

A

SYNOPSIS OF THE DIURNAL

LEPIDOPTERA OF KENTUCKY.

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BY HATTIE H. WARNER.

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DEPARTMENT  
OF ZOOLOGY AND ENTOMOLOGY,  
OF THE STATE COLLEGE.

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A SYNOPSIS  
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The present synopsis has been prepared during the past school year (1893-94), at the State College in the Laboratory of Zoology and Entomology, and is based upon the collection belonging to the Experiment Station.

The number of species is not large, and probably will be increased at least a third when they have been given careful attention. Considering the fact that the group has not been given particular attention, the number will compare favorably with that of other States. The number thus far collected in Kentucky would indicate that the State is rich in species in proportion to its extent.

The synopsis is offered in its present condition as a contribution to a knowledge of our species, with the intention of extending and completing it in the future. Those having occasion to use it will find most of the species represented which they are likely to encounter in ordinary collecting.

**The General Characters of Butterflies.**

The small head, with the enlarged clypeus, is characteristic alike of moths and butterflies. In both the maxillæ are developed as a long tubular tongue, excepting the silk-spinners or Bombycidæ, which have the mouth-parts obsolete. The wings are usually broad, regularly veined, and covered with microscopic scales. Among the characteristic differences between them will be noticed the clubbed antennæ of the butterflies, rarely found among moths. The three divisions of the body of the butterfly, also, are more nearly equal in size than those of the moth. The butterfly when in repose holds its wings erect, and when flying they are not connected; some of the moths, on the contrary, hold their wings together by means of a bristle and socket. Another noticeable difference between the two,

we find in the pupa state, moths being often enclosed in a cocoon, the butterflies rarely so. The skippers alone approach the moths in their somewhat similar manner of pupation; they form a kind of cocoon from leaves and line it with silk. The pupæ may be attached by the posterior end to a twig, with a silken thread passing entirely around the middle of the body. In other cases, as *Danaïis archippus*, the silken thread is wanting, the only attachment in this case being at the posterior end of the body. They are usually found in places chosen with some reference to concealment and protection against the weather. The Lepidoptera are never parasitic.

We find few wide variations in the habits, transformations, and even the external anatomy of the butterflies. Their wings are as highly specialized as those of any of the insects, and are their principal organs of locomotion, the legs, being always rather frail. The latter are used mainly to support the animal when at rest. As a rule, the wings are very large in proportion to the rest of the body.

The spindle-like body is well formed for flying, and is covered with microscopic scales, often also with hairs. The head is quite small and is covered with hairs. The very large and conspicuous compound eyes are placed on the sides of the head. From between the eyes extend the knobbed antennæ, usually very slender. These are supposed to bear the organs of smell. The tips or knobs of the antennæ vary in form, being oval, elliptical, hooked, or ending in a small straight spine. In the butterflies we find only one pair of palpi developed, while in the moths two pairs are often present. The palpi vary in length and also in the manner in which they are held. The maxillæ form a slender, hollow tube, which, when not in use, is held as a spiral between the palpi. This is the organ by means of which they obtain food, sucking or sipping the nectar from flowers. The butterfly needs but little and takes but little food, living only long enough to deposit its eggs. Nine thousand species are known in the world, 900 in North America, and 125 in New England.

In its development the butterfly presents one of the most perfect metamorphoses that occurs among animals. It passes through four stages, (1) the egg, (2) the larva, (3) the pupa, (4) the adult.

The eggs are deposited on the foliage of plants. Wonderful instinct is shown in choosing a suitable place for the eggs. They are placed on the leaves of plants on which, strange as it may seem, the butterfly herself could not live. The young can exist only on certain kinds of leaves, and on these alone will the eggs be found. It is indeed wonderful, even more, it seems a divine instinct, which teaches the mother butterfly that this food upon which she could not live, is the only food that can sustain the life of her young. The eggs are very

small, spherical or round, often flattened on one side. The larva when it first emerges from the egg is a very tiny thread-like worm. It increases rapidly in size, and the amount of food consumed by it during this stage is astonishing. It moults the skin four times during the larva stage and spends from a few weeks to some months in the larval condition. As the time draws near for the next step in its transformation, we find the animal apparently shrinking or shortening, the head often becoming greatly enlarged. It finally wants no more food and recognizing the fact that a period of rest is at hand, fastens itself securely in some place, moults its skin for the last time, and appears to us as a queer-looking oblong body—the pupa.

In this state it is no longer an active, moving animal; it is without movement excepting a very slight motion of the abdominal segments. The body wall is close-fitting and firm, with the wings indicated. In this stage the legs are soldered to the body. The animal takes no food. It may remain in this condition for some time. From the pupa the butterfly emerges. All colors, from the gaudiest to the most delicate, we find tinting its wings. In this state it has reached its perfection, as a beautiful, airy, butterfly, living only on the nectar of flowers. It now forms a wonderful contrast indeed to the forms through which it has come to us.

A few butterflies exhibit what is known as protective coloration. An example of this among Kentucky butterflies is *Paphia andria* the under surface of whose wings is entirely different in color from the upper surface—a very bright upper surface being accompanied by a very dull under surface. When flying it is very conspicuous; watching it alight it seems to disappear, so different is its color and appearance when at rest. The shape of the folded wings is very close to that of the leaves of many plants, while the under surface looks very much like a dead leaf in color. When frightened it often alights on the ground among dead grass, or upon trees with dying foliage, probably by so doing, rendering itself less easily detected by its enemies, the birds.

### Structure.

The body of the butterfly is divided into three main divisions; the head, the thorax (the middle division, which bears the legs and wings.) and the abdomen. The crust of the head is divided into the occiput, epicranium, and clypeus. The occiput is behind the ocelli, the epicranium bears the eyes, the clypeus is the front of the head, and is always largely developed in butterflies. Of the mouth-parts the labrum, the labial palpi, and the maxillæ are well developed. The eyes are compound, with numerous hexagonal facets, and form the entire sides of the head.



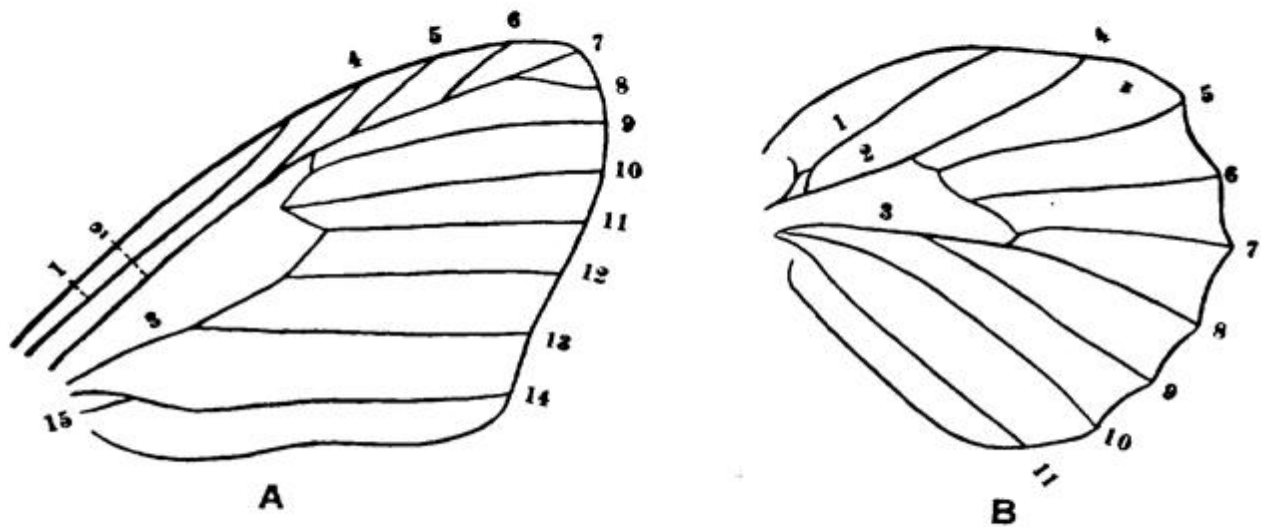


FIG. 1. SHOWING THE VEINS OF THE WINGS.

A. Forewing. 1, costal vein; 2, sub-costal vein; 3, median vein; 4, 5, 6, 7, 8, sub-costal veinlets; 9, independent vein; 10, 11, 12, 13, median veinlets; 14, sub-median vein; 15, internal vein.

B. Hind wing. 1, costal vein; 2, sub-costal vein; 3, median vein; 4, 5, 6, sub-costal veinlets; 7, 8, 9, median veinlets; 10, sub-median vein; 11, internal vein.

The thorax is divided into the prothorax, mesothorax, and metathorax; the crust of each of these is subdivided above into the scutum and scutellum, while the episternum and sternum lie below. The prothorax is very much reduced in size, it being almost rudimentary in comparison with the well developed mesothorax and metathorax. It bears on each side the "shoulder tuft" or "pterygoid," covering the bases of the fore wings. The abdomen has eight segments present or represented, and bears no appendages. The two pairs of wings are attached to the meso- and metathoracic divisions. The fore and hind wings are more nearly alike in their veining than in outline. The fore wings are somewhat triangular in shape, the hind wings rounded or square. Each wing has five principal veins: 1st, the costal; 2d, sub-costal; 3d, median; 4th, sub-median; 5th, internal. The costal and sub-costal form the front margin of the wing and are called the costa. The median vein, as the name signifies, is the middle one, and extends from the base to the outer margin. The sub-median follows the median and extends from the base to the posterior angle of the wing. The internal is small, often wanting, and follows the sub-median. The legs are attached to the thorax and are divided into the coxa, trochanter, femur, tibia, and tarsus, terminating in a double claw with the pad-like pulvillus between. The anterior of the three pairs of legs is sometimes rudimentary.

The digestive system of butterflies is well adapted to the kind of food necessary to them. They suck in their food through the long spiral tongue by means of a sucking stomach. The œsophagus is a slender tube extending from the mouth through the thorax; the



sucking stomach is attached to the posterior extremity of the oesophagus just anterior to the true stomach. The true stomach extends to about the fifth abdominal segment, then becomes much smaller and makes several convolutions, enlarges into the crop, narrows again into the rectum and extends to the anus.

Malpighian tubules are present. Salivary glands and silk glands are also present in butterflies.

The nervous system consists of a ventral cord with several ganglia: The so-called brain sending nerves to the eyes, two thoracic ganglia sending nerves to the legs and wings, and four abdominal ganglia.

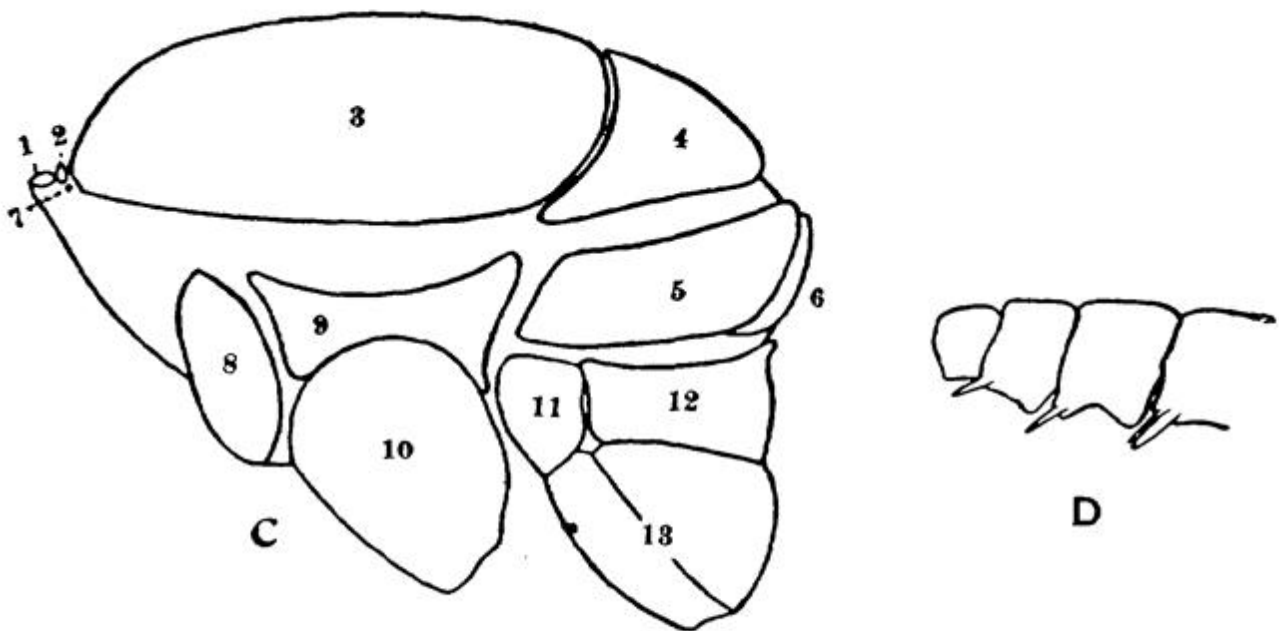


FIG. 2. SHOWING THE DIVISIONS OF THE THORAX AND THE RUDIMENTARY FRONT TARSUS.

C. Thorax. 1, scutum of prothorax; 2, scutellum of prothorax; 3, scutum of mesothorax; 4, scutellum of mesothorax; 5, scutum of metathorax; 6, scutellum of metathorax; 7, spiracle; 8, episternum of mesothorax; 9, epimeron of mesothorax; 10, coxa of middle leg; 11, episternum of metathorax; 12, epimeron of metathorax; 13, coxa of posterior legs.

D. Rudimentary front tarsus.

The butterfly breathes by means of spiracles, or stigmata, never through the mouth. The spiracles are arranged along the sides, never more than one pair to a segment. On the thorax the spiracles are placed between the epimera and episterna of the segment. The spiracle is a small opening guarded by two valves which open or close the spiracle and also protect it. The tracheæ are of two layers, of which the inner layer is of special interest; it is a spiral filament. In breathing the butterfly lengthens and contracts the abdomen. When the air is drawn in, the abdomen elongates, when it is expelled, the abdomen contracts. The heart is a long slender, jointed organ lying above the intestine.

## THE USE OF THE KEYS.

The paragraphs are numbered consecutively. Before each will be found the number of the paragraph, and a second number in parenthesis; the latter refers to the alternative or opposite of the characters given under that paragraph. For example we have in paragraph one, the character "wings-tailed," printed "1. (17) wings tailed," further down the page we find paragraph seventeen printed "17. (1) wings not tailed." If the specimen does not agree with paragraph one then turn to seventeen. Whenever a paragraph does not agree with your specimen; turn to the number in parenthesis and trace from there. Compare your specimen with paragraph one, if it agrees with that, pass to paragraph two, and so on until the name of a species is found opposite the paragraph. Then turn to the number given by the name of the species and read the description.

Always trace the specimen first through the synopsis of the families, then turn to the species synopsis under the family and determine the species. The number after the species in the table refers to the description of the species.

## A Synopsis of the Families.

1. (6) Antennæ clubbed but not hooked (sometimes slightly bent).
2. (3) Cell closed. Hind wings sometimes tailed. Size generally large or medium. Three pairs of legs fully developed. Ground colors various, often white, black, or yellow.....Fam. Papilionidæ. Page 8.
3. (2) Cell open. Hind wings not tailed or at most with minute thread-like appendages.
4. (5) Front pair of legs not well developed. Size variable, often large. ....Fam. Nymphalidæ. Page 16.
- 5 (4) All three pairs of legs fully developed. Size small. Colors blue, coppery, brownish, or blackish. ....  
Fam. Lycaenidæ. Page 31.
6. (1) Knob of antennæ, decidedly bent or hooked. Sometimes not evidently bent and ending in a minute spine. Six feet adapted for walking. Body generally robust and head broad. Size generally small. ....  
.....Fam. Hesperidæ. Page 34.

## Family Papilionidæ.

The butterflies of this family are from medium size to large, ranging from about one inch to five inches from tip to tip of the anterior pair of wings. Most of them are prettily marked, their colors bright and clear. The antennæ are not long, are slender, and terminate in a knob or club, usually straight, though sometimes slightly curved. The body is short and slender, generally concolorous with the wings. Three pairs of well developed legs are present, the first pair extending forward, the two posterior pairs extending backwards. Wing cells closed. Hind wings sometimes tailed.

## Table of Species.

1. (17). Wings tailed.
2. (16). Ground color black, with spots or stripes across wings.
3. ( 4). With stripes across both wings. A bright red anal spot.  
—*Papilio ajax*, 1.
4. ( 3). With rows of spots across wings.
5. ( 7). With one row of spots across wings, which are on the  
outer margin of wings (sometimes obscure or want-  
ing on the fore wings).
6. (12). Without ferruginous spot on anterior margin of hind  
wings.—*Papilio philenor*, 2.
7. ( 5). With two rows of spots across wings.
8. (15). Both rows of spots near the outer margin of fore wings,  
the inner often faint or wanting in worn specimens.
9. ( ). Ferruginous or orange anal spot.
10. (11). Anal spot pupilled with black.—*Papilio asterias*, 3.
11. (10). Anal spot not pupilled.
12. ( 6). Ferruginous or orange spot on anterior margin of hind  
wing.
13. (14). Under surface of wings with two rows of spots across  
both wings, and with two small light spots in the  
cell.—*Papilio troilus*, 4.
14. (13). Under surface of wings with only one row of spots across  
wings. No light spots in the cell.—*Papilio turnus*  
(form *glaucus*), 5.
15. ( 8). Both rows of spots very well developed and not marginal.  
Spots very large and deep yellow. Tail black with  
yellow spot in the end.—*Papilio cresphontes*, 6.
16. ( 2). Ground color lemon yellow, striped with black.—*Papilio*  
*turnus*, 5.
17. ( 1). Wings not tailed.
18. (31). Color white, yellowish white or sulphur yellow.
19. (26). Wings without continuous black outer border.
20. (23). Color white or white marked with black.
21. (22). With black spot at the end of cell of fore wings.—*Pieris*  
*protodice*, 7.
22. (21). Without spot at the end of cell of fore wing, —*Pieris*  
*rapæ*, 8.
23. (20). Color lemon-yellow or white.
24. (25). With spot at end of cell on under surface, sometimes  
present on upper surface. Spot brown sometimes  
with ferruginous center. Species large.—*Callidryas*  
*eubule*, 10.
25. (24). No spot at end of cell. Lemon yellow marked with black.  
Species small.—*Nathalis iole*, 9.

26. (19). Wings with black outer border. Color lemon-yellow to white.
27. (30). Spot in cell of anterior wings, oval or round. Ferruginous spot at end of cell of hind wings.
28. (29). Outer border very broad on fore wings without spots in border. Yellow on fore wing forming a dog's head. The spot at the end of cell forming the eye.—*Colias cæsonia*, 11.
29. (28). Outer border uniformly black, narrower. In the female with a row of spots developed.—*Colias philodice*, 12.
30. (27). Spot at end of cell of fore wings, a faint bent line.—*Terias lisa*, 14.
31. (18). Color deep orange with outer black border.—*Terias nicippe*, 13.

### 1. PAPILIO AJAX, LINN.

Wing expanse from 2.5 to 3.5 inches, upper surface velvety black, wings crossed by bands of pale greenish blue, usually three in number. The outer of these starts at the apex of the anterior wings and extends across the hind wing as a row of spots, 4 or 5 in number. The two other bands are broader but do not extend continuously with those across the hind wing. A small bar and one spot between the end of the cell and the other bar. The tail of the hind wing is 1 to 1.2 inches long, and is black, edged with white or light blue. Bright red anal spot. Between tail and anal angle two crescentic spots of deeper blue, also traces of a blue spot posterior to anal spot. Under surface of fore wings much the same as above. The under surface of the hind wings has the marks more clear, and in addition, down the middle a bright red line bordered internally with white, then black; externally simply with black. Anal spot large and somewhat curved. Another smaller red spot is present outside the anal spot. Upper surface of body black, sides with two or three yellowish white stripes. Antennæ brown. Common in wooded regions throughout Kentucky. The larva feeds on the leaves of the paw-paw. Specimens from Clay's Ferry, Kentucky River, Nortonville, High Bridge, Lexington, etc.

### 2. PAPILIO PHILENOR, LINN.

Wing expanse 3.5 to 4.5 inches. Body and wings black; wings crossed by one row of white spots. Spots distinct on hind wings, about six present, but gradually fading out on fore wings and not reaching the apex. Hind wings reflecting either a deep blue or bluish green color; with spots between the venules. Both wings are edged with white lunules, which lie between the venules, about seven being present on each wing. Under surface with the spots on fore wings



much larger and more distinct; usually five present. Hind wings with seven large orange spots, each almost encircled by a black ring and tipped anteriorly with a small white spot. These orange spots lie on a bluish background. Tail .3 to .4 inches. Body with one row of yellow spots along the side. A line of four yellow points behind the head, between the wings. Frequent throughout the State. Nortonville, Lexington, Bowling Green, etc.

### 3. PAPILIO ASTERIAS, FAB.

Wing expanse 3 to 4 inches. Color rich black; wings crossed by two rows of yellow spots. Both rows on fore wings parallel with outer margin of wings. Outer row of spots on fore wing round or oval in shape, on the hind wing almost crescent-shaped. Between the rows of spots on hind wing, clouds of blue or traces of them are present between the venules. Anal spot deep orange, pupilled with black and bordered posteriorly with yellow. Under side of wings with same markings as above, fore wings having a small bar present at the end of the cell. Spots on hind wings colored deep orange, the inner row being much larger than on upper surface. A yellow spot or bar at the end of the cell. Tail .3 .4 inch. Body black, with three rows of yellow spots on side. Two yellow points or dots between the eyes, and two larger yellow spots on the neck. Frequent everywhere.

### 4. PAPILIO TROILUS, LINN.

Wing expanse 3 to 4 inches. Color black, wings crossed by two rows of pale green spots. Often not more than one row well developed. In the outer row on fore wings from nine to seven spots are present; not more than five spots present in the inner row. White lunules between the venules on the outer margin of wings. Outer row of spots enlarged on hind wings, the most anterior one or costal spot, orange. Inner row of spots on hind wings represented by a cloud, either light blue or green. Anal spot orange, small and not pupilled. Under side of fore wing with upper markings repeated, also with two small spots in the end of the cell. Hind wings, under surface with spots much enlarged, deep orange in color. In the inner row of spots, the space between the fourth and fifth spot is occupied by a dash of light green scales. Small clouds of steely blue between rows of spots on hind wings. Tail .4 inches. Common locally. Glasgow Junction, Clay's Ferry, and Fulton.

### 5. PAPILIO TURNUS, LINN.

Wing expanse 3.5 to 4.5 inches. Color bright yellow, with terminal border of black, much broader on hind wings than on fore

wings. Within the black border one row of yellow spots. The margin of the wings opposite these spots is yellow. Costa of fore wings black, sprinkled with yellow scales. Fore wings crossed by four black bars, the internal one (the one closest to the body) being the only one that extends from anterior to posterior margin. The second extends from costa to median vein. The next is just at the end of the cell. The outer and smallest, is half way between the black outer border and the cell. Spots in the border on hind wings present as lunules, 5 or 6 in number. The first often orange, a few orange scales sometimes present on the others. Anal spot orange, edged posteriorly with yellow. A crescent of light blue scales just before the anal spot. The inner half of black border often clouded with blue. Only one, the interior, of the four black bars on the anterior wings crosses the hind wings. Margin of wings next to the body black. Yellow hairs present on inner part of hind wings. Tail .5 inch. Under surface of wings with markings of upper surface repeated, the black somewhat sprinkled with yellow. Lunules on hind wings suffused with orange. Pale scales sprinkled over the black border. Just below the black border on the interior terminal line will be seen traces of a light blue line, broken by the veins as they cross it. Some orange scales sprinkled over the yellow on the hind wings. Narrow black bar present at the end of the cell. Body black above, yellow beneath, with black stripes. Very common everywhere. Specimens from Providence, Lexington, Nortonville, Clay's Ferry, etc.

*Form glaucus.* Ground color black instead of yellow, spots and lunules present as in the other form. The blue clouds between the veins on the hind wings extend in a curved line from costa to internal margin. Bordering the clouds of blue internally is a wavy black line and between it and the base of the wing blue scales are sprinkled. The black markings of the yellow form are indicated on the under surface. The row of yellow lunules are much larger and more orange than in the other form.

#### 6. PAPILIO CRESPHONTES, CRAM.

Wing expanse 4 to 5.25 inches. Color rich brown or brownish black and yellow. Wings crossed by two prominent rows of large yellow spots. One row begins at the apex of anterior wing, extends inward toward the body and meets the yellow bar at the base of the hind wings. Beyond the end of cell two yellow spots are present in line back from the costa, also three other large yellow spots are present, which extend from about the middle of the other row of spots back to the posterior angle. Anal spot orange, bordered anteriorly with black then a few blue scales, posteriorly with black, edged with yellow. Tail .4 to .5 inch, black with yellow spot in center. Under surface of wings almost entirely yellow. The

markings above are all repeated but very much enlarged. Cell of fore wings almost entirely yellow. Hind wings, the half next to the body, entirely yellow, cell with black bar at the end. The black line through the center of wings enclosing seven crescent-shaped blue lunules. Next to the cell on either side of the venule which extends to the tip of the tail, are two orange spots. Body black above, yellow on sides and below. Rather rare. Specimens from Lexington and Brooklyn Bridge.

#### 7. PIERIS PROTODICE, BD. & LEC.

Expanse of wings 1.5 to 1.8 inches. Male: white, with brownish black markings. Broad bar at end of cell of fore wings. A more or less distinct row of spots, three in number, about three-fourths the distance from base to outer margin. Hind wings chiefly white, several obscure marks present in fresh specimens. Traces of rays present on fore wings, along veins. Under surface with upper markings repeated. Several obscure marks on anterior portion of hind wings, one of which is at the end of the cell. Female very different in appearance from male, looking almost as though the ground color was brownish black with markings of white. Inner half of wings almost entirely grey. Terminal band of triangular spots, which sometimes meet the sub-terminal row of spots. Hind wings also with irregular brownish black markings. Under surface of wings with markings repeated but paler, being much lighter on hind wings; apex of both fore and hind wings yellow. Common some seasons, but generally rather rare.

#### 8. PIERIS RAPAE, LINN.

Wing expanse 1.6 to 1.8 inches. Color white with brownish black markings. With black or grayish bar across apex of fore wing. With a round spot present in the first median interspace. Hind wings with one black spot on the costa. Base of both wings and costa of fore wings sprinkled with black scales. Under surface of fore wings: Apex light yellow, costa and base sprinkled with yellow scales. Two spots present, the one from above is reproduced and in addition, one in the last median interspace. Hind wings completely covered with yellow scales. No markings. Female with base of wings much more heavily sprinkled with dark scales. Apex black and in addition to the black spot on fore wings of male, another spot reaching almost to hind margin. Spot on costa of hind wings larger. Costa of fore wings somewhat yellow. Under surface as in male. Very common everywhere.



## 9. NATHALIS IOLE, BD.

Size small. Wing expanse 1.1 to 1.2 inches. Color yellow, marked with brown or black. Fore wings yellow with broad dark band across apex, posterior margin of wing with a broad dark band also. This band does not quite reach the posterior margin, and does not extend entirely across the wing. Traces of dark rays are present on both wings, usually two or three prominent on fore wings; one small spot in first media interspace. Fringes yellow. Hind wings yellow, broad dark band on costa, sometimes a small yellow spot enclosed by the band, base sprinkled with dark scales. Under surface of fore wings same color as above. Costa orange, but the margin of yellow sprinkled with black scales. Apex sprinkled with dark scales. Dark band of upper surface reproduced, with two dark spots above in line from apex to posterior margin. Hind wings sprinkled with darker scales, looking greenish in color, no distinct marks. Very rare.

## 10. CALLIDRYAS EUBULE, LINN.

Wing expanse 2.5 inches. Color bright lemon-yellow, inner margin of hind wings paler. Extending inward, between the veins, from the outer margin of the fore wings, are rays of raised scales—in males. The first five of these reach almost to the cell. The hind wings have a like border, though narrower. The male is without other markings above, the female has a dark brown spot with a ferruginous center at the end of the cell of fore wings. Costa and fringes brown, with brown at the end of the veins. Under side greenish yellow with ferruginous bar at the end of cell of fore wings. Hind wings with a white or silvery spot circled with ferruginous, in the cell. Traces of other marks sometimes present. Under surface of female of the same color but darker, costa rosy, fringe ferruginous brown. The cell of fore wing has at extremity a bar of five rosy spots circled and separated by brown and ferruginous. End of cell of hind wings with two silvery white spots circled as the others, in a patch of brown and ferruginous scales. "On the fore wings beyond the cell are two rows of elongated, wavy, ferruginous and brown patches, one of three spots, extending from near apex obliquely inward. The other of two spots, submarginal and almost parallel to margin." Hind wings marked similarly, except only two spots are present in the first row. Near the base are six, more or less, round spots—two above the cell and two below, and one at the insertion of the wings. Farther out and below the cell are three other spots. Fore wings sprinkled with ferruginous scales. Antennæ are rosy, ferruginous at tip. Head and prothorax rosy. Abdomen and all under parts yellow. No specimens in laboratory collection. Rather common locally in Western Kentucky.

## 11. COLIAS CAESONIA, STOLL.

Wing expanse 2.25 to 2.5 inches. Upper surface yellow. Both wings with a terminal black border, much the broadest on the fore wings. The fore wings might be described as very dark black-brown, with a central irregular spot of yellow in shape like a dog's head, the spot at the end of the cell forming the eye. The base of wing sprinkled with yellow scales. Hind wings yellow with dark border, between the border and the yellow a shading of orange. Two orange spots at the end of the cell, one large and one small one. In front of the cell of hind wings a large, bright orange spot. Under surface yellow, the spots at the end of the cell being pupiled with silver. A sub-marginal row of minute dots across both wings. Dog's head is also distinguishable on under surface, being of a much clearer and more lemon-colored yellow than the rest of the wing. In the female the dog's head is not so clear a yellow, being somewhat sprinkled with black scales, and with a slightly bluish reflection. The base of the wings is much more heavily shaded than in the male. Hind wings with black rays between the veins. Costa and antennæ rosy. Fringes light, with parts slightly rosy. Only one specimen in collection.

## 12. COLIAS PHILODICE, GODT.

Wing expanse 1.7 to 2.5 inches. Color sulphur-yellow with black border. In females this band is broader on the fore wings and with a more or less evident row of spots in it. No spots in the border are present in males. Dark spot at the end of the cell, round or oval in shape. Costa and base sprinkled with dark scales. Hind wing with spot at the end of the cell orange, with smaller spot of similar color just above, more prominent in the females than males. Costa, collar, fringes and antennæ of females rose-colored. Males with same color but much paler. Under surface of wings: Fore wing clear yellow, costa edged with rose, but with a border of dark scales sprinkled over it. Spot at cell reproduced, pupilled with silver. A sub-marginal row of dots across both wings. Posterior margin of fore wings much paler than the center. Hind wings completely sprinkled with dark scales. Spots at end of cell reproduced with silvery centers. Legs and base of hind wings often rosy. Another form of the species occurs marked similarly, but white instead of yellow in color. Our most abundant butterfly. In the latter part of summer collects in large swarms about moist sand.

13. *TERIAS NICIPPE*, CRAM.

Wing expanse 1.6 to 1.8 inches. Color deep orange, with broad black border. Inner margin of hind wings lemon-yellow. Border on fore wings broadest at apex. Costa light yellow sprinkled with dark scales. Bent black line at end of cell of fore wings. Band on hind wings broadest in the middle extends from apex to anal angle, terminating near the posterior angle, the inner half sometimes wanting; its inner line irregular. No spots present. The border of the hind wings has the anal half sprinkled with yellow. Fringe of fore wings rosy, of hind wings yellow. Under surface of fore wings similarly colored, cell spot reproduced, costa yellow. Traces of two spots beyond the end of cell. Veins of both wings ending in black points. Posterior margin of fore wings paler. Hind wings vary in color from sulphur yellow to brown. Brown spot on costa. Sometimes irregular brown patches are present. In females a whitish place on hind wing is present, nearly in the middle of the wing, surrounded by irregular brown spots. Common everywhere in low lands. Lexington, Nicholasville, Clay's Ferry, High Bridge, Bowling Green, etc.

14. *TERIAS LISA*, BD.-LEC.

Wing expanse 1.1 to 1.5 inches. Color lemon-yellow to almost white, with black border broadest on fore wings. Border broadest at apex on both wings. Very faint dark line at end of cell of fore wings. Costa and base of wings deeply sprinkled with dark scales. Interior margin of hind wings pale. Under surface of wings lemon-yellow, posterior margin of fore wings paler. Veins of both wings ending in black dots. Small black dot at end of cell of fore wings. A few black scales on cell and costa. Hind wings sprinkled lightly with black scales. Dark spot on costa, a pinkish or brownish apical spot. The female is paler; base of fore wings deeply sprinkled with dark scales. Only occasional.

**Family Nymphalidae.**

Size varies from 3 inches to 1 inch. Color black, brown, fulvous, grey or fawn. Wings large and broad. Antennæ rather slender; the knob varies from slender to stout. Only four legs adapted for walking—with one exception, *Libythea bachmanni*. First pair of legs with no tarsus developed. The second pair of legs is directed forward, the third backward.

## Table of Species \*

1. (24). General color of both wings fulvous, or tawny above, with black markings.
2. (17). Wings rounded, not angled.
3. (10). Both wings with distinct black terminal border.
4. ( 7). With white spots in the border.
5. ( 6). With two rows of spots, chiefly white, in the border. No black line across outer third of hind wing.—*Danais archippus*, 15.
6. ( 5). With one row of spots in border, with black line across hind wing marking the outer third.—*Limenitis disippus*, 31.
7. ( 4). Without white spots in the border.
8. ( 9). Under surface of hind wings marked with silvery white.—*Phyciodes nycteis*, 20.
9. ( 8). Under surface of hind wings with silvery marks.—*Phyciodes tharos*, 21.
10. ( 3). Without distinct terminal border on wings.
11. (12). With large silver spots on under surface of hind wings.—*Argynnis cybele*, 17.
12. (11). With no silver spots on under surface of wings.
13. (14). With no white markings on fore wings. Hind wings with minute pupiled spots underneath.—*Euptoieta claudia*, 18.
14. (13). With white markings on fore wings. Hind wings with rather large eye-spots underneath.
15. (16). Under surface of hind wings with two large eye spots.—*Pyrameis huntera*, 27.
16. (15). Under surface of hind wings with four small eye-spots.—*Pyrameis cardui*, 28.
17. ( 2). Wings angled.
18. (23). With silver mark on under surface of hind wings.
19. (20). Silver mark in two parts, a dot and a short curved line.—*Grapta interrogationis*, 22.
20. (19). Silver mark in one piece.
21. (22). Under surface obscurely marbled, silver mark narrow and but little curved.—*Grapta progne*, 24.
22. (21). Under surface elaborately marbled, silver mark, comma shaped, strongly curved.—*Grapta comma*, 23.

\*Since this table and the descriptions following were prepared, Miss Sadie F. Price, of Bowling Green, has reported to Prof. Garman that at one time she found *Agraulis vanillæ*, common at Bowling Green. It is a handsome fulvous species, marked with black above, the under side of the front wings with ten, and of the hind wings about twenty-four, silvery spots. The rather slender fore wings expand from 2.25 to 3 inches. The larva feeds on the passion-flower.



23. (18). With no silver on under surface.—*Paphia andria*, 34.
24. (1). General color of both wings not fulvous, in one case general color of fore wings fulvous.
25. (36). Color black or very deep rich brown.
26. (29). Both wings with continuous terminal border.
27. (28). Terminal border deep orange, female entirely different—of a blue or green-black color.—*Argynnis diana*, 16.
28. (27). Terminal border light yellow sprinkled with black.—*Vanessa antiopa*, 25
29. (26). No continuous terminal border.
30. (33). With rows of spots across both wings.
31. (32). Wings crossed by four rows of small spots, outer fulvous, three inner rows yellow, the inner sometimes wanting in worn specimens, the outer often obscure.—*Melitæa phaeton*, 19.
32. (31). Wings crossed by two rows of blue spots, much blue on hind wings.—*Limenitis ursula*, 30.
33. (30). Without rows of spots across wings.
34. (35). With fulvous bar across posterior margin of hind wings, and across fore wings from costa, nearly to posterior angle.—*Pyrameis atalanta*, 26.
35. (34). No fulvous bar on either fore or hind wing. Fore wing with two black eye-spots in yellow patch. Yellow sometimes wanting.—*Satyrus alope*, 39.
36. (25). Color not black.
37. (40). With eye spots above.
38. (39). Eye-spots two very large, two small. Two fulvous bars across the cell of fore wings.—*Junonia cœnia*, 29.
39. (38). Eye-spots of medium size, often only three present. Color light brown.—*Neonympha eurytris*, 37.
40. (37). Without distinct eye-spot above.
41. (50). Palpi medium, lying close to head.
42. (45). Palpi white underneath.
43. (44). Under surface of hind wings with a distinct row of eye-spots; black, pupiled with blue; fore wings with white spots above.—*Apatura celtis*, 32.
44. (43). Under surface of hind wings without eye-spots, or if present very faint; fore wings without white spots.—*Apatura clyton*, 33.
45. (42). Palpi grey or concolorous with wings.
46. (47). Both wings crossed on upper surface by a row of round black spots, these spots reproduced on under surface; distinct and pupiled.—*Debis portlandia*, 35.
47. (46). Wings not crossed on upper surface by a row of spots.

48. (49). Under surface with sub-marginal row of spots, across both wings.—*Neonympha sosybius*, 38.
49. (48). Under surface with no marks on fore wings; with four small spots on margin of hind wings.
50. (45). Palpi very long; in form of a beak.—*Libythea bachmanni*, 40.

## 15. DANAIS ARCHIPPUS, FABR.

Wing expanse from 3.75 to 4.5 inches. Color fulvous, paler on interior margin of hind wings. With velvety black border on both wings. Border contains two rows of small spots, the outer white, the inner partly fawn-colored. Within the space just beyond the cell of fore wings, are four or five brown spots. Veins heavily marked with black. A black spot occurs on the male about the middle of the hind wings, beside the second median venule. Several white spots occur in border of fore wings, about the middle of the costa. Antennæ black. Body black with white spots. Under surface of wings paler. Center of fore wings fulvous, same as upper surface. Spot within the border of fore wings at apex, very light fulvous. Spots on upper surface reproduced on under surface. Hind wings very pale fulvous, the veins enclosed in broad black lines. Common everywhere.

## 16. ARGYNNIS DIANA, CRAM.

Wing expanse 3.25 to 4 inches. Male and female not alike. Male: Color of wings dark velvet-brown with a broad band of orange, forming terminal border. Band crenate next to the brown. Veins with brown shading, almost to the edge. A brown line near the margin, and within this line are two more or less distinct rows of brown dots, one sub-marginal and the other next to the brown. Under side of fore wings black at base. Cell almost entirely black, with three bent fulvous bars within. Just within the end of the cell two silvery spots. A black zigzag line beyond the cell. Spots in border are not reproduced or only one or two at best. Hind wings with the inner two-thirds colored leaf-brown, the outer part colored as above, with no spots. Separating these is a black edging more or less covered with silvery scales, ending at each margin in a triangular silvery spot. Between the costal and sub-costal veins is a silvery crescent, edged internally with black. Some silvery scales in the cell. A band of silvery crescents lies just within the margin. Female: Upper part blue or green-black, outer portion of fore wing paler, with three rows of blue or whitish spots. Three more spots at the end of the cell. Hind wings marked more like the male. Under surface with the basal two-thirds marked like the males, colors black and pale blue. Apical portion dark brown, with an apical whitish spot edged

within with silver. Near the margin a row of whitish spots, a row representing the inner row above, is also present. Between these are several light bars tinged with pale buff. Hind wings with basal two-thirds dark brown, the outer portion having the veins brown. The part between the veins black, washed with brown. Silver markings the same as in the males. One specimen from East Cairo. Very rare.

#### 17. ARGYNNIS CYBELE, FABR.

Wing expanse 3 to 3.5 inches. Color fulvous with velvety black markings. Costa of fore wings, cell and base of both wings rich brown. Cell of fore wings with four black bars across it. The zigzag line begins on the costa bending outward above the cell, then extending backward toward, but not reaching the posterior margin. A terminal line crosses both wings, within this line a row of black crescents rests on it, in the fore wings; on the hind wings the crescents do not touch the line. Between the zigzag line and this row of crescents is a row of black spots. On the fore wings they are large and distinct, the largest ones being in the middle. These spots on the hind wings are small, not more than five or six present. The zigzag line on the hind wing is interrupted, looking like a row of indistinct crescents. A black bar across the end of the cell of the hind wings, and traces of another within. Veins on fore wings black, each ending in a black spot. Fringes light, but black at veins. Interior third of hind wings with long fulvous hairs. Under surface of fore wings much paler. Four bars in cell reproduced, with another just beyond the cell. The zigzag line also reproduced. The rows of spots only partly developed, and with some silvery scales on them. The crescents are also partly covered with silvery scales. Hind wings are much darker brown, and sprinkled with yellowish white scales. At about two-thirds the distance from the base a broad yellowish white band across the wings. On each side of this band a row of silvery spots. Those of the inner row are more round, the smallest one being the middle one. About eight other silvery spots are present at the base of hind wings. Three in cell, one large one at the end of the cell, two on the costa and two between the cell and interior margin. Thorax and head with ferruginous hairs. Antennæ ferruginous, knob black, tipped with fulvous. Common about thistles in summer.

#### 18. EUPTOIETA CLAUDIA, CRAM.

Wing expanse 1.75 to 2.75 inches. Upper surface fulvous, fore wings often pale fulvous. A pale band crossing both wings about the



middle, bordered on each side by a zigzag black line. Fringe white, black at veins. Margin of wings black followed by a light band; sometimes the band is a row of light spots, and next to the light band within is another wavy black line. Between the zigzag line and wavy line, a row of round black spots, the third from apex often small or wanting. Base of wings darker. At the end of cell of fore wings an oval spot circled with black. One black bar across the middle of the cell. Hind wings more fulvous than fore wings, and marked much like the fore wings. The row of black spots having the first and third small, often wanting. No spot at the end of the cell—with the line across the wing crossing the end of the cell and with a black bar within the cell. Base of wings sprinkled with black scales. With long fulvous hairs on inner half of wings. Posterior margin paler and without hairs. Under surface of fore wings: Base fulvous, apex, pale. Black zigzag line from costa down the middle of the wing. Spot at the end of the cell reproduced, also the bar within the cell present. Of the row of spots only three are present, these being the posterior three. Under surface of hind wings: Base brown, across the center a pale band which shades darker as it approaches the anal angle. This followed by a dark band within which are about three indistinct ocelli. Edge or outer margin paler sometimes whitish. Veins are whitish. Common in fall all over Kentucky. Lexington, Bowling Green and East Hickman.

#### 19. MELITÆA PHAETON, DRURY.

Wing expanse 2 to 2.5 inches. Color black, wings crossed by four rows of spots. The inner sometimes indistinct. The rows lying close together and all in the outer third of the wings. The outer row of spots is fulvous, and almost round in shape on fore wings. The inner rows are pale yellow, the row next the fulvous row somewhat crescent-shaped. Two small fulvous spots present at the end of the cell of fore wings; traces of others sometimes present in the cell. No distinct spots in cell of hind wings, though traces are sometimes present. Body black, a row of yellow spots on each side. Clubs of antennæ, palpi, and legs fulvous, also a row of similarly colored spots on each side of abdomen below the yellow row. Under surface of wings with all the rows of spots on upper surface reproduced distinctly. The outer fulvous row being larger and somewhat triangular in shape, then follow the row of yellow crescents. Then come two or three rows of round yellow spots. Cell of fore wings with the two fulvous spots at the end united, also with one large fulvous spot at about the middle of the cell. Several small yellow spots also present in the cell. The inner half of under surface of the hind

wings, almost as completely covered with spots as the outer half, though most of them are fulvous. One large fulvous spot across the end of the cell. Three spots within the cell, the middle one fulvous, the other two yellow. Common in June at Pineville.

20. *PHYCIODES NYCTEIS*, DOUB. & HEW.

Wing expanse 1.5 to 1.75 inch. Upper surface fulvous with black markings. Both wings with black border, broadest on apex of fore wings; within this border—on fore wings—traces of a row of small fulvous spots, more distinct in the female. A broad black band at the end of the cell of fore wings. Costa and base black, heavily sprinkled with fulvous scales. Base of fore wings with irregular black lines, similar lines also within the cell. Posterior margin of wings fulvous, sprinkled with black, growing darker as it approaches the base. Hind wings with black terminal border, the base almost black, marked much like the fore wings. The remainder of wing fulvous, crossed by a narrow black line. The outer half of the fulvous contains a row of round black spots, the fourth and fifth of which are sometimes pupilled. Fringes white but black at veins. Interior margin much paler. Under surface of fore wings pale fulvous with brownish black border, containing a row of minute white dots. Exterior margin of wing with fulvous line. On the apex just within this line three small white lunules resting on it. Several irregular black lines within the cell. Black patch at the end of the cell. Base of wing fulvous, paler on costa. Two more lunules, just within the marginal line and lying on it, are at about the middle of the exterior margin. Hind wings paler than fore wings. Pale yellow with brown and silvery white markings. Fulvous marginal line also present on the hind wing. Posterior part of wing with a brown border enclosing row of black spots, several of which are pupilled with white. A row of silvery lunules resting on the marginal line, the first, second and fifth the largest. Across the middle of wings a row of silvery spots, also a similar row nearer the base extends across the cell. Moderately common everywhere. Lexington, Brooklyn Bridge and Pineville.

21. *PHYCIODES THAROS*, DRURY.

Wing expanse 1.2 to 1.5 inch. Fulvous with rich black markings. With broad black border, broadest at the apex of fore wings. A fulvous bar sometimes consisting of a series of spots across the fore wings from costa to posterior margin, veins across it black. Between that and outer margin, within the band, a row of fulvous spots usually five; these two fulvous bands sometimes united forming one broad one.

The cell and base with a number of coalescing black circles. Hind wings mostly fulvous with black border. Base and inner half of wing marked something like the fore wing. Within the fulvous, a sub-marginal row of black spots and irregular black line across the central fulvous part. Interior margin pale fulvous. Base of wings black sprinkled with yellow. Under surface of wings pale fulvous; four irregular darker fulvous lines in the cell. A black dash from costa beyond the cell; following below the cell are two dots and a black spot on posterior margin. Terminal line reddish brown, just within another line, irregular and of a similar color. Several large black spots on outer half of wings. Hind wings clear yellow, marked all over with irregular reddish brown lines. Marginal lines like those of fore wings. Traces of a rather broad brown border. A row of black dots across outer fourth of wings. No silvery white present as in *P. tharos*. Very common all over Kentucky. Lexington, Nortonville, etc.

## 22. GRAPTA INTERROGATIONIS, FABR.

Wing expanse 2.25 to 2.75 inches. This is a dimorphic species, occurring in the two forms: *fabricii*, Edw., and *umbrosa*, Lintn. 1. Dimorphic form *fabricii*: Color fulvous marked with ferruginous brown, and with black spots. Margin of hind wings, and outer margin of fore wings pale violet. Wings strongly angled, hind wings with a short tail. Both wings with outer border of ferruginous brown, within which is a row of fulvous spots or traces of it. Fore wings with black bar across the end of the cell, with two black spots in line from the costa back, at almost the middle of the cell. The anterior spot is elliptical or a small bar, the other spot almost round. From about the middle of hind margin, a row of black spots, four in number, extending forward a little beyond the cell, all round but the one nearest the cell. Hind wings with three black spots, the first one large, doubled and at about the middle of costa, the other two small, one on each side of the end of cell. Interior margin much paler, tinged like the margin of wings. Interior half of wing with long hairs, from green to brown in color. Body also with hairs. Eyes hairy. Legs and under surface of palpi, cream-color or light yellow. Under surface of wings plain, color brown, often with violet suffused over it. Costa of fore wings with light yellow spots at the basal portion. Hind wings with no special marks but the silvery mark, which has been likened to a semicolon or a broken C. 2. Form *umbrosa*: Color much as in *fabricii*, but with a black border much darker, almost the entire hind wing a very dark brown. The violet edge is not so distinct in this variety as in the former. Spots are the same in both. The principal difference between the two is in the under



surface of the wings. Under surface is of different shades of brown, and marbled. Three irregular spots in the cell of fore wing. Basal half of wings darker than the outer half. A sub-marginal row of black points across both wings. With some violet and blue shades also on wings. Otherwise like the form *fabricii*. Abdomen short and broad. One of the most abundant species in Kentucky.

### 23. GRAPTA COMMA, HARRIS.

Wing expanse 2.25 to 2.5 inches. Color fulvous, with spots, outer border black. A black patch half way between the spot at the end of the cell and the apex, the fulvous part separating this patch from the black border. Also a similar patch near the posterior angle of fore wings. With two spots in cell, and bar at the end of cell, as in *G. interrogationis*. Row of spots from posterior margin forward, only three spots in the row. Across the middle of hind wings an irregular row of black spots. Within the outer border a sub-marginal row of fulvous spots. Under surface is elaborately marbled with light and dark brown, the light brown often having a pinkish tinge. The basal half of wings much darker than the outer half. Outer half is washed with the light pinkish brown, except the terminal border which is dark. The sub-marginal row of black dots present across both wings. A broad silvery comma on hind wings. Eyes hairy. Hairs on body and upper surface of hind wings. Edge of wings sometimes slightly tinted with violet. Body short and stout. Rather rare. Lexington.

### 24. GRAPTA PROGNE, CRAM.

Wing expanse 1.75 to 2 inches. Upper surface fulvous with dark border and black spots. Just within the outer dark band, a row of pale fulvous spots across both wings. With black spot across the end of cell of fore wings and with two spots within, with row of spots from posterior margin forward, as in *G. comma*. Three black spots near the middle of the hind wings. One large and in front of the cell, one almost within the cell, and the other on the opposite side of the cell. Under surface of wings light brown, streaked with fine lines of darker brown. Inner half of wings darker than the outer. The silvery mark a narrow but little curved line looking like an interrupted G. The sub-marginal row of black points very faint. Eyes hairy; wings angled; hairs on body and hind wings. Body short and stout. Rather rare. Specimens from Clay's Ferry.

### 25. VANESSA ANTIOPA, LINN.

Wing expanse 2.5 to 3.25 inches. Upper surface of a dark rich brown, with broad terminal border of light yellow, sprinkled with dark

scales. Border most heavily sprinkled with brown scales at the apex of fore wings. Just within the yellow border, separating it from the brown, is a black band almost as broad as the yellow, and within the black band a distinct row of blue spots across both wings. On the costa of fore wings beyond the cell, two yellow bars; the entire costa is marked with narrow yellow lines. Hind wings and body with long maroon-brown hairs. Wings angled. Eyes hairy. Under surface darker brown, crossed abundantly by short black lines. The outer border reproduced but much paler, sprinkled with brown scales. The marginal line is darker than the border. Touching the border from the interior is a line of green lunules bordered with black. The two bars on the costa of fore wings reproduced. A small yellow dot present at the end of the cell of hind wings, sometimes a similar one on the fore wings. Palpi twice the length of the eyes, yellow and brown. Legs mostly brown. Not common; most frequently seen towards fall. Lexington.

#### 26. PYRAMEIS ATALANTA, LINN

Wing expanse 2.25 to 2.75 inches. Color black with fulvous and white markings. Fore wings with fulvous bar from costa to posterior angle. Beyond this bar on the costal margin is a white bar crossed by the black veins. It is midway between the fulvous bar and the apex. Beyond this bar and midway between it and the apex is a row of white spots beginning on the costal margin, usually five in the row, the fourth one being much the largest. Outer margin of both wings with slender lunules between the veins. Hind wings more brown than the fore wings, and with a broad fulvous bar almost from the apex to the anal angle. Within the bar a row of black dots, the last one much enlarged, forming a black lunule covered with blue scales. Body and hind wings with hairs. Eyes hairy, under surface of palpi white. Under surface: The fulvous bar on the fore wings reproduced but rose-colored, fading as it approaches the posterior angle. Cell crossed by the broad rose-colored bar, then with a small similarly colored U-shaped line within the cell, also a small blue line near the base of cell. The white bar and spots of upper surface repeated, several of the spots often circled. Blue scales sprinkled between the rose bar and white bar. Apex and posterior border paler. The hind wings are prettily marbled with different shades of light and dark brown, grey and violet. On the middle of the costa a light yellow spot, sprinkled over with dark scales. An imperfect row of sub-marginal spots, some times pupilled. Frequently seen. Lexington.

#### 27. PYRAMEIS HUNTERA, FABR.

Wing expanse 2 to 2.25 inches. Color above, fulvous and black. Cell of fore wings crossed at the end by black bar, with two small

bars within. Beyond the cell the white bar—sometimes pale fulvous—and white spots as in *P. atalanta*. Apex of wings black, continuous with the border. Base of wings black, heavily sprinkled with fulvous. Hind wings with terminal, narrow, black border of two lines, a sub-marginal row of black spots, the second and fifth pupilled with blue. Body and hind wings with long hairs. Eyes hairy. Under surface of fore wings rose-colored, excepting apex; the base and outer margins are white, grey and brown. At the apex, beginning at costal margin and extending backward, is a row of four spots, different in color, mostly circled by light brown. Apex is lilac-tinted. Hind wings brown, marbled with grey and white. The terminal lines are brown, narrow and four in number. Two large sub-marginal ocelli, pupilled with dark blue, circled with a lilac ring, then a brown, a yellow, and finally a black ring. The posterior ocellus is much the largest. Rather common. Lexington, Bryant, Hickman Co.

#### 28. PYRAMEIS CARDUI, LINN.

Wing expanse 1.75 to 2.5 inches. Upper surface fulvous with black and white markings. Markings and color almost exactly like *P. huntera*, but without the lilac tint on apex of fore wings. Bar beyond the cell always white. A black band beginning at the anterior margin of the cell, crosses the cell though broken extending irregularly towards the posterior angle, but reaches only to the last vein. The small white spot in the fulvous of fore wings, representing the sixth in the sub-marginal row of spots in the *P. huntera*, is wanting in this species. The sub-marginal row of spots on hind wings not pupilled. Under surface of fore wings much like that of *P. huntera*, excepting that the rose-color is more fulvous, and the brown is yellowish. Hind wings are marbled more, and the terminal band of ocelli have five present instead of two. The first being small, the last one the largest. Eyes hairy; body and hind wings hairy. Palpi white underneath. Common everywhere throughout the State.

#### 29. JUNONIA CÆNIA, HUB.

Wing expanse 1.25 to 2 inches. Upper surface olive-brown. Cell of fore wings with two fulvous bars, edged with black. One at the end of the cell, the other across the middle. Two ocelli on both wings. On fore wings the posterior one is very large, black, pupilled with blue and circled with brown. The anterior ocellus is very small, also black and pupilled with blue. From the middle of costa backward toward the posterior angle of wing, extends a whitish or a light tan-colored bar which is interrupted by the large ocellus. Hind



wings with fulvous bar across outer margin. Wings with the terminal wavy brown lines. The anterior eye-spot of hind wings much the larger of the two present. The center of the spot shading from the interior out, from fulvous into pink, then blue, the outer half of black, circled by a tan-colored, then a black ring. The posterior ocellus blue and black in the center, with similar circles around it. Posterior margin much paler. Under surface much paler, color from fawn-color to tan. Fulvous bars in cell of fore wings much broader, filling the cell; base of cell also fulvous. Ocelli reproduced but not so distinct, black, pupilled with pale blue. Hind wings with markings very indistinct, the first ocellus being smaller than it is above, but doubled. The other much smaller. Occasional in Eastern Kentucky, common in the western part on the Ohio river. Glasgow Junction, Fulton.

### 30. LIMENITIS URSULA, FABR.

Wing expanse 2.5 to 3 inches. Upper surface black with terminal rows of pale blue spots, crescent shaped. Always one row present, generally two. Traces of a row of fulvous spots from apex to about the middle of wing. Hind wings with the outer half almost entirely blue. The two rows of lunules larger than on fore wings. Between the lunules and the blue of the middle of the wings, a black bar. Veins black across the blue. Under surface much paler, being almost brown; apical portion of fore wings paler than the rest. Two rows of blue lunules repeated. The row of fulvous spots much larger than above. Cell of fore wings with some blue within, and two fulvous spots edged with black. One at the end of the cell narrow, the one in the middle of the cell much larger. Two similar fulvous spots in cell of hind wings; one similar spot just in front of the cell. Costa of both wings fulvous at base. The row of fulvous spots also across hind wings, at about one-fourth the distance from base to margin on outer edge. Frequently seen in the latter part of summer. Glasgow Junction, Lexington, Pineville, etc.

### 31. LIMENITIS DISIPPUS, GODT.

Wing expanse 2.5 to 3 inches. Color fulvous with black markings, with black terminal border across both wings. Border with a row of white spots within it. Veins heavily marked with black. Cell of both wings open. On the costa of the fore wings is a black triangular spot. It contains three white spots, and lies beyond the cell, extending backwards to the posterior angle of wings as a narrow black line. In the cell of fore wings, on the anterior margin, is a small black spot sometimes with a few white scales on it. No special marks



on the hind wings, besides the border, excepting a narrow black line which commences on the costa at about two thirds the distance from the base, and extends across the wing to the anal angle. Under surface of fore wings with markings from above repeated. The spot on margin of the cell reproduced, triangular in shape and with white scales. Half way between the spot and the base of wings is an elongated white spot, also on the anterior margin. The sub-apical spot of fore wings much paler. Hind wings with same marks as on upper surface; the black line across wings is edged interiorly with white. The under surface is very much paler than the above. Body black, with broad white stripe along the side. Not very common. Lexington, Tyrone, Glasgow Junction, etc.

### 32. APATURA CELTIS, Bd. & Lec.

Wing expanse 1.5 to 2 inches. Color different shades of brown, some parts often almost fawn-colored. Base of wings shading almost to olivaceous. Apex of fore wings black. An irregular row of sub-marginal white spots, the second—from apex—is small and out of line, being nearer the margin, the fifth is a round dark brown spot circled with ferruginous. The last two are yellowish white. Beyond the cell the yellowish white spots, two similar spots in line with them extending backward. Two black spots within, and one black bar across the cell. Hind wings with black terminal line, within the line a row of faint black lunules. Traces of a row of light brown spots across the middle of the wing, beginning on the costa and fading as it extends backward. A sub-marginal row of brown spots, the second out of line, being nearer the margin. Hind wings with long hairs. Under surface grey and drab. The center and half of fore wings slightly yellow. Upper markings repeated but not so distinct. Two ocelli on fore wings, the anterior one the smaller and pupilled, the posterior one not pupilled. Hind wings with the row of black spots each circled with yellow and pupilled with light blue. Brown-black apical spot present. Two small spots and one bar in the cell. Common everywhere. Lexington, Fulton.

### 33. APATURA CLYTON, Bd. & Lec.

Wing expanse 1.75 to 2.6 inches. Form Ocellata Edw. Color dark blackish brown, excepting the base of fore wings, which is fulvous. A faint terminal row of yellowish white spots across both wings. Two irregular rows of yellowish spots across the fore wings beyond the cell, two black bars across cell, the inner bar sometimes divided into two spots. Hind wings dark brown, costa paler, and interior margin paler. With sub-marginal row of black spots cir-

pled with ferruginous. Hind wings with hairs, under surface of fore wings much paler, upper markings repeated but in different colors. Cell almost grey. Beyond the cell, beginning at costa, an irregular brown line extending almost to the posterior margin. Hind wings browner than fore wings, with the sub-terminal spots reproduced, small and pupilled with light blue, though not so distinct as *A. celtis*. Rare. Lexington, Tyrone, etc.

#### 34. PAPHIA ANDRIA, SCUD.

Wing expanse 2 to 2.4 inches. The male is ferruginous in color, often almost red. Female fulvous. Tail  $\frac{1}{2}$  to  $\frac{1}{4}$  inch. Male: With black bar across the end of cell, and with a border of black across both wings, broadest on apex of fore wings and across posterior margin of hind wings. The internal margin of it is not well defined. Under surface "dead-leaf-brown." No distinct markings, inner half of wings bordered by an irregular dark line, nearer the margin another dark line. Between these two a lighter band across both wings. Interior margin of both male and female, pale. Female: Between the cell and apex two dark wavy lines extending backward to posterior margin, enclose a lighter band, though of same color as the rest of the wings. A small black spot on costa of hind wings, also an irregular black spot in the middle of anterior half. Under surface like that of male. Bar across the cell on upper surface as in male. Wings angled in both. Less common in Eastern Kentucky. Common locally in the Western part of the State. Lexington, Hopkinsville, Glasgow Junction.

#### 35. DEBIS PORTLANDIA, FABR.

Wing expanse 1.75 to 2.25 inches. Color wood-brown. Both wings crossed by a sub-terminal row of black or dark brown spots. Fore wings have four or five spots present in the row. The first and third very small. The spots are circled with light yellow. Just beyond the cell, beginning on the costa, is a dark irregular band, which extends across the wing to the posterior margin as a line. The outer third of the wing is paler than the inner, excepting at the apex, which is a little darker. Both wings have two marginal brown lines, followed by a pale grey line. Hind wings with no marks except a row of spots. The middle one the smallest. All are circled with light yellow. Under surface of wings crossed by two brown lines, the outer very irregular and broken as it passes to the hind wings. The inner one more regular and narrower. The spots on both wings reproduced and much clearer than above. Almost all of them pupilled. The spots on fore wings are all enclosed by a light grey band, which in

some lights is tinted with violet, and passing around the spots is connected, forming an irregular ellipse. Hind wings have the last spot doubled, this not being represented at all on the upper surface. A band like that on fore wings also surrounding the spots on hind wings. Two marginal lines present, the outer yellow, the inner grey. Moderately common in Western Kentucky. Aden Springs, Fulton.

36. *NEONYMPHA GEMMA*, HUB.

Wing expanse 1.25 inch. Color pale wood-brown, almost drab. No marks on upper surface excepting on hind wings. At about the middle of the outer margin two blackish spots. Under surface: Wings crossed by three wavy darker brown lines. No other marks on fore wings. Hind wings with the brown spots represented by four small blackish spots, each with metallic blue scales on it. The margin of the apex and anal angle also have some of the metallic scales present. Only two of the wavy brown lines across the hind wings present. Occasional. Specimens from Fulton.

37. *NEONYMPHA EURYTRIS*, FABR.

Wing expanse 1.5 to 1.75 inch. Color wood-brown. Fore wings with two eye-spots, black, circled with yellow. Hind wings with two similar spots. The anterior one often faint or wanting. The posterior one clear and followed by another minute one. Basal half of wings slightly darker than other half. Under surface as above, often much paler. The ocelli more distinct than above, with silvery scales on them and between them. On the hind wings a small ocellus in front of the anterior ocellus and another after the posterior ocellus. Both wings are crossed by two brown lines. Rather common in open woods. Nortonville, Midland, High Bridge.

38. *NEONYMPHA SOSYBIUS*, FABR.

Wing expanse 1 to 1.25 inch. Color umber-brown; no marks above; two marginal lines faint. Under surface a little lighter than upper. Wings crossed by three dark brown lines. Fore wings with four, sometimes five ocelli. They are black, circled with yellow, small. Hind wings have six ocelli present. The first, third and fourth, small. A brown band across cell of both wings. Common everywhere in woodland. Fulton, Lexington.

39. *SATYRUS ALOPE*, FABR.

Wing expanse 1.8 to 2.25 inches. Color rich brown; fore wings with a broad yellow band, enclosing two round black ocelli, each pupilled

with white or light blue. Behind the cell is a black dash, indistinct and found only in the males. Under surface of fore wings with yellow bar reproduced, but paler. The ocelli clearer than above. The dark brown marginal lines are present. The cell and a little beyond the cell closely marked by numerous short dark brown lines. Hind wings crossed all over on under surface by short dark brown lines. An irregular black bar across the middle of the cell, sometimes not evident. The ocelli, usually six in number, placed in two groups of three each, the middle one of each group being the largest. The ocelli are black circled with yellow and pupilled with pale blue. Midland. Frequent.

#### 40. LIBYTHEA BACHMANNI, KIRTL.

Wing expanse 1.75 inch. Readily recognized by its long beak-like palpi, which are three times as long as the head. Apex of fore wings is truncated and angulate as in *Grapta*. The apical half of the fore wings is black, and contains three white marks, two spots sub-terminal in position, and a white bar beyond the end of the cell. The cell and center of the wing ferruginous, darker at the base and posterior margin. Basal half of the hind wings dark and the border dark, the center ferruginous and internal margin pale. Under surface of fore wings, the white spots lilac-tinted, the outer margin paler than above. Central part fulvous. Hind wings lilac-tinted, with brown scales sprinkled over it. Two irregular brown bars across the wing, the inner from costa across end of cell to interior margin, the outer almost sub-terminal across posterior margin. Occurs throughout the State. Common in Western Kentucky, along the Mississippi and Ohio rivers.

#### Family Lycænidae.

Mostly small butterflies. They have six feet adapted for walking. The chrysalis is short and in its attachment is much like that of the *Papilionidæ*, being attached at the anal extremity, with a silken thread around the body for support.

#### Table of Species.

1. ( 6). Upper surface blue, or blue with black border.
2. ( 3). Upper surface azure blue, hind wings not tailed. Female with very broad black border on costa and outer margin of fore wings.—*Lycæna pseudargiolus*, 44.
3. ( 2). Upper surface darker blue with black border.
4. ( 5). Under surface of wings black, with red spots at base of wings. Abdomen orange. Species rather large.—*Thecla halesus*, 41.



5. ( 4). Under surface of wings grey, with no red spots. Under surface of abdomen white. Species small. — (male) *Lycæna comyntas*, 45.
6. ( 1). Upper surface not blue or at most with only a bluish cast.
7. ( 8). Fore wings fulvous, with border and spots black.— *Chrysophanus hypophleas*, 43.
8. ( 7). Fore wings without fulvous.
9. (10). Upper surface of wings brown-black. Under surface pale grey with many small black spots.— *Lycæna comyntas*, 45.
10. ( 9). Upper surface blackish grey with bluish reflection. Under surface slate color, with distinct line across both wings.— *Thecla humuli*, 42.

#### 41. THECLA HALESUS, CRAM.

Expanse of wing 1.4 to 1.6 inch. Upper surface mostly deep blue with black border. Blue at base of wings becomes tinted with green, the same color extending over the upper surface of the body. Black border dull, without spots, black sex-mark present at the end of cell of fore wings. Hind wings with two tails, the posterior one being the longer and having in front of it, a blue lunule, which has on each side a smaller similar one. Under surface of wings brown-black, with deep red spots at base of wings, one on the fore wing at the base of costa, two on hind wings, one at base of costa, the other posterior to it. On under surface a blue dash across middle of fore wing in the male. Hind wings with blue lunules reproduced, with three anterior yellowish green ones; posterior angle containing lunules in black. Female larger than male, less blue and of a paler color; black border forming outer half of wings. Under surface without the blue dash on fore wings of male. Very distinct black marginal line. Under surface of abdomen of both male and female, a very deep orange. Not very common in the State. Specimens from Lexington.

#### 42. THECLA HUMULI, HARR.

Wing expanse 1.1 to 1.2 inch. Color black or blackish grey. Males with an obscure dark region at the end of the cell of fore wings. Fore wings with no marks. In front of the tails is a bluish grey line, in front of which are dashes of the same color. Between the tails is an orange spot enclosing a black spot. A touch of orange at the internal angle. Hind wings with two thread-like tails, white at tip. Knobs of antennæ orange at tip. Under surface of wings colored from drab to grey. Wings crossed by two black lines. The outer one often fading out toward the apex of fore wings. The inner one edged

exteriorly with white, interiorly with deep orange, and bending interiorly ends on the interior margin, the two together forming a figure something like W. The anal orange spot in front of it both reproduced and enlarged. Costal margin orange at base of fore wings. Specimens from High Bridge and Fulton, Kentucky.

#### 43. CHRYSOPHANUS HYPOPHLEAS, BD.

Wing expanse .9 to 1.1 inches. Upper surface of fore wings rich fulvous with black border. One black spot in the cell and a black spot at the end. Beyond the cell in the fulvous is a row of black spots. The first of these are beyond the cell and three in number, posterior to this group comes the next which has two distinct spots. The last one often doubled: then follows the last group, containing two spots. Hind wings are brown with fulvous bar across the posterior margin. The bar is interrupted on the exterior margin by a series of half developed black spots. A narrow black bar across the end of the cell, under surface of wings. Fore wings orange, except the border and apex which are drab. Black spots of the upper surface are reproduced but smaller and circled often with light yellow. One more small round black spot present near the base of the cell. The outer margin of the orange bordered with black. Hind wings drab, with small black spots, three on the costa, one or two in the cell, a black bar at the end of the cell, and a sub-terminal row of small black dots. The fulvous bar of upper surface reproduced by an irregular fulvous line which is redder, darkest exteriorly. Occurs frequently throughout the State. Lexington, Ky.

#### 44. LYCÆNA PSEUDARGIOLUS, BD-LEC.

Wing expanse 1 to 1.2 inches. Upper surface azure blue, terminal line black. Costa and interior margin much paler, sometimes almost white. Female is different. Fore wings with a broad black border from base of costa extending entirely around the wings except on the posterior margin. The blue of the female is paler than that of the male. Hind wings with costa black, and with a terminal row of black spots distinct. Interior margin pale as in the male. Under surface of both alike. Color silvery white or grey with dark brown marginal line. Wings with a terminal row of spots followed by a row of crescents. The marks across the disc of the four wings are dots in an arched series. A bar across the end of the cell of both fore wing and hind wing. Hind wings with some other spots, several along the interior margin, and several near the base of wings. Frequent. Lexington.

45. *LYCÆNA COMYNTAS*, GODT.

Wing expanse .8 to 1.1 inches. Male and female of a different color. Male is violet-blue above with black border. Female brown, sometimes bluish at base. Fringes light blue or grey. Hind wings of both have a terminal row of spots, from one to three of which are preceded by orange crescents. Under surfaces alike, of a silvery grey color with dark brown markings. Marginal lines black, followed by the terminal row of spots and crescents. A row of spots on fore wings between the bar at the end of the cell and the crescents, very distinct. Hind wings with the outer border of spots from above reproduced. The spots within the orange crescents circled with silvery blue scales. Besides this border of spots, there are about ten spots on the hind wing. One in the cell, two on the costa, and the others somewhat irregularly placed. Occurs everywhere

**Family Hesperidæ.**

This family has usually robust bodies with fore wings triangularly shaped. The knob of the antennæ is generally bent or hooked. They possess six feet adapted for walking. It will be noticed of these that when still their wings are held up, the upper surfaces close together, or the wings held simply spread.

**Table of Species.**

1. (18). Upper surface brown or brownish-black with fulvous markings.
2. ( 9). Hind wings with fulvous.
3. ( 6). Fulvous on hind wings in one large central spot.
4. ( 5). Very little fulvous on fore wings. Species small. Abdomen usually slender and longer than hind wings.—*Ancyloxypha numitor*, 46.
5. ( 4). Fore wings almost entirely fulvous.—*Pamphila zabulon*, 47.
6. ( 3). Fulvous on hind wings in several spots, or irregularly placed.
7. ( 8). Under surface indistinctly spotted, color from light fulvous to greenish yellow.—*Pamphila huron*, 48.
8. ( 7). Under surface brown, distinctly spotted with clear yellow.—*Pamphila peckius*, 50.
9. ( 2). Hind wings with no fulvous.
10. (15). Fore wings with distinct yellow or fulvous markings. Fulvous on or reaching the costa.
11. (12). Clear fulvous on the costa of fore wing.—*Pamphila cernes*, 51.



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12. (11). Fulvous on fore wings, a semi-translucent row of spots across the middle.
  13. (14). Under surface of hind wings with median silvery white spot.—*Eudamus tityrus*, 61.
  14. (13). White on under surface of wings not silvery.—*Eudamus lycidas*, 60.
  15. (10). Costa not fulvous. Fore wings with about three small fulvous spots. Base and costa with olivaceous scales. Hind wings with long olivaceous hairs.—*Pamphila otho*, 49.
  16. (1). Upper surface without fulvous markings.
  17. (18). Upper surface thickly marked with white spots.—*Pyrgus tessellata*, 53.
  18. (17). Upper surface not thickly marked with white.
  19. (20). White on fore wings almost yellow. Usually eight spots present, three medium in size, five small. Under surface of hind wings with white anterior margin.—*Pamphila zabulon*, 47.
  20. (19). White on fore wings not yellowish.
  21. (24). Antennæ ending in a very pronounced hook. Hook about one-sixth the length of antennæ. Wings of a uniform brown. Body robust.
  22. (23). White on fore wings a row of medium-sized spots extending in line from middle of costa almost to posterior angle.—*Eudamus bathyllus*, 59.
  23. (22). White on fore wings not in a row from costa to posterior angle. Spots very small.—*Eudamus pylades*, 58.
  24. (21). End of antennæ not a pronounced hook, but bent usually to an angle of 90° or less.
  25. (30). Upper surface of wings blackish brown; no olivaceous scales or hairs present.
  26. (27). Wings of a uniform brown, with no darker brown spots or marks. Wings not scalloped.—*Pholisora catullus*, 56.
  27. (26). Wings very dark brown, with darker brown or black markings.
  28. (29). Fringes evidently scalloped, wings faintly dusted with yellow scales. Never more than four small white dots present on fore wings.—*Pholisora hayhurstii*, 57.
  29. (28). Fringes not scalloped. About eight small white spots on fore wings. Under surface of hind wings with violet reflection at apex.—*Nisoniades juvenalis*, 55.
  30. (25). Upper surface not blackish brown.
  31. (32). Upper surface brown. Fore wings marked with dark brown and white. Hind wings marked with tan or light brown spots.—*Nisoniades martialis*, 54.

32. (31). Upper surface of hind wings without spots, but with olivaceous hairs. The most posterior spot on fore wings almost fulvous.—*Pamphila verna*, ♀2.

46. ANCYLOXYPHA NUMITOR, FAB.

Wing expanse .8 to 1 inch. Color blackish brown marked with fulvous or deep orange. Fore wings usually with clear fulvous on the costa; darker in the cell, sometimes with fulvous scales sprinkled over the wings. Hind wings with a large central deep yellow spot, the border being brown. Fringes of hind wings yellow, those of fore wings grey-brown. Under surface of fore wings brown, excepting the costa and apex, which are yellow. Hind wings bright yellow; no markings. Abdomen usually longer than hind wings, and white underneath. Abundant everywhere along streams.

47. PAMPHILA ZABULON, BD.-LEC.

Wing expanse 1.1 to 1.25 inch. Male, Form *hobomock* Harr: Upper surface almost wholly yellow. Fore wings with a brown border beginning at apex and extending around the wing on the exterior and posterior margins. It is dentate within on the exterior margin. Base of wings dark and irregular; dark patch beyond the cell extending from costa almost to border. An oblique black bar at the end of the cell. On the center of wing and the costa clear yellow. Hind wings with a large central yellow spot, the entire wing with brown border. Under surface much paler. Border and brown marks of upper surface repeated. The base of wings black. Bar at the end of the cell fainter. Hind wings with border reproduced, but much fainter. Base of wings rich brown; interior margin dark greenish brown. Form *quadraquina*, Scud. Female dark brown without any fulvous. Fore wings with eight yellowish white spots. Three small sub-apical spots extending from the costa back. Two small spots beyond the cell and out of line with the others. Then come three much longer spots. These are in line with those from the costa. Hind wings dark brown, with no marks. Under surface of fore wings with spots reproduced. The last three much enlarged. The costa often yellow. The base of wings blackish brown. Hind wings, apex of fore wings and exterior margin washed with lilac. Found in the eastern part of the State. Brooklyn Bridge.

48. PAMPHILA HURON, EDW.

Wing expanse 1.2 to 1.5 inch. Male: Upper surface with much fulvous. A brownish black border. The border is narrower opposite the cell. Base of wings dark. The stigma contracting from base to

tip. The outer angle is produced and is velvety black. The posterior margin is also velvety black. Beyond the stigma and resting on it exteriorly is a circular black patch, which reflects blue or purple in different lights. Hind wings dark brown, with a central yellow patch. The veins over it are brown. Hind wings with yellow hairs. Fringes light. Under surface of wings yellow, deepest on the costa of fore wings. Base of fore wings and posterior margin blackish brown. Marginal line black. Hind wings dark on costa and at base of wings; interior margin some darker. Female with not so much fulvous as male. Blackish brown washed with yellow. The cell is yellow excepting at base. The hind margin of fore wings yellow; base of wings dark. Fore wings with eight spots, three sub-apical, two beyond the cell and two behind the cell. The last two and two of the sub-apical spots translucent. Hind wings with yellow spot in cell and with a spot or small bar across the outer half of wings. With yellowish green hairs on inner half of wings. Under surface much like that of male. Spots on fore wing reproduced. Costa and cell deep yellow, base black, posterior angle pale. Hind wings not so yellow as in the male; with two very faint irregular curved rows of spots; often very indistinct. Common some seasons in Eastern Kentucky. Lexington and Bowling Green.

49. PAMPHILA OTHO, SM.-ABB. (Variety *egetemet*, Scud).

Wing expanse 1.25 inch. Upper surface dark brown, with vinous reflection. Costa and base of fore wings somewhat sprinkled with yellow scales. These also along hind margin of wing. Two small sub-apical yellow spots are present, also one larger similarly colored spot beyond the stigma. The anterior part of the stigma velvety and dark brown, almost black, nearly elliptical in shape. The posterior part is also velvety and triangular in shape; between these are two light brown divisions, and beyond them exteriorly a brown spot. Hind wings brown, but thickly covered with greenish yellow hairs. Body covered with olivaceous hairs. Under surface dark brown, sprinkled with yellow scales. Spots on fore wings reproduced; costa yellow, base of cell black, outer half with yellow scales. Hind wings with an indistinct row of spots across the outer third of wing. Hind wings heavily sprinkled with yellowish green scales. Only one specimen. Glasgow Junction.

50. PAMPHILA PECKIUS, KIRBY.

Wing expanse 1 to 1.25 inches. Upper surface blackish brown, marked with deep yellow. Male and female alike excepting the fore wings. Male with the inner two-thirds of fore wings washed with



yellow; costa and cells almost a clear yellow. A velvety black stigma present, oblique. This is followed by a round brown patch. The outer third of wing is sprinkled slightly with yellow scales. Traces of the row of spots on the wing of female also present; usually the sub-apical ones. Hind wings brown, with the center of five long yellow spots, separated from one another by the brown veins; also a yellow spot at the end of the cell. Fore wings of female dark brown, not yellow at base, but with base slightly sprinkled with yellow scales. Cell and costa sprinkled with yellow scales; two yellow spots present at the end of the cell. An irregular row of spots across the wings two-thirds the distance from base to outer margin. Seven spots in the row, the two beyond the cell out of line with the others. Under surface of both alike. Brown, heavily sprinkled with deep yellow or ferruginous scales. The row of spots of upper surface of wings reproduced. The costa is yellow, and the outer half of the cell is sprinkled with yellow. Base of fore wings dark brown. Hind wing with the row of spots reproduced but much larger. Also another yellow band present, across the base of hind wing. These two bands sometimes meet in the middle of the wing. The outline of the outer band is very irregular, the third spot in the band being much the largest. Very common everywhere.

#### 51. PAMPHILA CERNESE, BD. & LEC.

Wing expanse 1 to 1.25 inch. Male and female much alike, excepting markings of fore wings. Male: Upper surface dark brown; inner half of fore wings deep yellow. The sub-costal spots, if present, very small; one small yellow spot at the anterior end of the stigma. Stigma velvety black, broader than in *P. peckius*. Hind wings brown, with yellowish hairs and no spots; a variety has four faint spots present. Hairs on the body olivaceous. Under surface of fore wing brown, sprinkled with yellow scales. The spots from above reproduced, the three sub-costal ones very small and faint; two spots in the median inter-space present. Base of wings black, costa and anterior half of cell a clear deep yellow. Hind wings brown, heavily sprinkled with yellow scales; no marks. Female: Color as in male. A yellow ray before the cell, and partly within it. A row of six spots across the wings, three sub-costal and small, three between the median interspaces. Under surface of fore wings with less yellow than in the male; spots reproduced. Hind wings as in male, but more brown. Common throughout the State.

#### 52. PAMPHILA VERNA, EDW.

Wing expanse 1.25 inch. Upper surface blackish brown. An irregular row of semi-translucent spots across the wings, the first three



sub-costal and small, the two beyond the cell generally absent,—if present, mere points—then follow three in the median interspaces, the second of these being much the largest. Costal edge sometimes with a few yellow scales. A very faint yellow spot sometimes present at the end of the cell. Stigma black, oblique, surrounded by rich dark brown scales. Hind wings dark brown, with olivaceous hairs, traces of two or three very faint yellow spots present. Under surface a rich brown, darkest at the base of fore wings. The outer half of posterior part of the wing is washed with pale scales. The spots from above are reproduced, with one small spot in the cell. Hind wings dark brown, with a faint row of five very small yellow spots present. Female much as the male. Only one specimen in collection.

### 53. PYRGUS TESSELLATA, SCUD.

Wing expanse 1.1 to 1.2 inches. Upper surface brownish black, spotted with white. Body, head and base of wings with long grey hairs. Fore wings with four irregular rows of spots across them, one large spot across the end of the cell. Hind wings with two rows of spots across them, one spot across the end of cell. Spots on fore wings usually number from 25 to 30. Hind wings with not more than 15 or 18 spots. Fringes white, black at end of veins. Under surface slightly yellowish, spots from the upper surface reproduced. Costa white or yellowish. Wings darkest at base. Hind wings with the white spots blending so as to form three irregular white bars across wings. The brown of hind wings yellowish or slightly olivaceous. Interior margin without spots, excepting the anal angle, which has one large triangular brownish black spot. The outer band of black is represented by black lunules. Base of costa with two black spots. Female like the male but darker, the spots smaller, and with fewer hairs on the body and wings. Common everywhere.

### 54. NISONIADES MARTIALIS, SCUD.

Wing expanse 1.5 inch. Upper surface brown. Fore wings in appearance darker than the hind wings, and marked with black. Two irregular dark bands across the wings, the interior one beginning on costa, crossing the end of the cell and bending inward toward the base. The exterior band contains six white semi-translucent spots, the first four beginning at the costa and extending in line back from it. The other two in the median interspaces are white and semi-lunar in shape. A similar small spot is present at the end of the cell. Hind wings of two shades of brown, with only traces of spots. Under surface of fore wings brown, the darker brown not

reproduced. The whitish spots all reproduced. The posterior margin and angle much paler than the rest of the wing. Hind wings rich brown, with traces of a row of black spots surrounded by a lighter ring. Only one specimen in collection, from Nortonville.

55. *NISONIADES JUVENALIS*, FAB.

Wing expanse 1.4 inch. Color blackish brown. Marked with small whitish dots and obscure black spots. The dots confined to fore wings; four lie next the costa at about the beginning of the outer fourth of the wing; two somewhat triangular dots lie in the median interspaces; the seventh is at the outer end of the cell. The most noticeable of the black spots form two series parallel with the outer margins of the wings; they are made more conspicuous by pale scales on each side of them. Fringes concolorous with the wings. Color of under side much the same as above, the markings being repeated; a faint violet reflection on this surface becomes more evident on the fringe and apex of the front wings. Body uniform with the wings in color; the abdomen paler beneath. Palpi and head clothed above with brown and gray hairs mixed, the gray predominating below. Antenna dark brown, becoming slightly rufous at tip of club, touched with white at base in front. A small white dot on head behind the base of each antennæ; a third triangular dot in line with these is median in position. Fayette county.

56. *PHOLISORA CATULLUS*, FAB.

Wing expanse 1.1 to 1.2 inch. Upper surface a deep brownish black. A row of eight white hyaline spots across the fore wings, the last three of which are mere dots, the 3rd, 4th and 5th curving outward beyond the cell. Between this row of spots and the anterior margin is a faint row of dots, almost terminal; these extend across both wings, but are very faint, sometimes wanting. A small white dot is present at the end of the cell of fore wings. Fringes concolorous with wings. Under surface of wings of same color as above. The faint terminal row of spots not reproduced. The outer row is reproduced, but the posterior spots are sometimes wanting. White dot at the end of the cell also present. Posterior margin of fore wings pale, without spots. Hind wings a deep brown, with no markings. Palpi white. Common everywhere. Specimens from Lexington, and Providence.

57. *PHOLISORA HAYHURSTII*, EDW.

Wing expanse 1.1 to 1.2 inch. Upper surface brown, sprinkled over with yellow scales. Both wings crossed by two bands of black.

The outer band with three small hyaline spots, from the costa in line backward; another similar spot in the second median interspace. Fringes dentate, lighter between veins. Under surface deep brown, the spots on fore wings reproduced. Yellow hairs present at the base of fore wings, and a very few over the wings. The dark bar across the wings not so distinct as above. Hind wings with the inner half thickly sprinkled with yellow scales. Traces of a bar across the cell. Not common. Only two specimens. Lexington.

58. EUDAMUS PYLADES, SCUD.

Wing expanse 1.4 to 1.5 inch. Upper surface deep brown, the inner two-thirds of wings slightly darker than the outer third. Hind wings with no marks. Fore wings with small white hyaline spots. The first three anteapical the next three opposite the end of the cell, from the costa in line back to the cell. Two more small ones are in the median interspaces and one other below on the lower median venule. The two hindmost, somewhat triangular in shape. The spots from costa back are subquadrate, Under surface of fore wings with spots reproduced; apical half of wing reflecting a lilac tint. The base and center of wing very dark. Posterior margin lighter than the rest of the wing. Hind wings brown, sprinkled over with light scales, basal portion the darkest. Wings crossed by two irregular black lines. Only two specimens. Brooklyn Bridge.

59. EUDAMUS BATHYLLUS, SM.-ABB.

Wing expanse 1.4 to 1.6 inch. Upper surface dark brown, fringes grey, dark at ends of veins. The spots of fore wings are similar to those in *E. pylades*, only larger. The spots from the costa to the end of the cell are connected with the spot in the cell; if they meet they form an hour-glass-shaped spot; if they do not quite meet they are both triangular in shape. The spots appear to be in line from the costa across the end of the cell, with the two last of the three spots in the median interspaces; the spot in the first median interspace is out of line, being a little nearer the margin. The middle one of these last three spots is quite large compared with the other spots. The anteapical spots are three in number, also white hyaline spots. Under surface perhaps a little paler than above. Spots all reproduced. Apical portion with lilac reflection. Posterior margin fawn-color. Under surface much like that of *E. pylades*. Hind wings with two broad dark bands crossing them. Only two specimens. Bowling Green and Glasgow Junction.

60. EUDAMUS LYCIDAS, SM.-ABB.

Wing expanse 1.7 to 1.9 inch. Upper surface dark brown; inner half of wings slightly paler than the outer half. The spots are yel-

low, and almost form a bar from the costa across the end of the cell toward the posterior angle. These spots are arranged somewhat like those of *E. bathyllus*, but are much larger. The spots at the end of the cell and in the second median interspace, are very much enlarged and are quadrate. The antepical spots are also present, but small and not perfectly in line; they are connected by a dark line with another small yellow spot above the first median venule. Hind wings are without marks; the margin is black. The fringes are light grey, black at the veins, and entirely black at the anal angle. Under surface of fore wings, with spots reproduced. Apex black with white scales. Outer half lighter brown than inner half of wings, but with dark margin and dark line from antepical spots back to the larger spots. Posterior margin light. Hind wings with inner half mottled with black and brown. The interior margin fawn, with abbreviated brown lines. The outer half with a large white spot with irregular outline, sprinkled with brown scales. Anal angle black or brown. Only two specimens. Glasgow Junction, Ky.

#### 61. EUDAMUS TITYRUS, FAB.

Wing expanse 1.8 to 2 inches. Upper surface lark brown; hind wings and base of fore wings with fulvous hairs. A bar of yellow on the fore wings consisting of four large spots, one on costa, the next in the cell, the next in the second median interspace and very large, the last is small and rounded posteriorly. One small similarly colored spot occurs in the first median interspace, between the bar and the exterior of the wing. Three antepical spots are small and of a lighter color than the bar. Fringes grey, but black at veins. Fore wings beneath with spots reproduced, the apical portion and the exterior half of wing with purplish grey reflection. Base of wings and posterior margin dark, rich, glossy brown. Hind wings with a conspicuous silvery white spot in the center of the wing, narrowing as it extends forward to the costa. Basal half of wings deep brown, exterior half sprinkled with light scales and with purple reflection. Common throughout the State. Several specimens from Lexington.