at the outer end of this is a tawny spot.

Under side of the wings, lighter but spotted as above. The females have a tawny stripe along the middle of the costa of the fore wing above, and the oblique black stripe is wanting, but the other spots are larger and more distinct than in the males.

Body, dark brown above, with greenish hairs; a little lighter beneath.

The early stages are unknown to me. The perfect insect is on the wing in Orono from the middle of June to the middle of July.

61. Pamphila manataaqua, Scud.

Pam'-phi-la man-a-ta'-a-qua.

Expanse of wings, one inch and three-tenths.

Upper side of the wings, dark brown. The fore wings of the male have a large, brassy yellow spot, extending from the costa beyond the middle, and an oblique black dash near the middle. Hind wings with a brassy gloss.

Under side of the fore wings tawny yellow, dusky towards the outer margin, with a pale yellow oblique spot near the middle, and two or three minute ones of the same color near the costa.

Hind wings dusky ochre yellow beneath, with a transverse row of four small, paler yellow, almost obsolete spots. Head and body glossed with green above, yellowish white beneath.

The female differs from the male only in wanting the oblique black dash on the middle of the fore wings, and in the presence of two rather large, squarish yellow spots at the outer extremity of where the oblique dash would be if present, between the nervules, the lowest one largest, and not so near the outer margin as the other.

Mr. H. H. Lyman informed me that he took one specimen of this rare insect near Portland, July 20, 1874. I have not heard of its occurrence elsewhere in the State.

62. Pamphila metacomet, Har.

Pam'-phi-la met-a-com'-et.

Expanse of wings, one inch and a quarter.

Upper side of the body and wings, dark greenish brown. The males have an oblique, black velvety stripe near the middle of the fore wing.

The females have a few small pale yellowish spots in a sinuous line across the fore wing beyond the end of the cell.

The under side of the wings are slightly paler but marked as above.

The larva feeds on grass. The butterfly is on the wing in the middle of July.

63. Pamphila bimacula, Gr-Rob.

Pam'-phi-la bi-mac'-u-la.

Expanse of wings, from an inch and a quarter to an inch and a half.

Upper side of the wings, dark brown, overlaid somewhat with tawny scales. The males have an oblique, velvety black stripe near the middle of the wing, on each side of which, and on the cell, the wing is marked with tawny yellow. Between the end of the cell and the apex, there are a few small, tawny streaks between the veins. The females have two pale yellowish spots below the end of the cell, and a trace of one or two between the end of the cell and the apex. Fringes of all the wings, white.

Under side of the wings, pale tawny brown. The marks of the upper side are repeated. Body, above, of the color of the wings; clothed with whitish hairs beneath.

The early stages of this rare species are unknown.

The butterfly is on the wing in Orono early in July.

64. Amblyscirtes vialis, Edw.

Am-bly-scir'-tes vi-a'-lis.

Expanse of wings, one inch.

Upper side of the wings, dark brown with a line of three small whitish spots extending downwards from the outer fourth of the costa. There is sometimes a similar spot half way across the wing, and at an equal distance from the outer margin as those above.

Under side of the wings, dark brown with purple reflections.

This species feeds on grasses but is rare in Maine. The perfect insect is on the wing in Orono from the first to the middle of July.

65. Amblyscirtes samoset, Scud.

Am-bly-scir'-tes sam'-o-set.

Expanse of wings, one inch and an eighth.

Upper side of the wings, dark brown with greenish scales and hairs which give a greenish shade to the whole surface of the wings. A line of small pale yellowish spots crosses the wing beyond the end of the cell, consisting of three, near together below the costa; and three more somewhat larger and more distinct ones below the middle of the wing.

Hind wings with a faint trace of a pale line beyond the middle.

Under side of the wings lighter than above, and heavily overlaid with greenish scales. The markings are plainer than above. Fringes white, cut with dark brown at the ends of the veins.

The larva is said by Mr. Herman Strecker to feed on grass (*Andropogon*).

This is a rare species in Maine. The butterfly is on the wing through the middle of June.

66. Thanaos brizo, Bd-Lec.

Than'-a-os bri'-zo.

Expanse of wings, one inch and a half.

Upper side of the wings, dark brown. Fore wings almost black, and variegated with gray on the outer part; near the outer margin is a row of gray dots, within which is a transverse band composed of another row of oval gray spots, between two slender, black, zigzag lines; and across the middle, is another band of the same kind.

On the hind wings are two wavy rows of ochre yellow dots near the outer margin. All the wings have two rows of dots of the same color across the outer part.

This species is reported from Waterville. The larva is said to feed on oak, and beggar's lice (*Cynoglossum morisoni.*)

67. Thanaos icelus, Lintn.

Than'-a-os ic'-e-lus.

Expanse of wings, one inch and a quarter.

Upper side of the wings, blackish brown, sprinkled with pale bluish scales. A band, somewhat lighter than the basal part of the wing, crosses a little beyond the middle, heavily overlaid with the bluish scales, especially on the costal half. This is followed by a darker band with serrate edges, beyond which a paler shade extends to the outer margin; while through the middle of this pale space there is a series of dark spots. All these shades and bands run from the costa nearly to the hinder margin.

The hind wings are dark umber brown, with a terminal row of pale spots, and another similar row a little inside. Under side of the wings, lighter than above; and the spots of the upper side are repeated on the hind wings. The fore wings have a terminal row, and one preceding it, of lengthened dots, with two or three inside of this last.

The early stages of this common species are not known.

The perfect insect is on the wing during the middle of June.

68. Thanaos persius, Scud.

Than'a-os per'-si-us.

Expanse of wings, one inch and a half.

Upper side of the wings, blackish brown, sprinkled with pale bluish scales on the outer part of the fore wings. There are four whitish dots extending in a line downwards from the costa, half way between the end of the cell and the apex. There is a similar one half way between these and the hinder margin, and another, near the end of the cell. A row of black points crosses the wing just within the outer margin,

and another of triangular spots, half way between the outer margin and the end of the cell.

The hind wings are colored and marked as in *Thanaos icelus*. Underside, paler, and with the white spots showing more plainly.

This species is reported to be common in the western part of the State, during the middle of June, but it has not been observed in the region about Orono.

The larva, according to Mr. S. H. Scudder, feeds on willow, poplar, and *Lespedeza capitata*.

69. Eudamus pylades, Scud.

Eu-da'-mus pyl'-a-des.

Expanse of wings, one inch and a half.

Upper side of the wings, dark brown, with three small white spots on the middle of the costa, separated only by the veins; three or four similar ones on the outer fourth of the costa, and three arranged in the form of a triangle between the end of the cell and the anal angle. Fringes, gray, barred with dark brown at the ends of the veins. Under side of the fore wings the same as above, but shaded with darker brown at the base, and sprinkled with pale blue scales on the outer part.

Fig. 35. Egg of *Eudamus pylades*. x 28.

Under side of the hind wings, colored as above, but with two irregular bands across them, limited by wavy, black lines, and sprinkled on the outer part with pale blue lines. Body, above and beneath, dark brown. Fig. 35, the egg greatly enlarged (Scudder). This is a very common species in Maine, and the larva feeds on clover. The perfect insect is on the wing during the month of June.