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THE HESPERIOIDEA OF AMERICA NORTH OF MEXICO

by
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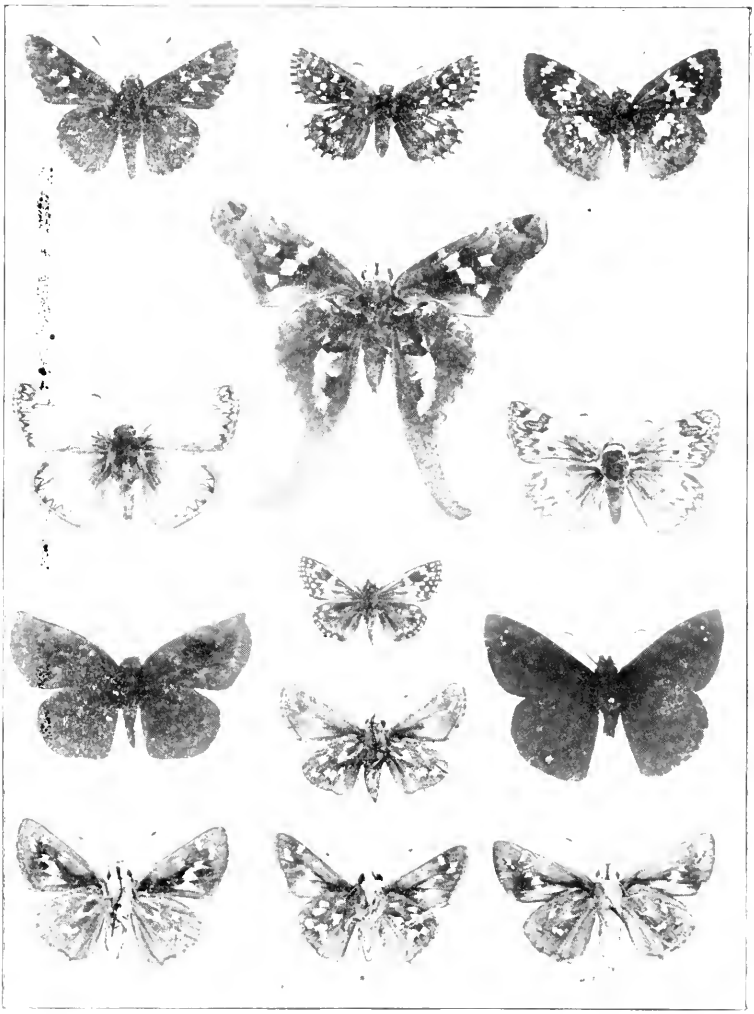


PLATE I

1. Atrytonopsis python Edw., ♂
2. Hesperia centaureæ Ramb., ♀
3. Xenophanes tryxus Cr., ♂
4. Hesperia ericeformis Boisd., ♂
5. Chioides zilpa Butl, ♂, under surface
6. Hesperia ericetorum Boisd., ♂
7. Hesperia philetas Edw., ♂
8. Eantis thraso Hbn., ♀
9. Pamphila nevada Scud, ♀, under surface
10. Melanthes brunnea H.-S., ♂
11. Pamphila comma, race colorado Scud., ♀, under surface
12. Pamphila viridis Edw., ♂, under surface
13. Pamphila comma, race oregonia Edw., ♀, under surface

UNIVERSITY OF IOWA STUDIES IN NATURAL HISTORY

PROFESSOR CHARLES CLEVELAND NUTTING, M.A., Editor

CONTINUATION OF BULLETIN FROM THE LABORATORIES OF NATURAL HISTORY OF THE STATE UNIVERSITY OF IOWA

VOLUME IX NUMBER 4

THE HESPERIOIDEA OF AMERICA NORTH OF MEXICO

A GENERIC REVISION AND SYNOPSIS OF THE SPECIES

by

ARTHUR WARD LINDSEY, PH.D.

PUBLISHED BY THE UNIVERSITY, IOWA CITY

THE HESPERIOIDEA OF AMERICA NORTH OF MEXICO

Since the time of the early writers who were satisfied to place their skippers in the two genera, *Pamphila* and *Hesperia*, the classification of these insects has been in a more or less chaotic state. The two old genera can readily be subdivided, but the structures of the skippers which are useful in their classification are of a peculiarly unstable character and have therefore proven a stumbling block to those who have attempted such subdivision. This is due to the fact that very few of our species are structurally identical, as a result of which one division has led to another until we have reached the deplorable state where, to be consistent, we must either lump extensively or split still more finely, with most lepidopterists in favor of the former. In the following pages I have attempted to rearrange our species and reorganize our genera to eliminate the confusion which has attended the group in North America, while bearing in mind both the convenience of the classification and the opinions of the learned authors of many genera for which I have been unable to see any necessity. Undoubtedly I have erred in some points, especially in the case of the numerous species found in the southwest which belong to genera more typical of the Central American fauna, but I believe that the examination of a more complete collection of exotic species will clear up many obscure points for which I have been able to offer only a tentative solution.

In the course of my work I have had occasion to ask information of Prof. H. F. Wickham, Dr. J. McDunnough, and Dr. Henry Skinner. Dr. Skinner has also supplied me with a number of specimens which I could not otherwise obtain, and Prof. Wickham has lent a number of books from his private library. Dr. Barnes of Decatur, Ill., has very generously allowed me the freedom of his fine collection and library, and also supplied me with many specimens for study. Mr. R. A. Leussler of Omaha

has given me specimens of several species which I had been unable to secure, and Mr. Nathan Banks has kindly examined the collection at Cambridge for certain material and furnished transcripts of several necessary descriptions not in my possession. Mr. Gerhard of the Field Museum made it possible for me to spend several profitable hours in the examination of the Strecker collection in that institution. To all of these men I wish to express my gratitude for their valuable assistance.

The first step toward a rational classification of the skippers was made by Scudder in 1874 [1] when he proposed the division of the family, as he regarded it, into two tribes, the *Hesperides* and *Astyci*. These represented approximately the genera *Thymele* and *Pamphila* of Fabricius' classification in Illiger's Magazine in 1807. Scudder based his tribes on the secondary sexual characters of the males and characters found in the early stages.

This paper was followed in 1878 by Mabille's work on the Hesperiidae in the Brussels museum.[2] Mabille adopted the tribes proposed by Scudder but subdivided them into several minor groups each. Scudder later expressed his approval of these divisions for the *Hesperidi* but reserved his judgment of the *Astyci*.[3] Many of Mabille's groups are not represented in our fauna; the others have been the subject of very little dispute.

In the same year there appeared a paper by Burmeister [4] in which the family is divided into four tribes. I am familiar with this paper only through the remarks of Scudder in the Butterflies of New England, but these are quite sufficient to show that none but historic interest attaches to the rather remarkable arrangement proposed.

A year after this Speyer produced a brief work [5] in Germany wherein we find the first suggestion of the systematic importance of the position of vein five of the primaries. This suggestion furnished the necessary complement to Scudder's foundation for the major subdivisions of the skippers, which are still in use.

Nothing further of importance was done in the systematic

[1] Bull. Buff. Soc. Nat. Hist. I, 195, 1874.
[2] Ann. Soc. Ent. Belg. XXI, 12, 1878.
[3] Butt. New Eng. II, 1372, 18.
[4] Desc. Phys. Rep. Arg., Lep. 245, 1878.
[5] Stett. ent. Zeit. XL, 477, 1879.

study of these insects until 1893, when Watson published [6] his "Proposed Classification of the Hesperiidae," which is practically the classification now in use. Watson divided the family into three subfamilies, the *Pyrrhopygginae*, *Hesperiinae* and *Pamphilinae*, equivalent to the *Pyrrhopygini* of Mabille and the two tribes of Scudder. He further subdivided the Hesperiinae into two groups and the Pamphilinae into three. Group C of the Pamphilinae is wholly oriental and African. The others correspond to the similar divisions of Scudder in part. As Watson was working on the collection in the British Museum where *Megathymus* was placed in the Heterocera, he merely mentioned the genus to indicate that if placed in the Hesperiidae it would form an additional subfamily.

At this time Godman and Salvin had been publishing for six years parts of the three volumes on Rhopalocera of the Biologia Centrali-Americana. The first signature on the skippers appeared a few months before Watson's revision, but the work was not completed until 1901. The subfamilies are those of Watson and the Hesperiinae are divided as in his classification, but the Pamphilinae, worked up by Godman after Salvin's death, are divided into eight groups. These are not wholly acceptable, but they suggest an improvement over the two groups of other writers. The chief systematic interest of the Biologia lies in the number of genera described, the excellent plates, and the great value of the work for specific identifications.

But one other paper, Mabille's monumental "Famille Hesperidae," [7] has been written on the Hesperioid fauna of the world since the earliest times. In this work Mabille uses the same arrangement as that of Watson, excepting the establishment of the subfamily *Ismeninae* to take the place of Watson's Group C of the Pamphilinae, and the definite placing of *Megathymus* in the subfamily *Megathyminae*.

There remains to be mentioned Dyar's "Review of the Hesperiidae of the United States." [8] This brief paper is the only one ever published on the skippers of this country, and in spite of omissions and commissions of an unusual nature it has filled a

[6] Proc. Zool. Soc. London, 1893, 3-132, pl. I-III.
[7] Genera Insectorum XVII, 1903-4.
[8] Journ. N. Y. Ent. Soc. XIII, 111-141, 1905.

great need of systematic lepidopterists. It was intended, as the name implies, merely as a synopsis of the genera and species and follows the "Famille Hesperidae" with comparatively few changes.

These works are the foundation of our present system of classification. Many others with a wider range have contributed to our knowledge of the skippers but in none of these is any work of importance on the gross classification attempted.

It will be noted in the preceding sketch of the history of the skippers that they have been treated as the family Hesperiidae, equivalent to the several families of butterfles with which they have been associated. This position is the only one to which they have been widely assigned, though a number of writers have given them superfamily rank. E. Reuter carries this a step further and proposes a distinct suborder under the name Grypocera,[9] equivalent to the Rhopalocera and Heterocera, while Spuler does likewise, but applies the name Netrocera.[10] This reopens the question of suborders, for if we accept Comstock's Frenatae and Jugatae the two older groups can no longer occupy this rank and must be either reduced or discarded. I regard them as natural groups though I am inclined to agree with Comstock's subdivision. The Rhopalocera and Heterocera may conveniently be designated as series. In this arrangement I cannot accept Reuter's Grypocera as indicative of the true relations of the skippers, but the name is still given some use in Europe. There are many points, however, in which the skippers show more primitive development or peculiar uniform specialization which distinguish them from the true butterflies, and the most natural arrangement appears to be that of Comstock [11] in which they are made a superfamily equivalent to the butterflies proper, According to our present nomenclature this superfamily should be known as the Hesperioidea. The following synopsis indicates the foundation of this classification for the suborder Frenatae.

Frenatae

Series HETEROCERA. Antennae rarely clavate. When clavate usually more or less pectinate or ciliate. Hind tibiae usual-

[9] Act. Soc. Faun. Flor. Fenn. XXII.

[10] Spuler, Die Schmetterlinge Europas I, 70, 1908.

[11] Manual 364, 1895.

ly with two pairs of spurs; front legs normal. Frenulum present in many families. Venation of primaries generalized or characteristically specialized. Pupa loose in cocoon, earthen cell or plant tissues. Superfamilies Sphingoidea, Saturnioidea, Bombycoidea and Tineoidea.

Series RHOPALOCERA. Antennae usually strongly clavate; never pectinate or ciliate.

Superfamily HESPERIOIDEA: Pupa suspended in a slight cocoon. Hind tibiae rarely with less than two pairs of spurs; front legs normal. Frenulum absent. Primaries with twelve veins, all free. (All five branches of radius present and from cell according to Comstock's system.)

Superfamily PAPILIONOIDEA: Pupa naked, usually suspended from silken attachments and specialized for concealment. Hind tibiae with only the terminal pair of spurs; front legs in higher families greatly reduced. Frenulum absent. Primaries with less than twelve veins or with some stalked.

In the Hesperioidea we have two families, the Hesperiidae and Megathymidae. The second includes only the genera Megathymus and Aegiale, and is equivalent to the subfamily of other writers. The first includes all other skippers. The Megathymidae are very closely related to the Pamphilinae, and some students regard them as a highly specialized branch from the same parent stock. The fact that the boring habit of the larvae is apparently acquired lends color to this opinion, but I cannot regard the small head as a necessary accompaniment of the boring habit. Rather than assume an elaborate process of evolution for the reduction of such a specialization as the large head, I regard the Megathymidae as a line separated from the parent stock of the Pamphilinae before the increase in size of the head, and proceeding by parallel development to a point of higher specialization of similar structures.

The three subfamilies of Hesperiidae are easily distinguished, apparently natural groups. The only question regarding them is that of relative position, and the present arrangement of the Hesperiinae between the Pamphilinae and Papilionoidea is favored by most of the evidence, though in the structure of the imago

they are more primitive than the Pamphilinae. The close relationship of the Pyrrhopyginae with the Hesperiinae and of the Megathymidae with the Pamphilinae leads to their being placed at the beginning and end of the superfamily respectively. The result is a linear series which is not entirely satisfactory, but since no linear series can represent true phylogenetic relations this must be accepted as the best possible, and it does, at least, correctly indicate the general relations of the several major divisions.

The separation of genera has been the most troublesome phase of the study of skippers since Hübner's classification was first amplified. I have come to the conclusion that the intermediate position of the group, together with the apparently transitional state of many of the structures, is accompanied by a greater blending of forms than has been recognized in the past, and that the normal genus may present a wide variation of structure, *provided that a transition between the extremes be present in the included species.* This is nicely illustrated by *Thanaos, Hesperia* and *Poanes* (*sensu* B. & McD., Check List). In *Thanaos* we have a group of insects of very similar habitus which no one has ever divided, but within the genus are to be found differences in structure which have been made to separate three genera in other cases. The neuration, shape of the wings, palpi and secondary sexual characters very nearly run the gamut of variation found in Group B of the Hesperiinae. *Hesperia* is similar but shows an even greater range of variation in the antennal club, shape of the wings, and in the palpi. In fact this variation is so great as to occasion some doubt of its unity, but it is impossible to divide the genus without separating some species whose relationship is apparent.

The matter of secondary sexual characters as a basis for the separation of genera is the greatest bugbear of systematists in this family. Godman and Salvin and Mabille have contributed abundantly to the confusion of genera so based, and in many cases these genera cannot be separated by other means. As far as I am aware the only definite stand taken upon the question is that expressed by Watson in his revision.* He says: "With

* Since writing this I have found a quotation from Dr. P. L. Sclater by Col. C. Swinhoe in defense of genera based on secondary sexual characters (Ann. & Mag. Nat. Hist. (VII), III, 108, 1899).

regard to the vexed question of the generic importance of male secondary sexual characters, the conclusion which has been forced upon me is that, in any particular genus in which male secondary sexual characters are found, the particular male character (be it costal fold, discal stigma, or tuft of hairs) may be either present or absent in different species of that same genus, but is never replaced by a character of different structure."

This seems by far the most satisfactory attitude to adopt, though it is necessary to understand that in cases such as *Thanaos* and *Hesperia* two or three such characters may be present or absent in various combinations in the several species. In my work, rather than carry the splitting of genera further, I have unhesitatingly followed Watson's conclusion. This has resulted in the dropping of a number of familiar genera, but I think that once we are accustomed to the change it will render our classification more convenient and more useful, as well as more natural. Some change is demanded for the sake of consistency, and since our genera have already been carried beyond the point of usefulness, "lumping" is the only desirable change.

The structures of systematic value in the Hesperioidea are found in all parts of the body. The size of the head serves to distinguish the two families, and its appendages, the palpi and antennae, offer a means of separating many genera. The palpi vary in length and position and the relative size of the second and third joints is useful, but it is necessary to look at all of these things in a general way. For example, in *Pholisora* as here treated we find great variation in the vestiture of the palpi and in the relative length of the third joint, but throughout the genus long palpi with smooth deep scaly vestiture, an oblique second joint and a porrect third joint with long scales are present. *Thanaos* has palpi of a similar form but with shaggy vestiture. The third joint in some genera is long, slender and vertical.

The antennae have a characteristic slender tip which has been aptly termed the apiculus. This varies from the tiny point found in *Pamphila* to the long one of *Goniurus*, and has been entirely lost in some genera. This modification has apparently taken place by two distinct lines of evolution, first the loss of the apiculus by gradual reduction and second by the thickening and

fusion of the structure with the club. The first has apparently taken place in the Pamphilinae and the second in the Hesperiinae. The relation of the length of the apiculus to the thickness of the club has been used extensively to separate certain genera of the Pamphilinae but I find that its value is limited. It is variable in most species, and only where extremely short or extremely long is this variation negligible. In such species as *verna* the apiculus is sometimes longer and sometimes shorter than the thickness of the club and is always difficult to measure with satisfactory accuracy. The length of the entire antennae measured in proportion to some other part of the insect is useful to distinguish a few genera of our fauna.

The legs offer three important characters, viz., the presence or absence of the epiphysis on the front tibiae, the presence or absence of spines on the mid tibiae and to a certain extent their form, and the number of pairs of spurs on the hind tibiae. The epiphysis does not concern us in a study of the North American fauna and the spurs on the hind tibiae characterize only one genus, but the spinulation of the mid tibiae is useful in several cases and in spite of some evidence to the contrary, I believe that it is a good character, at least to the extent used in this paper.

The wings vary greatly in shape, sometimes in a striking way, as in *Eantis*, *Systasea* and *Goniurus*. In certain others, as *Atrytonopsis*, they have a distinctive form which is less useful because less pronounced in the female and difficult to characterize. The neuration is of comparatively little use beyond a few conspicuous features, for it is impossible to pick a reasonably long series of related species without finding some transition in all of the salient features. In spite of this I have made use of the position of vein 11 of the primaries to separate *Chiomara* from *Thanaos*, but in this case there seem to be other grounds, and the one vein furnishes a convenient and apparently reliable corollary. The distance between the bases of veins 6 and 7 of the primaries of *Pholisora* is greater than in most other genera. The relation of vein 5 to 4 and 6 in the primaries distinguishes the Megathymidae and most Pamphilinae from the other skippers, and helps to separate some genera. The position of veins 2 and 3 of the primaries is another character which must be used with caution, for these veins vary in closely related species and can be depend-

ed upon only in extreme cases. The neuration of the secondaries is scarcely worthy of notice, though some exotic genera are characterized by the presence of vein 5, which is usually absent or very weak.

The abdomen is of little service, though it aids in distinguishing the genera of group A of the Pamphilinae from certan Hesperiinae in that it projects beyond the secondaries in the former and scarcely reaches their anal angle in the latter.

The male secondary sexual characters in the Hesperiinae consist of the costal fold on the primaries, tuft (always proximal in our species) on the hind tibiae, tuft on the upper surface of the secondaries and the two lobes found at the base of the abdomen on its ventral surface in *Hesperia*. In the Pamphilinae the only form found in the North American fauna is the brand or stigma on the disk of the primaries. While I agree with Watson's treatment of these characters I believe that the great difference in form between some of the stigmata indicates sufficiently different development of the species possessing them to warrant their generic separation. Fortunately in our fauna this character can be supplemented by others. It is necessary to guard agains splitting on this basis, for many stigmata which are superficially different may easily be seen to follow in their fundamental structure a single type.

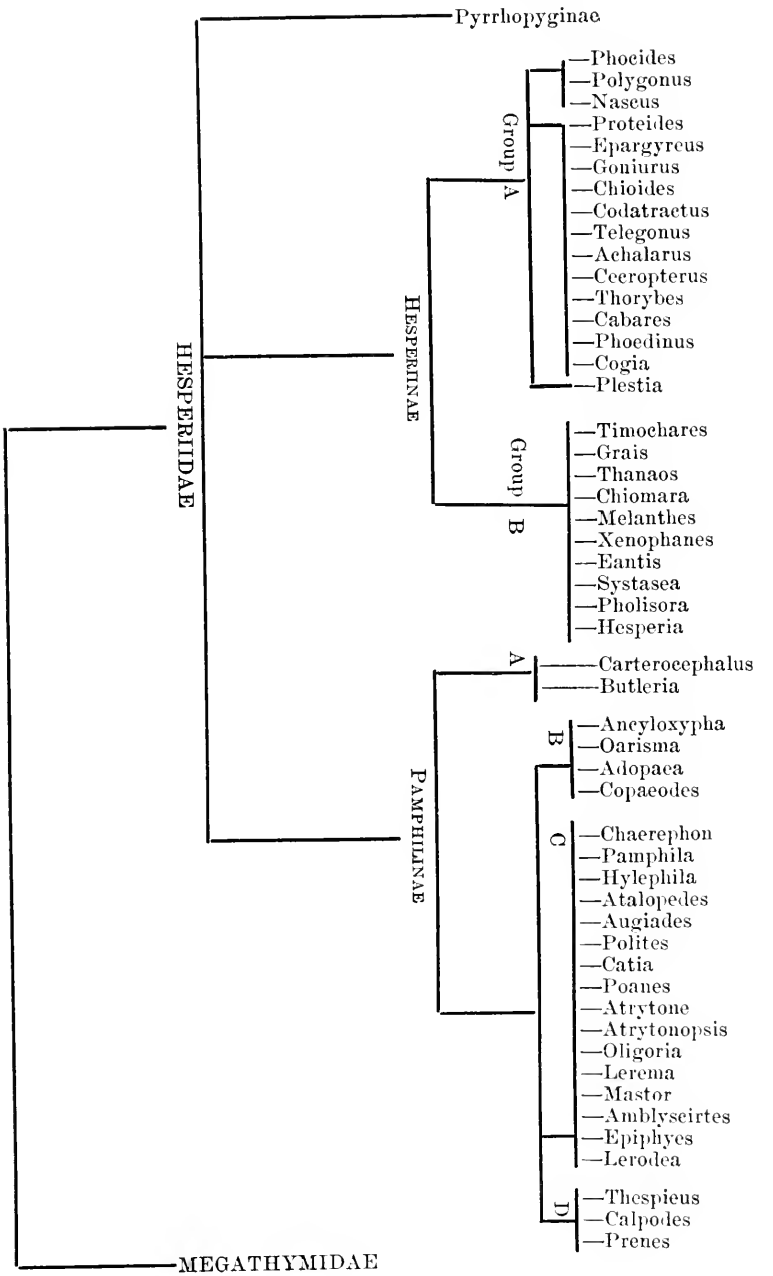
The genitalia, especially of the males, are of great value in making specific determinations, and similarity of genitalia often affords an index of generic relationship. I have found several apparent contradictions to the latter statement, and am therefore inclined to use it very cautiously until more is known about the skippers, but still I hesitate to include in the same genus species whose genitalia are of widely different forms.

In attempting to work out the phylogeny of our existing species I have come to the conclusion that the subfamily Ismeninae, made up entirely of old world species, represents the most primitive existing form. The entire subfamily is characterized by the upturned, appressed second joint of the palpi, very similar to that of the Hesperiinae of group A, and the long, porrect third joint which is unique. The antennae have a short shaft and a long, moderately thick club with a long apiculus which

is never sharply recurved. The hind tibiae of the males are provided with a tuft attached at the proximal end and lying along the upper edge of the joint in a groove formed of strong scales. Vein five of the primaries is intermediate between veins four and six. From these structures we may assume that the immediate ancestors of the skippers had antennae enlarged at some distance proximad of the distal end, leaving the terminal portion slender, and that vein five of the primaries in these insects had not yet formed a definite connection with either of the adjacent veins. From such forms evolution has proceeded with the permanent reflection of the apiculus by either a curve or a sharp bend. (I can construe the reflexed club of the Pyrrhopyginae only as a further development of the Hesperiid antenna, though this does not seem a satisfactory explanation). In addition the apiculus has been reduced as already mentioned and various slight specializations have taken place. The wings of the Hesperiinae have changed only in the variably complete loss of vein five of the secondaries and the lengthening of the cell in group A, while in the Pamphilinae vein five of the primaries, has formed a definite connection with the median stem (English system; cubitus of Comstock and Needham), as also is the case with the Megathymidae. Following these lines I have drawn up the following diagram which I believe will indicate better than a written discussion the relations and phylogeny of the genera used in this work. The arrangement undoubtedly has its faults, but I believe that it corrects a number of features of former arrangements which were more or less unnatural. In the main it adheres to the order of genera which has been in common use.

Superfamily HESPERIOIDEA

Antennae clavate, in a few genera with the club very slender. Club usually with a slender tip called the apiculus. Palpi variable, usually relatively large and thick, upturned to porrect. Head wide, eyes large and far apart, lashed. Insertion of antennae near eyes. Body stout, slender in a few genera. Wings relatively smaller than in the Papilionoidea and with very strong venation in most genera. Primaries with twelve veins, all free; cell open or weakly closed. One anal. Secondaries with eight


Pyrrhopyginae
HESPERIIDAE
HESPERIINAE
Group A
—Phocides
—Polygonus
—Naseus
—Proteides
—Epargyreus
—Goniurus
—Chioides
—Codatractus
—Telegonus
—Achalarus
—Ceroptérus
—Thorybes
—Cabares
—Phoedinus
—Cogia
—Plestia
Group B
—Timochares
—Grais
—Thanaos
—Chiomara
—Melanthes
—Xenophanes
—Eantis
—Systasea
—Pholisora
—Hesperia
PAMPHILINAE
A
—Carterocephalus
—Butleria
B
—Ancyloxypha
—Oarisma
—Adopaea
—Copaeodes
C
—Chaerephon
—Pamphila
—Hylephila
—Atalopedes
—Augiades
—Polites
—Catia
—Poanes
—Atrytone
—Atrytonopsis
—Oligoria
—Lerema
—Mastor
—Amblyscirtes
—Epiphyes
—Lerodea
D
—Thespieus
—Calpodes
—Prenes
MEGATHYMIDAE

or nine veins, five usually absent; cell open. Two anals. Front legs normal, tibiae usually with the epiphysis present (in all North American genera). Middle legs with one pair of spurs on the tibiae and with or without spines. Hind legs with two pairs of spurs, or with only the distal pair in some genera.

The two families are based on the following characters:

Family HESPERIIDAE: Head nearly as wide to wider than thorax. Hind tibiae usually with two pairs of spurs. Palpi moderate to large. Larvae external plant feeders.

Family MEGATHYMIDAE: Head narrower than thorax. Hind tibiae with one pair of spurs. Palpi rather small. Larvae borers in plant stems. Imagines larger than most Hesperiidae, heavy bodied and strong of flight.

Family HESPERIIDAE

Characters of the superfamily, distinguished from the *Megathymidae* as shown in the preceding synopsis. The North American species fall into three subfamilies which may be separated by the following key, which also deals with the groups into which the subfamilies are divided.

Key to subfamilies and groups

1. Club of antennae large, entirely reflexed....PYRRHOPYGINAE
   Club variable, never entirely reflexed.....2
2. Vein 5 of primaries not curved at base, usually about intermediate between 4 and 6. Mid tibiae without spines
   .....HESPERIINAE 3
   Vein 5 curved at base, arising nearer to 4, or with the mid tibiae spined.....PAMPHILINAE 4
3. Cell of primaries more than two-thirds as long as wing or antennae with a slender reflexed or recurved apiclus
   .....Group A
   Cell two-thirds or less. Club curved, blunt or fusiform, but never with a slender apiculus.....Group B
4. Vein 5 intermediate, straight. Club blunt. Palpi porrect
   .....Group A
   Vein 5 curved at base, nearer to 4. Palpi not porrect. Group B of authors.....5

5. Third joint of palpi long slender and vertical. Antennae short with the club blunt.....Group B
Third joint small or antennae with a slender apiculus .....Group C
Cell of primaries two-thirds as long as wing, usually with a recurrent vein or a vestige of it.....Group D

Subfamily PYRRHOPYGINAE

This subfamily includes a large number of South and Central American species of which only one, *araxes*, occurs within our territory. The large antennal club, bent back along the shaft or recurved, is typical of all the species. In other respects their structure agrees to a great extent with that found in group A of the Hesperiinae. The cell of the primaries is apically produced with the discocellulars outwardly concave, and is about two-thirds as long as the wing. The discocellulars are weak, but clearly traceable. Vein 5 is approximately intermediate in the primaries, and absent in the secondaries, though found in a few exotic genera.

Araxes has been included in the genus *Pyrrhopyge* by all writers with whose works I am familiar, but the difference in habitus and the form of the secondaries have led me to remove it. Watson's diagnosis of his genus *Microceris* (P. Z. S. 1893, 15) differs in only a few points from the structures of *araxes*, but the type, *variicolor*, judging by the original description and figure, is not at all closely related. I am therefore basing a new genus on the points of difference between *araxes* and Watson's description of *Microceris*.

Genus APYRROTHRIX gen. nov.

Similar to *Pyrrhopyge*. Differs from that genus in the more gently curved costa and more prominent apex of the primaries and the form of the secondaries. In *Pyrrhopyge* these appear to be longer through the cell than along the inner margin, and the outer margin is even or slightly concave between veins 2 and 7. The abdomen usually equals or surpasses the anal angle of the secondaries. In *araxes* the secondaries are broad and full, and surpass the abdomen. The outer margin is deeply crenulate, produced between veins 2 and 4 in the male and conspicu-

ously so in the female. According to Watson veins 7 and 8 of the primaries of *variicolor* are short stalked, while in *araxes* they are free. Watson's figure of the neuration of his genus differs in a few points in the secondaries also, and on the whole the relationship seems to be rather with the typical species of *Pyrrhopyge* than with *araxes*. Fig.1.

Type: *Erycides araxes* Hew.

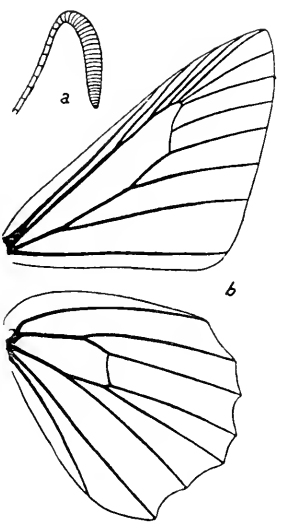


Fig. 1. *Apyrrothrix araxes* Hew. a. Club of antenna. b. Neuration

1. *APYRROTHRIX ARAXES*

Erycides araxes Hewitson, Desc. Hesp. 2, 1867.

Pyrrhopyga cyrillus Plötz, Stett. ent. Zeit, XL, 529, 1879.

Biologia Cent.-Am., Rhop. II, 252, pl. 73, ff 14, 15, 16, 1893.

Holland, Butterfly Book 319, pl. XLV, f. 9, 1898.

Mexico. I have two bred specimens from southern Arizona which are very close to *araxes* but the typical form is not known to occur north of the boundary.

1a. race *ARIZONAE*

Pyrrhopyge araxes, form *arizonae* G. & S., Biol. Cent.-Am., Rhop. II, 253, 1893.

Skinner, Trans. Am. Ent. Soc. XXXVII, 201, pl. X, 1911.

Dark marks on under surface of secondaries not well defined, suffused with ochreous. Outer margin of ochreous area diffuse.

Arizonae occurs in Arizona in August and September.

Subfamily HESPERIINAE

Structure very diverse but always showing the characters mentioned in the key. Antennae varying in length, club flattened oval to extremely long and slender, with the distal half or less reflexed or recurved. Palpi with the second joint closely appressed and the third minute to long, large and porrect. Neuration fairly constant. Branches of radius variable in position. Vein 5 straight and about intermediate between 4 and 6, 2 variable. Secondaries with position of 7 variable and vein 5 absent to weakly tubular at its outer end (*Thanaos*, some specimens),

usually marked by a fold. Mid tibiae without spines. Two pairs of spurs present on the hind tibiae in our genera. Secondary sexual characters of the males: costal fold, tibial tuft, tuft on secondaries, and basal lobes on under surface of abdomen.

GROUP A

Group A is more widely represented in South and Central America, and a number of our species are merely strays from more southern localities. The genera have been very inconsistently treated in the past, and I am lumping a few of them which show a complete lack of constant structural differences with the exception of the costal fold. Several such as *Cecropterus* and *Thorybes* are very closely related but because of the very distinct form of the male genitalia I am retaining them, based on such characters as will serve for their separation. The group is distinguished by the length of the cell and the form of the antennal club.

Key to the genera

1. L. D. C. of primaries very long and curved.....*Phocides*
   L. D. C. normal.....2
2. Apiculus of antennae longer than rest of club, straight and sharply bent at base.....*Nascus*
   Apiculus otherwise.....3
3. Primaries with a tubular, or at least well marked, recurrent vein in cell.....4
   Recurrent vein scarcely traceable or absent.....9
4. Antennae with a distinct, slender, reflexed apiculus.....5
   Antennal club fusiform, more or less elongate; arcuate or with a well rounded bend at middle.....7
5. Secondaries tailed.....*Goniurus*
   Secondaries not tailed.....6
6. Apiculus sharply bent; primaries apically produced .....*Protoides*
   Apiculus recurved; apex of primaries moderate..*Epargyreus*
7. Recurrent vein nearer vein 4 than vein 3.....8
   Recurrent vein nearer 3.....*Chioides*

8. Outer margin of secondaries slightly crenulate..*Codatractus*
Outer margin even.....*Telegonus*

9. Club of antennae large, fusiform.....*Plestia*
Club more slender, with a distinct apiculus.....10

10. Apiculus much shorter than rest of club, bent at about a right angle.....11
Apiculus about as long as rest of club, usually sharply reflexed or recurved.....13

11. Secondaries lobed.....*Polygonus*
Secondaries broadly rounded or merely produced at anal angle 12

12. ♂ with a tuft of scales on upper surface of hind wings; palpi moderate.....*Cogia*
No tuft. Palpi exceeding front by about length of head .....*Phoedinus*

13. Vein 1a of secondaries about two-thirds as long as 1b. Primaries with a broad yellow band.....*Cecropterus*
Vein 1a longer. Primaries with spots or a broken yellow band 14

14. Outer margin of secondaries broadly rounded; of primaries slightly and almost evenly convex.....*Thorybes*
Outer margin of secondaries more or less produced and angled at 1b; of primaries slightly sinuate.....*Achalarus*
Outer margin of secondaries with a slight truncate lobe between veins 3 and 4.....*Cabares*

Genus PHOCIDES Hübner

Phocides Hbn., Verz. bek. Schmett. 103, 1820. Type *Papilio palemon* Cr.

Erycides Hbn., Verz. bek. Schmett. 110, 1820. Type *Papilio pygmalion* Cr.

Dysenius Scudder, Syst. Rev. 46 (67), 1872. Type *Erycides albicilla* H. S.

Palpi oblique, vestiture smooth, deep and scaly; third joint small. Antennae with club rather long, moderately thick; apiculus not more than one-half as long as rest of club, very slender and abruptly bent. Primaries shaped as in *Goniurus*, with a

costal fold in the male. Cell over two-thirds as long as wing. Vein 5 nearer to 6 than to 4; L. D. C. long and strongly curved. Vein 3 near end of cell and 2 well toward base of wing. Recurrent vein faint, at base of vein 4. Secondaries produced toward anal angle with outer margin sharply bent at 1b but not lobed. Outer margin only slightly irregular. *Phocides* is easily recognized by the general habitus of the species when once seen. Fig. 2.

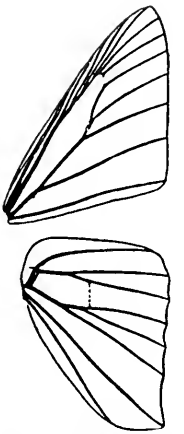


Fig. 2. *Phocides batabano* Lucas. Neuration

The action of former writers in combining these three genera was undoubtedly correct, though some slight differences of structure exist between the species occurring in our country.

Key to the species

Primaries immaculate, black.....*batabano*
Primaries with a red spot above.....*lilea*
Primaries with hyaline white spots.....*urania*

1. *PHOCIDES BATABANO*

Eudamus batabano Lucas, Sagra, Hist. Cuba, VII, 624, 1857.
Erycides mancinus H.-S., Corr.-Blatt Regensb. XVI, 143, 1862.
Erycides okeechobee Worthington, Papilio I, 133, 1881.
Skinner, Trans. Am. Ent. Soc. XXXVII, 199, pl. X, 1911.
Florida, March and April.

2. *PHOCIDES LILEA*

Erycides lilea Reakirt, Proc. Acad. Nat. Sci. Phil. 1866, 339.
Erycides albicilla H. S., Corr-Blatt Regensb. XXIII, 169, 1869.
Erycides socius Butl. & Druce, Cist. Ent. I, 112, 1872.
Dysenius cruentus Scud., Syst. Rev. 46(67), 1872.
Erycides sanguinea Scud., Syst. Rev. 47(68), 1872.
Erycides decolor Mab., Bull. Soc. Ent. France 1880, XLVI.
Biol. Cent.-Am., Rhop. II, 296, pl. 76, ff. 23, 24, 1893.
Skinner, Trans. Am. Ent. Soc. XXXVII, 199, 1911.

The only specimen which I have seen bears the label "Colima, Mex." Skinner lists a Texas record by Capt. Pope in the Mexican Boundary Survey.

3. *PHOCIDES URANIA*

Erycides urania Westw. & Hew., Gen. Diurn. Lep. 510, pl. 79, f. 1, 1852.
Erycides texana Scud., Syst. Rev. 47(68), 1872.

Skinner, Ent. News I, 23, 1890, and II, 101, pl. 1, 1891.
Skinner, Trans. Am. Ent. Soc. XXXVII, 198, 1911.
Texas, Arizona and southward.

Genus NASCUS Watson

Nascus Watson, Proc. Zool. Soc. London, 1893, 28, Type *Papilio phocus* Cr.

Watson characterized this genus as follows: "Antennae: club rather robust, bent into a hook, terminal portion very slender and rather longer than rest of club. Palpi upturned, third joint almost concealed. Fore wing: outer margin very much longer than inner margin, the apex being very conspicuously produced; cell more than two-thirds the length of costa; male with a costal fold; discocellulars very oblique, the lower one slightly the longer; vein 3 shortly before end of cell; vein 2 close to base of wing. Hind wing anally produced, and with an inconspicuous tooth at vein 1b; vein 7 close to end of cell; discocellulars and vein 5 barely traceable; vein 3 immediately before the end of the cell; vein 2 considerably nearer to end of cell than to base of wing. Hind tibiae with a long fringe of coarse hairs and with two pairs of spurs." In our fauna the very long apiculus separates this genus from all others. Fig. 3.

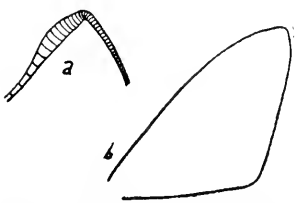


Fig. 3. *Nascus hesus* Westw. a. Club of antenna. b. Outline of primary

1. *NASCUS HESUS*

Telegonus hesus Westw. & Hew., Gen. Diurn. Lep. II, pl. 78, f. 5, 1852.
? *Papilio nicias* Fab., Mant. Ins. II, 86, 1787.
? *Eudamus etias* Hew., Desc. Hesp. 13, 1867.
Aaron, Ent. News I, 25, 1890 and II, 101, pl. 1, 1891.
Eudamus euribates Skinner (not Cramer) Trans. Am. Ent. Soc. XXXVII, 191, pl. X, 1911.
Mexico to Brazil; Skinner includes Texas, following Aaron, presumably.

I have compared Cramer's, Westwood and Hewitson's and Skinner's figures, and find that the two latter agree very well, but that, even allowing for the poor quality of Cramer's figure, they can hardly be *euribates* Cramer. I have no data on the occurrence of the species in this country.

Genus POLYGONUS Hübner

Polygonus Hbn., Samml. exot. Schmett. II, t. 144, 1822-6. Type *Polygonus lividus* Hbn.

Acolastus Scud., Syst. Rev. 50, 1872. Type *Hesperia savigny* Latr.

Nennius Kirby, Wytsman's Hübner 105, 1902. New name for *Polygonus* and *Acolastus*.

Second joint of palpi appressed, densely scaled; third porrect, small. Reflexed apiculus abruptly constricted, about one-half as long as rest of club. Head slightly wider than thorax. Primaries narrow, costa evenly curved, inner margin nearly straight and outer sharply curved opposite cell; no fold in male. Cell three-quarters as long as wing; vein 5 about equidistant between 4 and 6; spur vein scarcely traceable, nearer to 3. Secondaries broadly rounded, lobed at anal angle. Fig. 4.

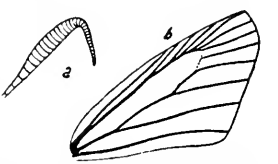


Fig. 4. *Polygonus amyntas* Fab. a. Club of antenna. b. Neuration of primary

According to Scudder (Hist. Sk. 253) *Polygonus* was preoccupied by *Polygona* in the Mollusca. *Acolastus* was preoccupied in the Coleoptera, a fact which was overlooked for many years, and Kirby offered *Nennius* to replace it. According to the current international rules of zoological nomenclature a difference of one letter is sufficient to validate a generic name, so *Polygonus* cannot be regarded as preoccupied, and therefore must be retained for *amyntas*.

1. POLYGONUS AMYNTAS

Papilio amyntas Fab., Syst. Ent. 533, 1775.

Polygonus lividus Hbn., Samml. exot. Schmett. II, t. 144, 1822-26.

Hesperia savigny, Latr., Enc. Meth. IX, 741, 1823.

Skinner, Trans. Am. Ent. Soc. XXXVII, 200, pl. X, 1911.

The typical form is very dark. It occurs in Florida in Aug. and Sept.

1a. race *ARIZONENSIS*

Erycides amyntas arizonensis Skinner, Trans. Am. Ent. Soc. XXXVII, 209, pl. X, 1911.

The western race of *amyntas* is paler than the typical form, both above and below, and the pale transverse bands of the secondaries are faintly visible on the upper surface. Texas and Arizona, September.

Genus PROTEIDES Hübner

Proteides Hbn., Verz. bek. Schmett. 104, 1820. Type *Papilio idas* Cr.

Dicranaspes Mab., Ann. Soc. Ent. Belg. xxi, 24, 1878. Type *Papilio idas* Cramer.

Proteides is very close to *Epargyreus*, and I think that with a large series of the tropical species the two genera will be found to be scarcely worthy of separation. In our fauna, however, the sharply constricted and reflexed apiculus and the narrow, apically produced primaries of *Proteides* are very distinctive. The male has no costal fold. Fig. 5.

1. *PROTEIDES IDAS*

Papilio idas Cramer, Pap. Exot. III, 118, p. CCLX, A, B, 1779-80.
Papilio mercurius Fab., Mant. Ins. II, 86, 1787.
Biol. Cent.-Am., Rhop. II, 301, pl. 77, f. 5, gen., 1893.
Skinner, Trans. Am. Ent. Soc. XXXVII, 194, 1911.
Occurs in Texas, New Mexico and Arizona. I have no further data.

Genus EPARGYREUS Hübner

Epargyreus Hübner, Verz. bek. Schmett. 105, 1820. Type *Papilio tityrus* Fab.

Second joint of palpi closely appressed, densely clothed with scales in which the small third joint is almost concealed. Antennae about one-half as long as the primaries, club more or less sharply curved at the middle. Head not quite as wide as thorax. Primaries elongate, rather narrow; outer and inner margins about equal in length, outer slightly more oblique but otherwise similar to *Goniurus*. Costal fold present. Cell three-quarters as long as wing; vein 5 slightly nearer to 4 than to 6. Recurrent vein nearer to vein 3. Vein 1 strongly sinuate. Secondaries rounded, lobed at anal angle. Fig. 5.

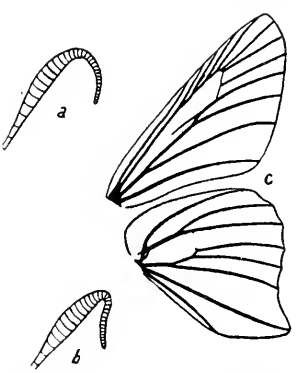


Fig. 5. a. Club of antenna of *E. zestos* Geyer. b. Club of antenna of *P. idas* Cramer. c. Neuration of *E. tityrus* Fab.

The primaries are longer and narrower in *exadeus* than in *zestos* and *tityrus*, and the apiculus of

the antennae shows a tendency to be more slender and more sharply bent. This has led me to the conclusion stated under *Proteides* that the two genera are possibly not distinct.

Key to the species

1. Under surface of secondaries with a silky white patch.....2
   No silky white on secondaires.....*zestos*
2. Spots of primaries deep yellow and usually broadly contiguous.*tityrus*
   Spots small and widely separated, or if larger, very pale yellow.*exadeus*

1. *EPARGYREUS ZESTOS*

Proteides zestos Geyer, Zutr. exot. Schmett. IV, 9, t. 106, ff. 615, 616, 1832.
Eudamus oberon Worthington, Papilio I, 132, 1881.
Skinner, Trans. Am. Ent. Soc. XXXVII, 193, 1911.
Florida, August and September.

2. *EPARGYREUS TITYRUS*

Papilio tityrus Fab., Syst. Ent. 532, 1775.
Papilio clarus Cramer, Pap. Exot. I, 66, pl. XLI, E, F, 1775.
Holland, Butterfly Book 323, pl. XLIII, f. 5, 1898.
Smyth, Ent. News XIX, 191, pl. X, 1908.
Skinner, Trans. Am. Ent. Soc. XXXVII, 192, 1911.

Ranges throughout the United States and into southern Canada and South America. June to August.

ab. *OBLITERATUS*

Epargyreus tityrus obliteratus Scudder, Butt. New Eng. II, 1402, 1889.
Only three small, rounded spots in place of the discal band, and only one small preapical spot. Silver on under surface of secondaries more extensive than usual.

3. *EPARGYREUS EXADEUS*

Papilio exadeus Cramer, Pap. Exot. III, 118, pl. CCLX, C, 1779-80.
Biol. Cent.-Am., Rhop. II, 299, pl. 77, f. 1, gen., 1893.
Skinner, Trans. Am. Ent. Soc. XXXVII, 194, pl. X, 1911.
Southern California, Arizona, New Mexico, March.

Genus GONIURUS Hübner

Goniurus Hübner, Verz. bek. Schmett. 104, 1820. Type *Papilio simplicius* Stoll.

Eudamus Swainson, Zool. Ill. (2), II, 48, 1831-2. Type *Papilio proteus* Linn.

? *Polythrix* Watson, Proc. Zool. Soc. London, 1893, 19. Type *Eudamus metallescens* Mabille.

Second joint of palpi closely appressed, third porrect, small. Antennae a little over one-half as long as primaries, club slender, apiculus shorter and distinctly more slender than remainder. Primaries broad and short; outer margin evenly rounded to slightly sinuate, about as long as inner; costa evenly rounded, relatively short, without fold in one species. Cell two-thirds as long as wing; vein 5 slightly nearer to 4 than to 6. Secondaries with anal angle produced into a long tail; outer margin slightly excavated opposite cell and before tail, sometimes slightly crenulate. Fig. 6.

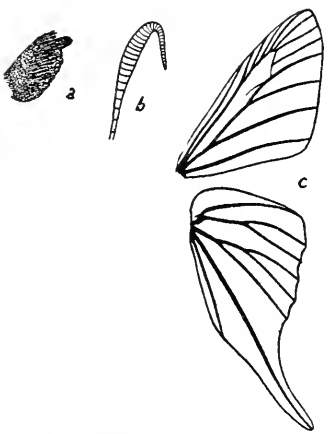


Fig. 6. *Goniurus*. a. Palpus of *simplicius* Stoll. b. Club of antennae of *simplicius* Stoll. c. Neuration of *proteus* Linn

The above description is taken from *simplicius* and *eurycles*. *Proteus* has a longer cell as shown in the figure and both *proteus* and *dorantes* have relatively shorter antennae. It may prove desirable to use *Eudamus* for these two species, but without knowing more of the related Central American fauna I cannot make a satisfactory decision on this point. Of the other three North American species which I here remove from *Goniurus* I feel that *albofasciatus* and *zilpa* warrant the establishment of a new genus, and that the relationship of *alceus* to *melon*, in spite of its tailed secondaries, is too close to be disregarded.

Key to the species

1. Upper surface with shining green hairs.....*proteus*
   Without green hairs.....2
2. Fringes checkered; spots not united to form a straight band..*dorantes*
   Fringes not checkered; band usually present.....3
3. Band always present; no costal fold in male; outer margin of primaries slightly sinuate.....*eurycles*
   Band sometimes broken or even absent; male with fold; outer margin slightly convex.....*simplicius*

1. *GONIURUS PROTEUS*

Papilio proteus Linn., Syst. Nat. I, 484, 1758.
Scudder, Butt . New Eng., II, 1386, 1889.
Biol. Cent.-Am., Rhop. II, 277, pl. 75, f. 5, gen., 1893.

Holland, Butterfly Book 321, pl. XLV, f. 6, 1898.
Skinner, Trans. Am. Ent. Soc. XXXVII, 194, 1911.

Florida and Georgia, August to October. Arizona and Texas, June and July. Dr. Skinner gives the range as New York to the Gulf and southward through Mexico and Central America.

2. *GONIURUS DORANTES*

Papilio dorantes Stoll, Pap. Exot., Supp., 172, pl. XXXIX, f. 9, 1790.
Eudamus amisus Hew., Desc. Hesp. 5, 1867.
Eudamus protillus H.-S., Corr.-Blatt Regensb. XXIII, 171, 1869.
Biol. Cent.-Am., Rhop. II, 278, pl. 75, f. 7, ♂ gen., 1893.
Skinner, Trans. Am. Ent. Soc. XXXVII, 197, 1911.
Southern California, Mexico.

2a. *race RAUTERBERGI*

Eudamus protillus var. *rauterbergi* Skinner, Ent. News VI, 113, 1895.
Skinner, Trans. Am. Ent. Soc. XXXVII, 197, 1911.

Skinner says that this form is "smaller and very much darker than *protillus*; the fringes are far less marked, and the tails lack the admixture of light hairs."

Texas, Arizona and southward; July and September.

3. *GONIURUS SIMPLICIUS*

Papilio simplicius Stoll, Pap. Exot., Supp., 171, pl. XXXIX, f. 6, 1790.
Biol. Cent.-Am. Rhop. II, 270, pl. 75, f. 1, ♂ gen., 1893.
Skinner, Trans. Am. Ent. Soc. XXXVII, 196, 1911.

Some females can scarcely be told from *eurycles*, but usually the obsolescence of the hyaline marks of the primaries and the slightly different shape of the wings enable one to recognize the species. The males are readily identified by the costal fold.

Texas, March and October.

4. *GONIURUS EURYCLES*

Hesperia eurycles Latr., Enc. Meth. IX, 730, 1823.
Skinner, Ent. News XII, 171, 1901.
Skinner, Trans. Am. Ent. Soc. XXXVII, 197, pl. X, 1911.

I have *eurycles* from Guatemala, taken in April, and from Colombia taken in November, but aside from Dr. Skinner's note in the Entomological News I have seen no records of its occurrence north of Mexico.

Genus CHIOIDES gen. nov.

Palpi large, porrect; second joint deeply scaled, third strong,

conspicuous. Antennae less than one-half as long as primaries, club relatively smaller and thicker than in *Goniurus*, and more broadly curved, with the apiculus less distinct. Primaries with the apex subtruncate, outer margin concave below apex. Cell about three-fourths as long as wing; recurrent vein nearer to vein 3 than to vein 4; bases of 3 and 4 much farther apart than M. D. C. and L. D. C. combined. Costal fold present in our species. Fig. 7.

Type: *Eudamus albofasciatus* Hewitson.

Catillus, a Central American species, and *albofasciatus* are very closely related, and agree in the form of the male genitalia. *Zilpa* differs somewhat in the form of the wings and the male genitalia, but on the whole it is apparently related to the other species, and with them distinct from *Goniurus*. The difference is scarcely greater than between *proteus* and *simplicius*.

1. *CHIOIDES ALBOFASCIATUS*

Eudamus albofasciatus Hew., Desc. Hesp. 3, 1867.
Biol. Cent.-Am., Rhop. II, 280, pl. 75, f. 11, ♂ gen., 1893.
Skinner, Trans. Am. Ent. Soc. XXXVII, 197, 1911.

Texas, March. Arizona, July and September. Distinguished from *zilpa* by the long narrow white band on the under surface of the secondaries.

2. *CHIOIDES ZILPA* (Plate I, Fig. 5)

Goniurus zilpa Butler, Lep. Exot. 109, t. XL, f. 2, 1872.
Biol. Cent.-Am., Rhop. II, 279, pl. 75, f 8, ♂ gen., 1893.

Patagonia Mts., Arizona, May. Kerrville, Tex., September.

Genus CODATRACTUS nom. nov.

Heteropia Mabille, Le Nat. 1889, 68. Type *Heteropia imitatrix* Mab. Preoccupied in sponges by *Heteropia* Carter, Ann. &Mag. Nat. Hist. (5), XVIII, 47, 1886.

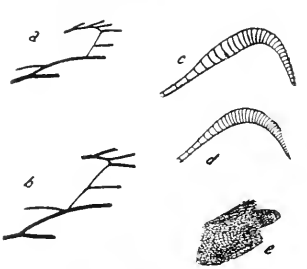


Fig. 7. *Chioides zilpa* Butler. a. Detail of neuration end of cell of primaries. c. Club of antenna. e. Palpus. *Codatractus alecus* Hew. b. Detail of neuration, end of cell of primary. d. Club of antenna.

Structure in general similar to *Chioides* but with veins 3 and 4 of the primaries not so far apart at their bases as the combined length of the two discocellulars and the recurrent vein nearer to 4 than to 3. The antennal club is fusiform, more or less sharply bent near the middle but with the distal portion not differentiated.

Outer margin of primaries slightly sinuate; no costal fold in male of *melon;* I have not seen a male of *alcaeus.* Fig. 7.

To place such a strongly tailed species as *alcaeus* with a species in which the secondaries are merely angled is radical, but a study of related Central American species has led me to believe that in this case, at least, it is justified. *Alcaeus* agrees with *melon* very closely in structure, and the male genitalia of the two species are very similar.

1. *CODATRACTUS ALCAEUS*

Eudamus alcaeus Hew., Desc. Hesp. 3, 1867.
Skinner, Ent. News XII, 171, 1901.

My only specimen is a female from Mexico, and I have seen no others. The reference to the Entomological News is the only record of its occurrence in the United States with which I am familiar.

2. *CODATRACTUS MELON*

Heteropia melon Godman & Salvin, Biol. Cent.-Am., Rhop. II, 297, pl. LXXVI, g. 26, 27, 1893.

The typical form of *melon* is not known to occur north of Mexico.

2a. *raee ARIZONENSIS*

Heteropia melon var. *arizonensis* Skinner, Ent. News XVI, 232, 1905.
Skinner, Trans. Am. Ent. Soc. XXXVII, 186, pl. X, 1911.

Baboquivari Mts., Ariz., July.

Differs from true *melon* in the whiter marginal area of the secondaries below.

Genus *TELEGONUS* Hübner

Telegonus Hübner, Verz. bek. Schmett. 104, 1820, Type *Papilio anaphus* Cramer.

Palpi oblique, third joint distinct. Antennae with a long slender tapering club, not sharply bent but curved at the middle. Primaries broad, outer margin equal to inner; costa slightly curved, without a fold in the male; outer margin very slightly sinuate. Secondaries produced and angled at 1b; outer margin straight from vein 7 to the anal angle. Cell of primaries about two-thirds as long as wing, discocellulars very oblique; vein 5 slightly nearer to vein 4 than to vein 6; recurrent vein near 4; vein 2 over one-half as far from base of wing as from 3.

1. *TELEGONUS HAHNELI*

Aethilla hahneli Staud., Exot. Tagf. I, 291, II, pl. 98, 1888.
Biol. Cent.-Am., Rhop. II, 306, pl. 77, ff. 13, 14, 1893.
Skinner, Ent. News XII, 171, 1901.

Staudinger's figure does not agree at all with that of Godman and Salvin, which represents the species recorded from North America. Since the latter authors state, however, that they had specimens from Dr. Staudinger himself, the best thing that we can do is retain the name in its present usage until the types can be examined.

Arizona (Skinner).

I have a specimen from Dr. Skinner labelled "Jamaica." Beyond his record in the Entomological News I have no knowledge of the occurrence of the species within our country.

Genus *PLESTIA* Mabille

Plestia Mab., Le Nat. (2), II, 146, 1888. Type *Plestia staudingeri Mab.*

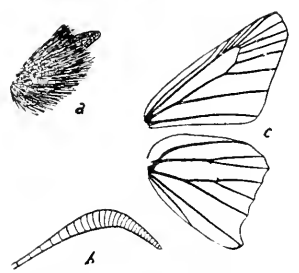


Fig. 8. *Plestia dorus* Edw. a. Club of antenna. c. Neuration of wings

Palpi porrect, exceeding front by length of head; second joint with shaggy vestiture of scales and hair, third conical, moderately large. Antennae with the club fusiform and pointed, almost as long as the shaft. Primaries trigonate, outer margin bent opposite cell; costal fold present in male. Cell over two-thirds as long as wing, recurrent vein absent. Vein 5 nearer 6 than 4. Secondaries trigonate, prominently lobed at anal angle. Legs and under surface of thorax very hairy. Fig. 8.

1. *PLESTIA DORUS*

Eudamus dorus Edwards, Papilio II, 140, 1882.
Biol. Cent.-Am., Rhop. II, 290, pl. 76, ff. 8, 9, 1893.
Holland, Butterfly Book, 322, pl. XLV, f. 11, 1898.
Skinner, Trans. Am. Ent. Soc. XXXVII, 187, 1911.

Arizona, May, June and July. New Mexico, May.

Genus *ACHALARUS* Scudder

Achalarus Scudder, Syst. Rev. 50 (71), 1872. Type *Papilio lyciadas*, Abbot and Smith.

Murgaria Watson, Proc. Zool. Soc. London, 1893, 37. Type *Telegonus albociliatus* Mabille.

Palpi porrect; second joint closely and roughly scaled; third small, almost concealed in vestiture of second. Antennae about one-half as long as primaries; club slender, tapering gradually into the reflexed tip, which is not quite as long as the rest of the club. Primaries moderately broad; costa slightly rounded, with or without the fold in the male; outer margin slightly sinuate in the male, more evenly rounded in the female; cell slightly over two-thirds as long as wing; spur vein very faintly indicated, near vein 4; 5 slightly nearer to 4. Secondaries angled at 1b in the male, more rounded in the female. In *epigona* this character is very variable, some specimens having the angle acute and others obtuse. Vein 5 is not present, as stated by Watson (P. Z. S. 1893, 34) but is indicated by a slight fold.

Although it seems very radical to combine these genera, a careful consideration of their structures has failed to disclose any basis for their separation. *Epigona*, formerly placed in *Phoedinus*, is obviously congeneric with *albociliatus*, and hence under the old arrangement would fall into *Murgaria*, while both dffer from *lycidas* only in the absence of the costal fold in the males. Some specimens of the white fringed species have the anal angles of the secondaries much more acute than in *lycidas*, and therefore look much different, but as I have stated, this character is very variable. The male genitalia are similar and of a peculiar form.

Key to the species

1. Primaries with yellow spots.....*lycidas*
   Primaries with or without white spots.....2
2. Primaries with well defined whitish hyaline spots.....*epigona*
   Primaries with an obscure dark band, rarely with a few white spots .....*albociliatus*

1. *ACHALARUS LYCIDAS*

Papilio lycidas Abbot and Smith, Lep. Ins. Ga. I, 39, pl. 20, 1797.
Proteides lyciades Geyer, Zutr. ex. Schmett. IV, 10, ff. 621, 622, 1832.
Skinner, Trans. Am. Ent. Soc. XXXVII, 188, 1911.

New York and Pennsylvania, August, and south to the gulf, where it is taken in May and June.

2. *ACHALARUS EPIGONA*

Myscelus epigona H.-S., Corr.-Blatt Regensb. XXIII, 167, 1869.
Eudamus epigena Butler, Trans. Ent. Soc. Lond., 1870, 493.
Eudamus orestes Edw., (Lintner Ms.), Cat. Diurn. Lep. N. A. 58, 1877.
Biol. Cent. Am., Rhop. II, 332, pl. 80, ff. 9-11, 1893.

Arizona, June and August.

3. *ACHALARUS ALBOCILIATUS*

Telegonus albociliatus Mab., Pet. Nouv. Ent. II, 162, 1877.
Eudamus coyote Skinner, Can. Ent. XXIV, 164, 1892.

Texas and Arizona. We have been confusing two species under this name, but at present I am unable to correct the error with certainty.

Genus CECROPTERUS Herrich-Schäffer

Cecrops Hbn., Zutr. Exot. Schmett. t. 32, ff. 183, 184, 1818. Type *Cecrops zarex* Hbn. Preoccupied in Crustacea.

Cecropterus H.-S., Corr.-Blatt Regensb. XXIII, 131, 1869. For *Cecrops* Hbn.

Rhabdoides Scud., Butt. New Eng. III, p. 1854, 1889. Type *Eudamus cellus* Boisd. & Lec.

Fig. 9. *Cecropterus cellus* Bd. and Lec. a. Club of antenna. b. Detail of neuration; anal area of secondary

Palpi larger than in *Achalarus;* second joint oblique, roughly scaled; third porrect, moderate, not concealed by vestiture of second. Antennae about one-half as long as primaries; club slender, tapering, bent near middle, with the apiculus scarcely more slender than the basal portion. Primaries similar to *Achalarus* ♀ and *Thorybes*; cell slightly over two-thirds as long as wing; recurrent vein faint but indicated at base of vein 4; 5 slightly nearer to 4 than to 6; discocellulars less oblique than in *Achalarus*, more as in *Thorybes;* costal fold not present in male. Outer margin of secondaries rounded, apex broadly rounded; Vein 1a about two-thirds as long as 1b. Fig. 9.

Cellus resembles *Thorybes* very closely in most of its structures, but I hardly think that the species belongs there. I do not see anything to separate it from the genus *Cecropterus*, however, and so am placing it for the present with the other species whose banded primaries give them a close superficial resemblance. *Pseudocellus* appears to be closer to *Achalarus* but I have not had material for dissection and so prefer to leave it with *cellus*.

1. *CECROPTERUS CELLUS*

Eudamus cellus Bd. & Lec., Lep. Am. Sept. t. 73, 1833.
Cecrops festus Geyer, Zutr. exot. Schmett. v, 21, ff. 907, 908, 1837
Biol. Cent.-Am., Rhop. II, 331, pl. 80, f. 8, ♂ gen., 1894.
Holland, Butterfly Book 326, pl. XLV, f. 12, 1898.
Skinner, Trans. Am. Ent. Soc. XXXVII, 189, 1911.

Pennsylvania, July. Virginia and West Virginia, May and June. Texas and Arizona, April and August.

2. *CECROPTERUS PSEUDOCELLUS*

Achalarus pseudocellus Coolidge and Clemence, Ent. News XXII, 3, 1911.
Skinner, Trans. Am. Ent. Soc. XXXVII, 190, 1911.

Arizona, June to September inclusive. This species is smaller and darker than *cellus*, lacks the terminal pale area on the under surface of the secondaries and has a pale ring at the base of the antennal club. I have examined a long series in the Barnes collection without finding any specimen in which the pale ring could not be seen.

Genus THORYBES Scudder

Thorybes Scud., Syst. Rev. 50 (71), 1872. Type *Papilio bathyllus* A. & S.

Lintneria Butler, Trans. Ent. Soc. London, 1877, 57. Type *Papilio daunus* Cramer.

Cocceius G. & S., Biol. Cent.-Am., Rhop. II, 336, 1900. Type *Eudamus pylades* Scud.

Palpi with the second joint appressed, densely scaled; third small, porrect, partly concealed by scales of second. Club of antennae moderate, tapering into a slender apiculus which is slightly shorter than the rest of the club. In specimens the apiculus varies from sharply reflexed to slightly recurved. Primaries rather short and broad with the costa and outer margin convex; cell slightly over two-thirds as long as wing; recurrent vein barely indicated near vein 4; 5 equidistant between 4 and 6; 2 nearer base of wing than to 3. Secondaries broadly rounded, length along vein 6 about equal to or greater than along 1b;

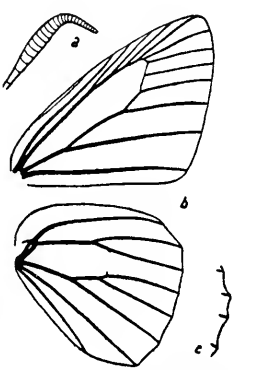


Fig. 10. a. Club of antenna of *Cogia hippalus* Edw. b. Neuration of *Thorybes pylades* Scud. c. Truncate lobe on outer margin of secondary of *Cabares potrillo* Lucas

anal angle sometimes very slightly prominent. Costal fold present in *pylades* and *drusius* but not in the other species. Fig. 10.

In establishing *Cocceius* Godman and Salvin state that it differs from *Thorybes* in the presence of the costal fold and that this indicates that its relationship is rather with *Achalarus*. It is related in many more points, however, to *Thorybes*, and the costal fold does not seem adequate to separate the two groups as genera. The male gentalia of the species are similar.

Key to the species

1. Fringes of secondaries white, at least in middle of outer margin. *drusius*
   Fringes not white 2
2. Under surface of secondaries transversely strigate 3
   Under surface not strigate 4
3. Hyaline spots moderate to small, without dark outlines; ground color dark ..... *mexicanus*
   Hyaline spots large with dark outlines; ground color pale ..... *mexicanus, race nevada*
4. Spots usually large, extending from vein to vein; palpi usually pale below ..... *bathyllus*
   Spots usually small; palpi usually concolorous with body below. . *pylades*
   Spots absent ..... *pylades, ab. immaculata*

1. *THORYBES DRUSIUS*

Eudamus drusius Edw., Can. Ent. xv, 211, 1883.
Biol. Cent.-Am., Rhop. II, 336, 1894.
Skinner, Trans. Am. Ent. Soc. XXXVII, 185, pl. x, 1911.

Arizona, June, July and August. Western Nebraska, Leussler.

2. *THORYBES PYLADES*

Eudamus bathyllus Harris (not A. & S.), Ins. Inj. Veg. 3rd ed., 312, 1862.
Eudamus pylades Scud., Proc. Bost. Soc. Nat. Hist. XIII, 207, 1870.
Biol. Cent.-Am., Rhop. II, 336, pl. 80, f. 23, 1894.
Holland, Butterfly Book 324, pl. XLVIII, f. 6, 1898.
Skinner, Trans. Am. Ent. Soc. XXXVII, 176, 1911.

Occurs throughout the United States and most of Canada. In Florida and Texas it has been taken as early as April and as late as October; farther north it flies from May to August.

ab. *IMMACULATA*

Eudamus pylades immaculata Skinner, Trans. Am. Ent. Soc. XXXVII, 177, 1911.

This is a rather uncommon form in which the hyaline spots of the primaries are entirely absent.

3. *THORYBES DAUNUS*

Papilio daunus Cramer, Pap. Exot. II, 44, pl. CXXVI, F, 1777.
Papilio bathyllus Abbot & Smith, Lep. Ins. Ga. I, 43, pl. XXII, 1797.
Holland, Butterfly Book 325, pl. XLVIII, f. 5, 1898.
Skinner, Trans. Am. Ent. Soc. XXXVII, 178, 1911.

Some females of *pylades and bathyllus* are difficult to separate but as a rule the size of the spots and color of the palpi in this species are characteristic. The males of this and the following species are easily separated from the others by the absence of the costal fold.

Florida north and west to Pennsylvania, Iowa, Nebraska and Texas. I have seen southern specimens dated May and August, while farther north the species occurs from June to September.

4. *THORYBES MEXICANA*

Eudamus mexicana H.-S., Corr.-Blatt Regensb. XXIII, 198, 1869.
Eudamus ananius Plötz, Stett. ent. Zeit. XLIII, 99, 1882.
Biologia Cent.-Am., Rhop. II, 334, pl. 80, ff. 15, 16, 17, 1894.
Skinner, Trans. Am. Ent. Soc. XXXVII, 180, 1911.

Specimens in the Barnes collection which agree with those in the British museum are similar to *pylades* above but faintly strigate below, and rather darker than normal specimens of *pylades*.

Arizona, June and July. Colorado, July.

4a. *race NEVADA*

Thorybes nevada Scud., Syst. Rev. 50 (71), 1872.
Eudamus aemilea Skinner, Ent. News IV, 64, 1893.
Holland, Butterfly Book 325, pl. XLVI, f. 39, 1898 (type).
Wright, Butt. W. Coast 254, pl. XXXII, f. 478, 1905.
Skinner, Trans. Am. Ent. Soc. XXXVII, 182, 1911.

Ground color rather pale, with a fine terminal line and margins of spots darker. Spots large. Strigation of under surface usually heavy.

California and Oregon, June and July. 8000 ft.

Genus CABARES Godman & Salvin

Cabares G. & S., Biol. Cent.-Am., Rhop. II, 337, 1894. Type *Thanaos potrillo* Lucas.

"Antennae with a gradually tapering club, curved in the middle into a crook. Palpi porrect, the third joint rather prominent. Primaries with the cell more than two-thirds the length of the costa, the second, third, and fourth subcostal segments subequal; lower discocellular rather shorter than the middle, the two forming an oblique line at a large acute angle to

the axis of the wing; third median segment less than half the second, and rather shorter than the first; a curved recurrent nervule starts from the end of the cell. Secondaries with the discocellulars very slender; third median segment very short; second subcostal segment also short. Primaries short, slightly truncate at the tip; no costal fold in the male; secondaries with a projection in the middle of the outer margin from the end of the median nervure. Hind tibiae with two pairs of spurs."

"Type *Thanaos potrillo* Lucas." (Original description).

This appears to be a good genus, and the one species which occurs in our fauna can easily be placed by the peculiar lobe on the outer margin of the secondaries. Fig. 10.

1. *CABARES POTRILLO*

Thanaos potrillo Lucas, Sagra's Hist. Cuba VII, 641, 1857.
Biol. Cent.-Am., Rhop. II, 337, pl. 80, ff. 24, 25, 26, 1894.

The species is occasionally taken in Texas.

Genus COGIA Butler

Cogia Butler, Trans. Ent. Soc. London 1870, 508. Type *Cogia hassan* Butler.

Palpi porrect; second joint heavily clothed with scales; third small but not concealed. Antennae about one-half as long as primaries; club moderately thick, tapering into the short, reflexed apiculus. This is about half as long as the rest of the club and is usually bent at about a right angle. Shape of wings similar to *Thorybes* but costa of primaries less strongly curved and secondaries a little more produced anally. Cell of primaries about two-thirds as long as wing; vein 5 intermediate between 4 and 6; recurrent vein faintly indicated, nearer to 4 than to 3. Primaries of male without costal fold but secondaries with a short tuft of scales lying in the fold along vein 1b near the base of the wing. Fig. 10.

Key to the species

1. Fringes fuscous.....2
   Fringes white.....*hippalus*
2. Subapical spots indistinct; those between veins 2 and 4 usually lacking; color dark.....*calchas*
   Subapical spots clear; those between 2 and 4 usually present; color pale fuscous.....*outis*

1. *COGIA CALCHAS*

Eudamus calchas H.-S., Corr.-Blatt Regensb XXIII, 188, 1869.
Spathilepia terranea Butler, Lep. Exot. 111, t. XL, f. 8, 1872.
Biol. Cent.-Am., Rhop. II, 340, pl. 81, f. 6, ♂ gen., 1894.

Texas, October. Most specimens can be distinguished from *outis* by the dark color and limited maculation.

2. *COGIA OUTIS*

Eudamus outis Skinner, Ent. News V, 332, 1894.
Skinner, Trans. Am. Ent. Soc. XXXVII, 184, pl. X, 1911.

Texas, August. Ground color pale fuscous, as in *hippalus*. The primaries usually have the two hyaline spots between veins 2 and 4 but I have seen specimens in which these were lacking or greatly reduced.

3. *COGIA HIPPALUS*

Eudamus hippalus Edw., Papilio II, 27, 1882.
Hesperia gila Plötz, Stett. ent. Zeit. XLVII, 91, 1886.
Biol. Cent.-Am., Rhop. II, 340, pl. 80, ff. 29-31, 1894.
Skinner, Trans. Am. Ent. Soc. XXXVII, 184, 1911.

Southern Arizona and New Mexico, June, July and August.

Genus PHOEDINUS Godman & Salvin

Phoedinus G. & S., Biol. Cent.-Am., Rhop. II, 335, 1894. Type *Eudamus caicus* H.-S.

I was inclined for a time to unite this genus with *Cogia*, disregarding the tufted secondaries, but the large palpi with their conspicuous third joint serve to distinguish it so easily that it seems better to retain it. The spur vein is very faintly indicated near vein 4. There are no secondary sexual structures in the male.

1. *PHOEDINUS MYSIE*

Thorybes mysie Dyar, Jn. N. Y. Ent. Soc. XII, 40, 1904.
Skinner, Trans. Am. Ent. Soc. XXXVII, 181, 1911.

This species is not represented in the Barnes or Strecker collections, and I have seen nothing which answers the description. Apparently it is a *Phoedinus* with fuscous fringes and more spots on the primaries than *caicus*. It was described from the Patagonia Mts., Arizona.

2. *PHOEDINUS CAICUS*

Eudamus caicus H.-S., Corr.-Blatt Regensb. XXIII, 188, 1869.
Eudamus schaefferi Plötz, Stett. ent. Zeit. XLIII, 99, 1882.
Eudamus moschus Edw., Papilio II, 141, 1882.
Biol. Cent.-Am., Rhop. II, 335, pl. 80, ff. 18-20, 1894.
Skinner, Trans. Am. Ent. Soc. XXXVII, 183, 1911.

The fringes of the secondaries of this species are pure white, save at the apex and anal angle.

Arizona, July and August.

GROUP B

The second group of the subfamily Hesperiinae is distinguished from group A by the short cell of the primaries, the form of the antennal club, and the palpi. The cell is never over two-thirds as long as the wing, and is usually a little less; the antennal club is ovate or fusiform, usually somewhat flattened and more or less curved, but never bent as in most of the genera of group A and never with a distinct apiculus; the palpi are porrect or oblique, either large or with hairy vestiture or both. The only similar palpi in group A are found in the genus Plestia.

The genera of this group appear to be very poorly defined, owing to the structural variation of the species. If we split to the extent reached by some lepidopterists we can make a genus for practically every species, so the opposite course seems advisable, and I have therefore lumped a number of familiar genera to group species which appear to be related. This has resulted, especially in *Pholisora*, in the association of species which can easily be separated by structural differences, but in all cases these characters show a transition through the several species which causes me to regard them as unreliable for the separation of genera.

Key to the genera

1. Secondaries irregular, excavated opposite end of cell and before anal angle; not trigonate. Vein 2 of primaries nearer base of cell than to vein 3.....*Systasea*
   Not such insects.....2
2. Club of antennae long, slender, not distinctly flattened, and scarcely exceeding twice the diameter of the shaft.....3
   Club thicker in at least one direction.....4
3. Primaries slightly excavated below apex; humeral angle prominent, rounded.....*Eantis*
   Apex rectangular; humeral angle normal.....*Xenophanes*
4. Palpi large; third joint conspicuous; vestiture not roughly hairy .....*Pholisora*
   Palpi moderate to large; third joint not conspicuous or vestiture hairy.....5

5. Club of antennae elongate-ovate, flattened, blunt; species largely white or checkered.....*Hesperia*
   Club more or less fusiform and pointed.....6
6. Outer margin of primaries evenly rounded or nearly so...7
   Apex of primaries subtruncate or rectangular.....8
7. Vein 11 of primaries arising just beyond middle of cell and reaching costa before end of cell.....*Chiomara*
   Vein 11 arising at or beyond outer third of cell and ending in costa beyond end of cell.....*Thanaos*
8. Anal angle of primaries broadly rounded; outer and inner margins about equal.....*Melanthes*
   Anal angle sharply rounded; outer margin distinctly shorter than inner.....9
9. Cell narrow, about equal to distance between cell and costa .....*Grais*
   Cell normal, much wider than this distance.....*Timochares*

Genus HESPERIA Fabricius

Hesperia Fab., Ent. Syst. III, (1), 258, 1793. Type *Papilio malvae* Linn.

Pyrgus Hbn., Verz. bek. Schmett. 109, 1820. Type *Papilio syrichtus* Fab.

Heliopetes Billberg, Enum. Ins. 81, 1820. Type *Papilio arsalte* Linn.

Syrichtus Boisd., Icones 230, 1833. Type *Papilio proto* Esp.

Scelothrix Ramb. Cat. Lep. Andal. I, 63, 1858. Type *Papilio carthami* Hbn.

Leucoscirtes Scud., Syst. Rev. 52 (73), 1872. Type *Syrichtus ericetorum* Boisd.

Muschampia Tutt, Brit. Butterflies, I, 218, 1906. Type *Papilio proto* Esp.

Sloperia Tutt, Brit. Butterflies I, 218, 1906. Type *Hesperia poggei* Led.

Powellia Tutt, Brit. Butterflies I, 218, 1906. Type *Papilio sao* Berg.

Favria Tutt, Brit. Butterflies I, 218, 1906. Type, *Hesperia cribrellum* Eversman.

Bremeria Tutt, Brit. Butterflies I, 296, 1906. Type *Syrichtus bieti* Obth.

Palpi porrect; second joint with shaggy vestiture in some species, smooth in others, and of mixed scales and hair. Antennae slightly less than one-half as long as primaries; club elongate oval, flattened, blunt. Costa of primaries more or less flattened; outer margin rounded, sometimes evenly and sometimes more strongly toward the apex. Cell less than two-thirds as long as wing; vein 5 slightly nearer to 6 than to 4; position of 2 and 3 very variable. Secondaries broadly rounded with a slight indication of an anal lobe, to sub-trigonate with the outer margin

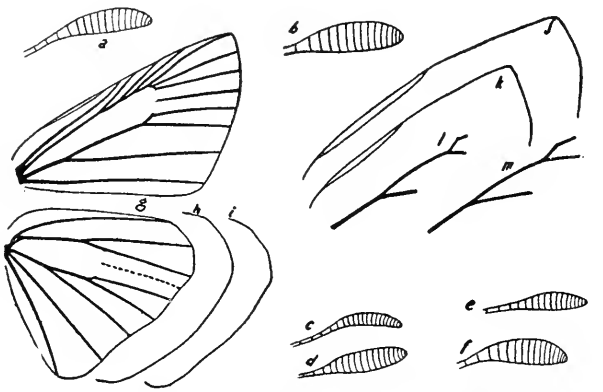


Fig. 11. *Hesperia.* Antennal clubs: a. *nivella*, b. *ericetorum*, c. and d. *tessellata*, two views, e. *syrichtus*, f. *macaira*, g. Neuration of *tessellata*, h. Outer margin of secondary of *syrichtus*, i. Outer margin of secondary of *nivella*, j. Costal margin and apex of primary of *nivella*, k. same of *syrichtus*, l. Detail of neuration, posterior margin of cell of *centaureae*, m. Same of *nivella*

slightly wavy. Secondary sexual characters of males the costal fold, tibial tuft, and abdominal lobes; one or more of these characters may be absent. Fig. 11.

The North American species have hitherto been placed in three genera, based chiefly on secondary sexual characters. Barnes and McDunnough made a step in advance by avoiding these characters in their Contributions III, pp. 121-2, where they remark: "A better means of separation of *Pyrgus* [including *syrichtus*, *montivaga* and *philetas*] from *Hesperia* (*Scelothrix*) than that given by Dyar, and one that would include both sexes appears to be found in the palpi; in *Pyrgus* they are only slightly upturned and the clothing under a strong lens is seen to be rather even and composed largely of scales with a few hairs

of equal length intermingled; in *Hesperia* the palpi are strongly upturned and very heavily and roughly clothed underneath with long hairs, the scales being confined to the lateral basal portion."

It is quite true that this furnishes a good basis for the separation of our species, and the general habitus of each group is also distinctive, but I have unidentified species of the genus from South America which have the habitus of *Hesperia* (sensu B. & McD.) and the palpi of *Pyrgus*. It seems that the only conclusion which will give a well founded classification is to adopt the genus *Hesperia* of many European writers.

I cannot expect unanimous approval of the sinking of *Heliopetes*, but after examining all of the species carefully and comparing them with those of *Hesperia* I am unable to point out any structure which does not find either its counterpart or a similar tendency in the latter genus. The pattern of *Hesperia* is easily traceable in *ericetorum* and *domicella*, both above and below; in *nivella*, *laviana* and *macaira* the under surface is puzzling, but the brown pattern may easily be a modification of a superficial vestiture such as that found in *syrichtus*, while the black marks are so scanty as to afford no comparison.

Key to the species

1. Upper surface of primaries with a broad white discal band or mostly white 8
   Band narrow and macular or not evident 2
2. Spots of primaries subquadrate, well separated 3
   Spots crowded, slender; with an additional row of spots beyond cell .. 6
3. Primaries with a triangular white spot in the angle of vein 2 and the cell 4
   This spot absent ..... *centaureae*
4. Male with fold; subterminal spots on under surface of secondaries deeply crescentic in most specimens, even when reduced in size .. *ruralis*
   Male without fold; subterminal spots never deeply crescentic, usually poorly defined 5
5. Under surface of secondaries without distinct contrasts, whitish; markings of upper surface usually reduced; a pale, glossy species .. *scriptura*
   Under surface with contrasting markings; upper surface with maculation rarely reduced; darker species ..... *xanthus, macdunnoughi*
6. Under surface of secondaries with two small submarginal lunules between veins 4 and 6 7
   These vague, fused with a marginal white patch or with each other ..... *tessellata*

7. Under surface of secondaries very pale, without sharp contrasts. *philetas*
   Maculation of under surface contrasting; under surface often powdered with brown scales. *syrichtus*
8. Basal third of wings dark. 9
   This area not more than slightly dark shaded. 10
9. Secondaries with a subterminal esries of large white crescents . . . . . *ericeteorum* ♀
   These crescents much reduced. *domicella*
10. Cell of secondaries below clear white. *nivella*
    Cell more or less brown. 11
11. Secondaries with broad smooth brown shades below. 12
    With a definite yellowish brown pattern, no broad shades. *ericetorum* ♂
12. Inside of outer shade oblique, almost straight. *laviana*
    Inside of outer shade curved with outer margin of wing. *macaira*

1. *HESPERIA CENTAUREAE* (Plate I, Figure 2)

Hesperia centaureae Rambur, Faun. Ent. Andal. II, 315, pl. 8, f. 10, 1840.
Hesperia wyandot Edw., Proc. Ent. Soc. Phil. II, 21, pl. 5, f. 4, 1863.
Scudder, Butt. New Eng. II, 1542, 1889.
Holland, Butterfly Book 327, pl. XLVII, f. 13, 1898.

N. Europe; Labrador, June and July. Ontario, Canada, May, July. New Jersey and Virginia, April and May. North Carolina, April. Colorado, August, 13000 ft. Male with costal fold and tibial tuft.

2. *HESPERIA RURALIS*

Syrichtus ruralis Boisd., Ann. Soc. Ent. France (2), X, 311, 1852.
Syrichtus caespitalis Boisd., op. cit., p. 312.
Hesperia ricara Edw., Proc. Ent. Soc. Phil. IV, 203, pl. I, f. 2, 1865.
Syrichtus petreius Edw., Trans. Am. Ent. Soc. III, 215, 1871.
Holland, Butterfly Book 328, pl. XLVII, f. 14, 1898.
Wright, Butterflies of the West Coast No. 458, pl. XXXI, 1905.
Oberthür, Etudesde Lep. Comp. VI, 339, pl. CXXXVII, ff. 1204, 1205, 1212, 1912 (types of *caespitalis* and *ruralis*).

Western North America from Texas to Alberta, April to July.

A smaller, darker species than the preceding. Male with fold and tuft.

3. *HESPERIA XANTHUS*

Pyrgus xanthus Edw., Field and Forest III, 142, 1878.
Holland, Butterfly Book 328, pl. XLVII, 15, 1898.

Colorado, July. *Xanthus* very closely resembles *ruralis* but most specimens have the subterminal maculation of the secondaries poorly defined and reduced as noted in the key, and the males lack the costal fold.

4. *HESPERIA MACDUNNOUGHI*

Syrichtus macdunnoughi Oberthür, Etudes IX, (2), 86, pl. CCLXIV, f. 2205, 1913.
B. & McD., Contributions III, (2), 122, pl. X, f. 14, 1916.

There are five specimens from Arizona in the Barnes collection under this name. Four I am unable to distinguish from *xanthus*; the remaining one has the secondaries pale below, as in *scriptura*.

5. *HESPERIA SCRIPTURA*

Syrichtus scriptura Boisd. Ann. Soc. Ent. France, (2), x, 312, 1852.
Holland, Butterfly Book 328, pl. XLVII, f. 12, 1898.
Wright, Butt. W. Coast 251, pl. XXXI, 459, 1905.
Oberthür, Etudes de Lep. Comp. VI, 339, pl. CXXXVII, p. 1206, 1207, 1912 (type f. 1206).

New Mexico, California, Colorado, April to June. This species is readily distinguished by the color of the under surface, its glossy appearance, and as a rule by the reduction of the maculation of the secondaries. As in the two preceding, the male has the tibial tuft but no costal fold.

6. *HESPERIA SYRICHTUS*

Papilio syrichtus Fab., Syst. Ent. 534, 1775.
Pyrgus montivagus Reakirt, Proc. Acad. Nat. Sci. Phil. 1866, 334.
Skinner, Ent. News XVII, 277, pl. XII, 1906.

Texas and Florida, June and July.

I have seen the type of *montivagus* in the Strecker collection and it is *syrichtus*, not *tessellata* as treated by many writers. I have a long series from Florida in which the under surface of the secondaries has a heavy superficial vestiture of brown scales in both sexes. Male with both costal fold and tibial tuft.

7. *HESPERIA PHILETAS* (Plate I, Fig. 7)

Pyrgus philetas Edw., Papilio I, 46, 1881.

Arizona and Texas, June to October.

8. *HESPERIA TESSELLATA*

Hesperia tessellata Scud., Syst. Rev. 52, (73), 1872.
Syrichtus communis Grote, Can. Ent. IV, 69, 1872.
H. montivaga Scud., (not Reakirt) Butt. New Eng. II, 1536, 1889.
Holland, Butterfly Book 327, pl. XLVII, f. 18, 1898.
Wright, Butt. W. Coast 250, pl. XXXI, 457, 1905.

Occurs from coast to coast and from the Gulf to northern Canada, April to October.

8a. *Race OCCIDENTALIS*

Pyrgus occidentalis Skinner, Ent. News XVII, 96, 1906.
Skinner, Ent. News XVII, 277, pl. XII, 1906.

California, Arizona and Texas. This form is scarcely worthy of a name, but may be regarded as a pale southwestern geographical race. I have not looked for differences in the genitalia.

9. *HESPERIA DOMICELLA*

Syrichtus domicella Erichson, Schomb., Reise. n. Guiana III, 604, 1848.
Pyrgus nearchus Edw., Papilio II, 26, 1882.
Holland, Butterfly Book 327, pl. XLVII, f. 19, 1898.
Arizona, August and September.

This and the four following species, formerly placed in *Heliopetes*, have both the costal fold and tibial tuft in the males.

10. *HESPERIA ERICETORUM* (Plate I, Fig. 4 ♂, 6 ♀)

Syrichtus ericetorum Boisd., Ann. Soc. Ent. France (2), X, 313, 1852.
Syrichtus alba Edw., Proc. Ent. Soc. Phil. VI, 206, 1866.
Wright, Butt. W. Coast 250 pl. XXXI, f. 456, 1905.
Oberthür, Etudes de Lep. Comp. VI, 339, pl. CXXXVII, f. 1210, 1912 (type).
California, April to August. Arizona, July.

11. *HESPERIA MACAIRA*

Pyrgus macaira Reakirt, Proc. Acad. Nat. Sci. Phil. 1866, 334.
Syrichtus oceanus Edw., Trans. Am. Ent. Soc. III, 213, 1871.
Leucochitonea locutia Hew., Exot. Butt., Leuch. t. 2, ff. 19, 20, 1875.
Brownsville, Texas; June.

12. *HESPERIA LAVIANA*

Leucochitonea laviana Hew., Desc. Hesp. 48, 1868.
Leucochitonea pastor Felder, Verh. z.-b. Ges. Wien XIX, 476, 1869.
Pyrgus leca Butler, Trans. Ent. Soc. London 1870, 510.
Texas, June and July.

13. *HESPERIA NIVELLA*

Leucoscirtes nivea Scud. (not *niveus* Cr.), Syst. Rev. 52 (73), 1872.
Leucoscirtes nivella Mab., Bull. Soc. Ent. Belg. XXVII, LV, 1883.
Leucochitonea orbigera Mab., Le Nat. X, 242, 1888.
Biol. Cent.-Am., Rhop. II, 446, pl. 90, ff. 22-24, 1897.
Brownsville, Texas; June.

Genus SYSTASEA Butler

Systasea Butler, Edw., Can. Ent. IX, 120, 1877. Type, *Leucochitonea pulverulenta* Folder.

Celotes G. & S., Biol. Cent.-Am., Rhop. II, 452, 1899. Type *Pholisora nessus* Edw.

Palpi porrect, moderate; second joint slightly hairy; third slightly drooping in dried specimens. Antennae about one-half as long as primaries; club moderate, curved, fusiform, rather blunt. Primaries with a costal fold in the male; costa slightly curved; outer margin curved, with a shallow excavation before

anal angle; inner margin slightly concave, scarcely longer than outer; U. D. C. short, M. D. C. and L. D. C. about equal. Vein 2 twice as far from 3 as from base of cell. Secondaries very irregular with emarginations opposite cell and before anal angle. As a rule the antennal club of *nessus* is slightly larger in proportion to the shaft than that of *pulverulenta* but it varies in each species. In spite of the difference in appearance of the two species I can find nothing to warrant placing them in different genera. It may be that tropical species exist which will fill in the gap between them. Fig. 12.

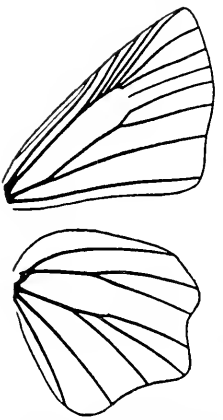


Fig. 12. Neuration of *Systasea pulverulenta* Feld

Key to the species

Terminal portion of wings with brown dashes..... .....*nessus*
This area without dashes.....*pulverulenta*

1. *SYSTASEA NESSUS*

Pholisora nessus Edw., Can. Ent. IX, 192, 1877.
Spilothyrus notabilis Streeker, Lep. Rhop. 131, 1878.
Biol. Cent.-Am., Rhop. II, 452, pl. 91, ff. 27, 28, 29, 1899.
Holland, Butterfly Book 329, pl. XLVII, f. 17, 1898.
Texas and Arizona, April to August.

2. *SYSTASEA PULVERULENTA*

Leucochitonea pulverulenta Feld., Verh. z.-b. Ges. Wien XIX, 478, 1869.
Hesperia zampa Edw., Trans. Am. Ent. Soc. V, 207, 1876.
Biol. Cent.-Am., Rhop. II, 413, pl. 87, ff. 24, 25, 1895.
Holland, Butterfly Book 329, pl. XLVI, f. 1, 1898.
Arizona, July and August. Texas, April and October.

Genus PHOLISORA Scudder

Pholisora Scud., Syst. Rev. 51, (72), 1872. Type *Papilio catullus* Fab.

Staphylus G. & S., Biol. Cent.-Am., Rhop, II, 429, 1896. Type *Helias ascalaphus* Staud.

Bolla Mabille, Gen. Ins. XVII, 72, 1903. Type — *pullata* Mab.

Hesperopsis Dyar, Jn. N. Y. Ent. Soc. XIII, 118, 1905. Type *Thanaos alpheus* Edw.

The species grouped in this genus offer a troublesome problem

in generic distinctions. *Bolla* was separated from *Pholisora* by Mabille on the basis of the more pointed club of the antennae. Dyar associates *Hesperopsis* in his description with *Hesperia* instead of *Pholisora* and calls attention to the long palpi, especially the long third joint, and the absence of the costal fold. I have bleached and mounted structures of *alpheus, libya, catullus, ceos* and *hayhurstii* and have found the following things to be true: In *alpheus* the third joint of the palpi is about three-fifths as long as the second and both are slender; the vestiture of the third joint makes it appear about twice as long as it really

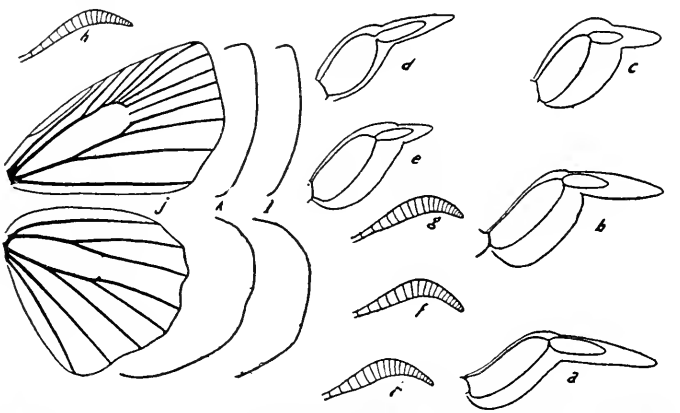


Fig. 13. *Pholisora.* Palpi: a. *alpheus*, b. *libya*, c. *catullus*, d. *ceos*, e. *hayhurstii*. Antennal clubs: f. *libya*, g. *catullus*, h. *ceos*, i. *hayhurstii*, j. Neuration of *hayhurstii*, k. and l. Outer margins of wings of *ceos* and *catullus*

is. *Libya*, associated with *alpheus*, has the third joint relatively shorter, both second and third thicker, the vestiture of the third similar and that of the second deeper. The entire appendage looks more like the palpus of *catullus* than *alpheus*. The eleventh vein of the primaries of *alpheus* arises well before the middle of the cell, while in all of the other species it arises near the middle, usually slightly beyond. *Ceos* differs from *catullus* in the relatively longer third palpal point and thicker second, and in the short vestiture of the third. In the shape of the wings it is intermediate between *catullus* and *hayhurstii* and farthest removed from *alpheus*. The antennal club is thickest in *alpheus* and most slender in *ceos*, but if the same aspect be compared the species are seen to differ but slightly. From this it

appears that there is no closer bond between *alpheus* and *libya* than between *libya* and *catullus*, while *ceos* varies in the opposite direction from *catullus* but in the structure of the palpi shows some affinity with the first two species. For these reasons I prefer to regard the group as one genus with a wide range of structural variation. In this sense *Pholisora* may be characterized as follows:

Palpi exceeding the front by the length of the head or more; second joint oblique, rather long, with moderate scaly vestiture; third porrect, slender, long. Antennae about one-half as long as primaries; club more or less tapered and blunt. Wings rounded; secondaries with or without a slight indention in the outer margin at the end of the cell and sometimes with a slight lobe at the anal angle. Neuration variable; vein 11 of primaries never much beyond middle of cell and vein 2 about the same distance from base of cell and vein 3; U. D. C. long, over half the length of M. D. C. Male with or without costal fold, never with tibial tuft. Fig. 13.

Key to the species

1. Primaries with a transverse series of dark dashes.....*alpheus*
   Primaries without dark dashes.....2
2. Secondaries with white spots below.....3
   Secondaries immaculate.....4
3. Under surface pale, yellowish; upper surface of primaries with transverse row of spots complete.....*lena*
   Under surface usually less pale and with numerous white spots when upper surface is heavily spotted; possibly not distinct from the preceding .....*libya*
4. Head and palpi ochreous.....*ceos*
   Head and palpi dark, concolorous with body.....5
5. Upper surface of an even shade.....6
   With faint, dark, transverse bands.....7
6. Undersurface brownish black.....*catullus*
   Under surface grayish glaucous.....*mejicanus*
7. Primaries with hyaline subapical spots.....*hayhurstii*
   No such spots.....*brennus*

1. *PHOLISORA ALPHEUS*

Thanaos alpheus Edw., Trans. Am. Ent. Soc. v, 206, 1876.
Pholisora oricus Edw., Can. Ent. xi, 51, 1879.
Biol. Cent.-Am., Rhop. ii, 442, pl. 90, f. 15, 1897.
Holland, Butterfly Book 331, pl. xlv, f. 2, 1898.

Wright, Butt. W. Coast 235, pl. XXX, f. 407, 1905.
Arizona, New Mexico, and Colorado, March to July.

2. *PHOLISORA LIBYA*

Heteropterus libya Scud., Bull. Geol. Surv. Terr., IV, 258, 1878.
Holland, Butterfly Book 331, pl. XLVIII, f. 14, 1898.
Wright, Butt. W. Coast 234, pl. XXX, f. 406, 1905.
California, June and October. Utah, July. Arizona, April.

3. *PHOLISORA LENA*

Ancyloxypha lena Edw., Can. Ent. XIV, 5, 1882.

There is one specimen in the Barnes collection which appears to be *lena* and is possibly a good species. It is rather pale in color, but this may be due to fading. On the upper surface it resembles a heavily maculate specimen of *libya* while below it has only a few spots. *Libya*, when heavily spotted above, is also well marked below. The one specimen is from Miles City, Montana, the type locality.

4. *PHOLISORA CATULLUS*

Hesperia catullus Fab., Ent. Syst. III, (1), 348, 1793.
Scud., Butt. New Eng. II, 1519, 1889.
Holland, Butterfly Book, 330, pl. XLV, f. 4, 1898.
Wright, Butt. W. Coast 234, pl. XXX, f. 403, 1905.
United States and Southern Canada, April to October.

5. *PHOLISORA MEJICANUS*

Nisoniades mejicanus Reakirt, Proc. Acad. Nat. Sci. Phil. 334, 1866.
Biol. Cent.-Am., Rhop. II, 441, pl. 90, ff. 11, 12, 1897.
Las Vegas, N. M.

The upper surface is practically the same as *catullus* but the glaucous gray appearance of the lower surface is unmistakable.

6. *PHOLISORA CEOS*

Pholisora ceos Edwards, Papilio II, 140, 1882.
Biol. Cent.-Am., Rhop. II, 432, pl. 89, ff. 7, 8, 1896.
Arizona, July.

7. *PHOLISORA HAYHURSTII*

Hesperia hayhurstii Edw., Trans. Am. Ent. Soc. III, 22, 1870.
Scudder, Butt. New Eng. III, p. 1857, 1889.
Biol. Cent.-Am., Rhop. II, 433, pl. 89, f. 16, gen., 1896.
Holland, Butterfly Book, 331, pl. XLVIII, f. 16, 1898.
Florida, north and west to Minnesota and Texas, March to October. Some specimens have merely a trace of the subapical spots.

8. *PHOLISORA BRENNUS*

Nisoniades brennus G. & S., Biol. Cent.-Am., Rhop. II, 434, pl. 89, f. 23, gen., 1896. (Mabille in litt.).

Skinner, Ent. News XII, 171, 1901.

I do not know this species. It is said to occur in our country along the Mexican border.

Genus EANTIS Boisduval

Eantis Boisd., Spec. Gen. pl. 13, f. 6, 1836. Type *Urbanus vetus thraso* Hübner.

Palpi porrect; second joint rather large, densely and smoothly scaled; third small, distinct. Antennae about one-half as long as primaries; club extremely slender and long, the tip curved. Costa of primaries rounded in basal half and almost straight to apex; outer margin excavated below apex, thence well rounded to anal angle; cell about three-fifths as long as wing; vein 5 intermediate between 4 and 6. Secondaries roughly quadrate; costa and inner margin curved, outer bent to an obtuse angle between 3 and 4 and produced between 6 and 7. Fig. 14.

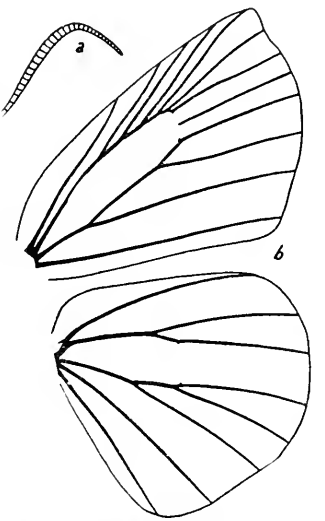


Fig. 14. *Eantis thraso* Hbn. a. Club of antennae. b. Neuration

1. *EANTIS THRASO* (Plate I, Fig. 8)

Urbanus vetus thraso Hbn., Samml. exot. *Schmett*, I, t. 151 ff. 1-4, 1807-16.

Hesperia tamenund Edw., Trans. Am. Ent. Soc. III, 215, 1871.

Biologia Cent.-Am., Rhop. II, 405, pl. 87, f. 7, ♂ gen., 1895.

Texas, May and July.

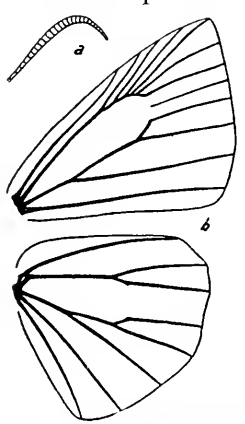


Fig. 15. *Xenophanes tryxus* Cramer. a. Club of antenna. b. Outline of wings

Genus *XENOPHANES Godman* & Salvin

Xenophanes G. & S., Biol. Cent.-Am., Rhop. II, 387, 1895. Type *Papilio tryxus* Cramer.

Palpi oblique; third joint moderate,

conical, not concealed. Club of antennae very slender, curved. Costa of primaries slightly curved; apex rectangular; inner margin nearly straight, outer slightly convex between apex and vein 2, thence nearly straight to anal angle. Costal fold absent. Cell less than two-thirds as long as wing; vein 5 intermediate; 2 slightly nearer to base of wing than to 3. Secondaries broadly rounded; inner margin nearly straight, anal angle sub-rectangular; outer margin slightly concave between veins 4 and 6 and very slightly between 1b and 2. Vein 5 present, very weak; 2 about as near to base of wing as to 3. Fig. 15

1. *XENOPHANES TRYXUS* (Plate I, Fig. 3)

Papilio tryxus Cramer, Pap. Exot. IV, 87, pl. CCCXXXIV, G, H, 1781.
Biol. Cent.-Am., Rhop. II, 387, pl. 85, f. 18, ♂ gen., 1895.

Brownsville, Texas, July.

The species is easy to recognize in our fauna by the many hyaline spots in the discal area of both wings.

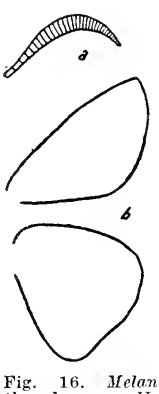


Fig. 16. *Melanthes brunnea* H.-S. a. Club of antenna. b. Outline of wings

Geneus MELANTHES Mabille

Melanthes Mab., Gen. Ins. XVII, 80, 1904. Type *Nisoniades brunnea* H.-S.

In general structure this genus is close to *Thanaos* but the secondaries are relatively a little larger the outer margin of the primaries longer and more oblique, the apex more produced and rectangular and the anal angle more broadly rounded. The antennae are moderate and the club fusiform, sharply pointed and evenly curved. Fig. 16.

1. *MELANTHES BRUNNEA* (Plate I, Fig. 10)

Nisoniades brunnea H.-S., Corr.-Blatt. Regensb. XVIII, 172, 1864.

Skinner, Ent. News XIV, 110, 1903.

I have this species from Cuba but Dr. Skinner's record, Sugar Loaf Key, Fla., is the only one which has reached me concerning its occurrence in the United States. The even brown shade of the wings, with a few hyaline points on the primaries, is characteristic.

Genus CHIOMARA Godman & Salvin

Chiomara G. & S., Biol. Cent.-Am., Rhop. II, 453, 1899. Type. *Achlyodes mithrax* Möschler.

Similar to *Thanaos*; outer margin of primaries only two-thirds

as long as inner, strongly curved; vein 11 arising just beyond middle of cell and reaching costa before end of cell. Male with tibial tuft but no costal fold. Fig. 17.

Gesta appears to belong in *Thanaos*; the figure of the genitalia in the Biologia is distinctly of the *Thanaos* type.

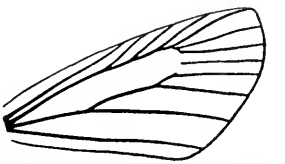


Fig. 17. *Chiomara asychis* Cramer. Neuration of primary

1. *CHIOMARA ASYCHIS*

Papilio asychis Cramer, Pap. Exot. IV, 87, pl. CCCXXXIV, E, F, 1781.

Pyrgus georgina Reakirt, Proc. Acad. Nat. Sci. Phil. 1868, 88 (fide G. & S.).

Biol. Cent.-Am., Rhop. II, 453, pl. 91, ff. 1, 2, 3, 1899; p. 741, 1901.

Texas, Arizona, October. I have one specimen from Corumba, Brazil, taken in March.

Genus THANAOS Boisduval

Thanaos Boisd., Icones 240, 1832-3. Type *Hesperia juvenalis* Fab.

Scudder and Burgess, Proc. Bost. Soc. Nat. Hist. XIII, 282-306, pl. 1870.

Skinner, Trans. Am. Ent. Soc. XL, 195-221, 1914.

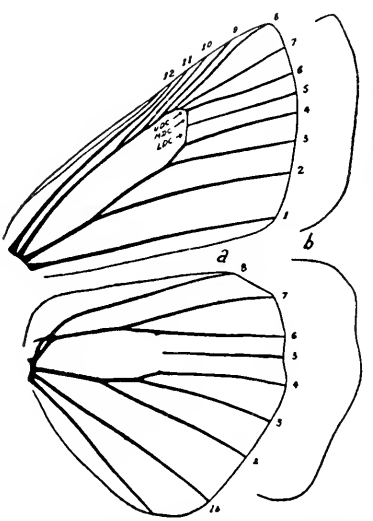


Fig. 18. *Thanaos*. a. Neuration of *juvenalis*, b. Outer margins of wings of *funeralis*

Palpi large, exceeding front by about length of head; vesture shaggy; third joint stout and roughly scaled. Antennae moderate; club fusiform, curved. Costa of primaries slightly convex, flattened along fold; outer margin in most species evenly rounded, in some more strongly curved opposite cell; relative width of primaries variable. Cell scarcely two-thirds as long as wing; vein 5 intermediate, 7 to 11 in the distal third of the cell, 11 ending beyond end of cell U. D. C. less than half as long as M. D. C. Secondaries variable in size and shape, broad out-

er margin rounded to wavy; costal fold present except in *gesta*. Hind tibiae of male with tufts in a few species. Fig. 18.

A key to the species of *Thanaos* based on superficial characters is of comparatively little use, for the species are closely related and there are few which do not intergrade with others. The following key is based on fairly typical specimens, but in a long series I have found many which could not be definitely placed by it, so I have thought it wise to speak a word of caution regarding its use. The genitalia of the males offer the ultimate means of determination, and since they can usually be examined fairly well by brushing away the scales from the tip of the abdomen and using a hand lens or binocular, their use in classification of the species should be practiced.

Key to the species

1. Fringes of hind wings white....13
   Fringes never white....2
2. Primaries without distinct hyaline spots, sometimes with one or two clouded spots next to costa....3
   Primaries with at least a subapical row of hyaline spots (or with very dark wings, *terentius* ♂)....5
3. Expanse under thirty mm; ♂ with tibial tuft; apex of primaries rather sharply angled....*icelus*
   Expanse usually over thirty mm; no tuft in male; apex of primaries more obtuse and outer margin more rounded....4
4. Gray powdering heavier toward apex of primaries; distribution general....*brizo*
   Primaries usually evenly powdered with gray scales; inner part of median band usually obsolete or broken; Southwestern and Californian species....*burgessi, lacustra*
   Powdering scant or absent; dark marks of primaries united to form broad bands; under surface without distinct spots; ♂ with tuft but no fold; southwestern species....*gesta*
5. Under surface of secondaries with two pale subapical spots, or at least a trace of them....6
   No subapical spots....7
6. Gray vestiture mostly of fine hairs....*propertius*
   Gray vestiture scaly....*juvenalis*
7. Hyaline spots large, at least a trace of one in end of cell; dark markings of primaries contrasting (♀), or spots lacking; primaries with little or no gray vestiture (♂)....*horatius*
   Spots small, color very dark, or gray powdering conspicuous....8
8. Very dark, sometimes with a brownish patch at end of cell; maculation obscure; ♂ with tibial tuft....*terentius*
   Tuft absent; marks more or less contrasting....9

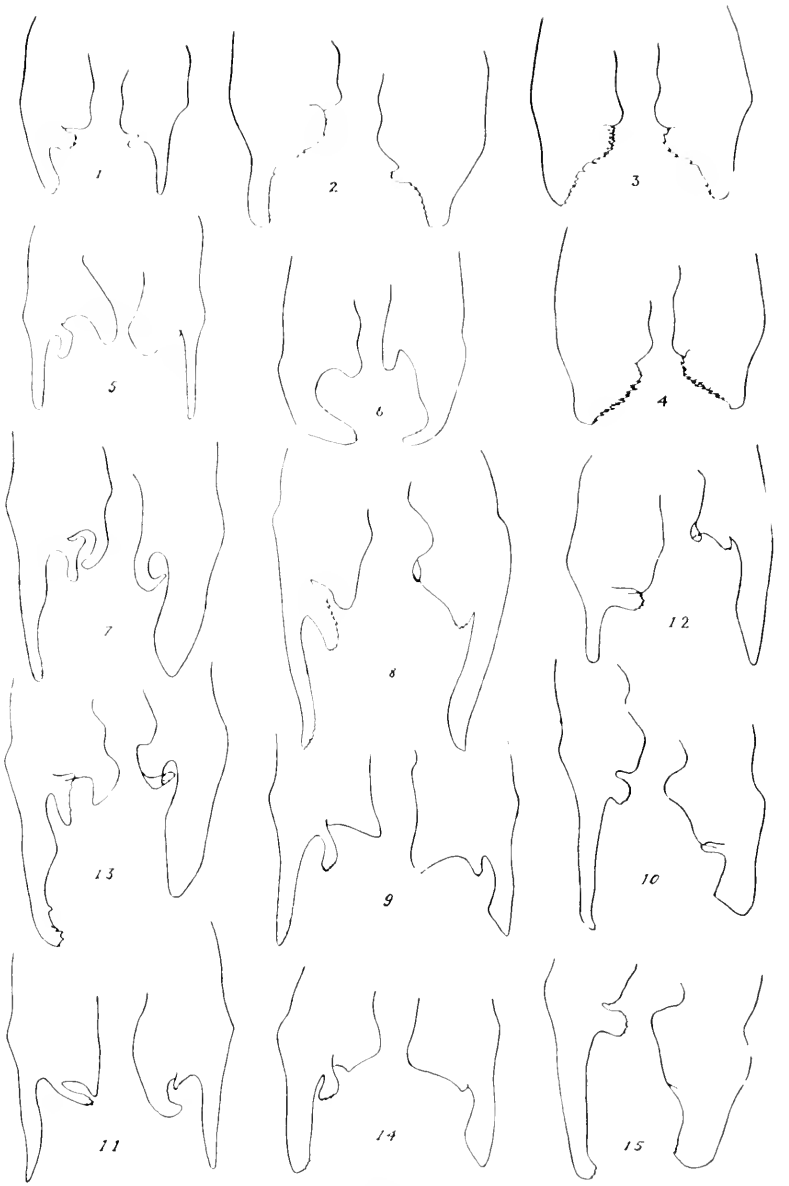


PLATE 11

MALE GENITALIA OF THANAOS

The figures are mere outlines of the claspers viewed from the outside, omitting spines and other vestiture. The right and left drawings of each figure are the right and left claspers, respectively.

1. Thanaos icelus Lint. 2. Thanaos brizo Bd. & Lec. 3. Thanaos burgessi Skinner. 4. Thanaos lecnstra Wright. 5. Thanaos persius Scudder. 6. Thanaos martialis Scudder. 7. Thanaos juvenalis Fab. 8. Thanaos propertius Scud. & Burg. 9. Thanaos horatius Scud. & Burg. 10. Thanaos terentius Scud. & Burg. 11. Thanaos pacuvius Lint. 12. Thanaos scudderi Skinner. 13. Thanaos elitus Edw. 14 Thanaos tristis Boisd. 15. Thanaos funeralis Scud. & Burg.

9. Dark marks conspicuous, secondaries checkered; fresh specimens with a purplish lustre.....*martialis*
Not such insects.....10
10. Larger, marks more or less obscured toward base of primaries.....*persius, pernigra*
Usually smaller, marks more evenly distinct over entire wing.....11
11. Fringes usually evenly colored.....12
Fringes pale tipped; western form.....*persius*, race *afranius*
12. Secondaries with pale spots below clear cut.....*lucilius*
Spots absent or diffuse; western species.....*callidus*
13. Tufts of dark scales in base of white fringe all along outer margin.....*scudderi, pacuvius*
Rarely with a suggestion of such tufts.....14
14. Primaries narrower than normal; ♂ with tibial tuft.....*funeralis*
Primaries normal, no tuft.....*tristis, clitus*
Under surface of secondaries with some white inside of fringe.....*tristis*, var. *tatius*

1. *THANAOS ICELUS*

Nisoniades icelus Scudder & Burgess, Proc. Bost. Soc. Nat. Hist. XIII, 288, 1870.

Lintner, 23rd Ann. Rep. N. Y. St. Cab. Hist. 162, pl. 7, ff. 5, 6, 1872.

Scudder, Butt. New Eng. II, 1507, 1889.

Holland, Butterfly Book 333, pl. XLVIII, 17, 1898.

Arizona, Colorado, Massachusetts, Pennsylvania and southern Canada; May to July. Athabaska and Mackenzie, June (Cary). North Carolina, April (Brimley & Sherman).

2. *THANAOS BRIZO*

Thanaos brizo, Boisd. & Lec., Lep. Am. Sept. pl. 66, 1833.

Scudder, Butt. New Eng., II, 1500, 1889.

Holland, Butterfly Book 332, pl. XLV, f. 7, 1898.

Atlantic coast to Rocky Mountains, Gulf to Southern Canada; April to July. Eastern specimens of this species are easy to identify, but it is difficult to separate *burgessi, lacustra* and *brizo* when all are from the same locality.

2a. race *SOMNUS*

Nisoniades somnus Lintner, Papilio I, 73, 1881.

Florida, February and April. This is merely a very dark form of *brizo*.

3. *THANAOS BURGESSI*

Thanaos burgessi Skinner, Trans. Am. Ent. Soc. XL, 203, 1914.

Arizona and New Mexico; March, April and August.

4. *THANAOS LACUSTRA*

Nisoniades lacustra Wright, Butt. W. Coast 253, pl. XXXII, 480, 1905.

California, June. This is not a form of *brizo*, as has been stated, but is

more nearly related to *burgessi*, though the genitalia differ enough to warrant regarding it as a distinct species.

5. *THANAOS GESTA*

Thanaos gesta H.-S., Corr.-Blatt Regensb. XVII, 142, 1863.
Thanaos invisus Butler & Druce, Cist. Ent. I, 114, 1872.
Biol. Cent.-Am., Rhop. II, 455, pl. XCI, ff. 7, 8, 9, 1899.
Nisoniades llano Dodge, Can. Ent. XXXV, 78, 1903.

Texas and Arizona; July.

6. *THANAOS PERSIUS*

Nisoniades persius Scudder, Proc. Ess. Inst. III, 170, 1863.
Scudder, Butt. New Eng. II, 1468, 1889.
Holland, Butterfly Book 334, pl. XLVIII, f. 1, 1898.

The typical form has an expanse of about thirty-five millimeters and is dark and obscurely marked, especially on the basal half of the wings. It occurs throughout the United States and north into Alaska; May to August.

6a. race *PERNIGRA*

Thanaos pernigra Grinnell, Ent. News XVI, 34, 1905.

California, July. A very dark Pacific Coast race.

6b. race *AFRANIUS*

Nisoniades afranius Lintner, 30th Rep. N. Y. Mus. Nat. Hist. 175, 1877.

California, Utah, Colorado, Arizona; May, July and August. *Afranius* does not exceed thirty millimeters and is rather distinctly marked and gray powdered; the fringes are pale, sometimes almost white, at their tips.

6c. race *LUCILIUS*

Nisoniades lucilius Scudder & Burgess, Proc. Bost. Soc. Nat. Hist. XIII, 287, 1870.
Lint., 23rd Rep. N. Y. St. Cab. Nat. Hist. 164, pl. 7, ff. 1, 2, 1872.
Scudder, Butt. New Eng. II, 1458, 1889.
Holland, Butterfly Book 333, pl. XLVIII, f. 10, 1898.

Northeastern United States and southeastern Canada, April and May. Dr. W. T. M. Forbes has kindly identified slides of genitalia in my possession as *lucilius*, which he regards as a species. I am unable to agree with this and follow Skinner in placing it as a race of *persius*, though a careful study of the early stages may show it to be distinct. It is usually smaller than *persius* and more distinctly marked.

7. *THANAOS CALLIDUS*

Thanaos callidus Grinnell, Ent. News XV, 114, 1904.
McDunnough, Ent. News XXVIII, 232, 1917.

After an eventful and troublesome career *callidus* has at last been run down by Dr. McDunnough. It proves to be a good species, treated as *lilius* Dyar by Skinner in his "Studies in the Genus Thanaos." The two

names may apply to the same thing, but in that case *callidus* has priority. The genitalia resemble those of *pacuvius*. California, June and July.

8. *THANAOS MARTIALIS*

Nisoniades martialis Scudder, Trans. Chi. Acad. Sci. I, 335, 1869.
Scudder, Butt. New Eng. II, 1493, 1889.
Holland, Butterfly Book 335, pl. XLVIII, f. 4, 1898.

New York, west to Colorado and north into Canada; May, July, August.

Dr. Forbes tells me that eastern specimens of this species have a brassy lustre, but all which I have seen from the middle west were decidedly purplish. The unusually bright, contrasting pattern is the most reliable characteristic.

ab. *AUSONIUS*

Nisoniades ausonius Lint., 23rd Rep. N. Y. St. Cab. Nat. Hist. 166, pl. 7, ff, 11, 12, 1872.
Scudder, Butt. New Eng. II, 1498, 1889.

Ausonius lacks the subapical hyaline spots and has the transverse series of dark dashes unusually prominent. It was described from a single specimen taken at Center, N. Y., on May 12, 1871, and has never been taken since.

9. *THANAOS JUVENALIS*

Hesperia juvenalis Fab., Ent. Syst. III, (I), 339, 1793.
Nisoniades juvenis Hbn., Verz. bek. Schmett. 108, 1820.
Nisoniades costalis Westw. & Hew., Gen. Diurn. Lep. II, 519, pl. 79, f. 3, 1852.
Nisoniades ennius Scud. & Burg., Proc. Bost. Soc. Nat. Hist. XIII, 296, f. 9, 1870.
Scudder, Butt. New Eng. II, 1476, 1889.
Holland, Butterfly Book 335, pl. XLVIII, f. 11, 1898.
Wright, Butt. W. Coast 252, pl. XXXII, 462 ♀, 469 ♂ (not ♀ *tristis*), 1905.

Atlantic coast to Rockies, Gulf to Northern Canada; May to August.

10. *THANAOS PROPERTIUS*

Nisoniades propertius Scud. & Burg., Proc. Bost. Soc. Nat. Hist. XIII, 298, f. 11, 1870.
Nisoniades tibullus Scud. & Burg., op. cit., p. 299, f. 12.
Wright, Butt. W. Coast 252, pl. XXXII, f. 463, 1905.

Texas, Arizona, California and north into Canada; June, July and August. The abundance of hairy gray vestiture in specimens which have not been badly rubbed is very characteristic.

10a. race *BOREALIS*

Thanaos propertius, var. *borealis* Cary, Proc. U. S. N. M. XXXI, 455, 1906.

Type one male from North Nahanni River, Mackenzie, June 4, 1904. Apparently this is a dark race with the pale maculation greatly reduced.

11. *THANAOS HORATIUS*

Nisoniades horatius Scud. & Burg., Proc. Bost. Soc. Nat. Hist. XIII, 301 f. 13, 1870.

Nisoniades virgilius Scud. & Burg., op. cit. p. 302, f. 14.

Nisoniades petronius Lint., Papilio I, 70, 1881.

Scudder, Butt. New Eng. II, 1486, 1889.

Holland, Butterfly Book 336, pl. XLVIII, f. 15, 1898.

Florida and Texas, north to Colorado and Minnesota; May, July, August, October. The females are conspicuously marked but the males resemble *juvenalis* closely.

12. *THANAOS TERENTIUS*

Nisoniades terentius Scud. & Burg., Proc. Bost. Soc. Nat. Hist. XIII, 292, f. 6, 1870.

Nisoniades ovidius Scud. & Burg., op. cit. 295, f. 8.

Nisoniades naevius Lintner, Papilio I, 69, 1881.

Scudder, Butt. New Eng. II, 1490, 1889.

Holland, Butterfly Book 336, pl. XLVIII, f. 3, 1898.

Florida, April, May and July. South Carolina, May. Mississippi, August. The very dark, even color of this species is easy to recognize, and as a rule the brown patch on the primaries is conspicuous.

13. *THANAOS PACUVIUS*

Nisoniades pacuvius Lint., 30th Rep. N. Y. Mus. Nat. Hist. 172, 1878.

Holland, Butterfly Book 336, pl. XLVIII, f. 9, 1898.

California, Arizona, New Mexico and Colorado; March, May, June and August.

14. *THANAOS SCUDDERI*

Thanaos scudderi Skinner, Trans. Am. Ent. Soc. XL, 215, 1914.

Thanaos pacuvius G. & S. (not Lintner), Biol. Cent.-Am., Rhop. II, 458, pl. 91, ff. 16, 17, 1899.

Texas and Arizona, July and August. I am unable to separate this species from *pacuvius* except by the structure of the male genitalia. Skinner points out a slight difference in the hyaline spots.

15. *THANAOS CLITUS*

Thanaos clitus Edw., Papilio II, 180, 1882.

Thanaos maestus G. & S., Biol. Cent.-Am., Rhop. II, 457, t. 91, f. 18, ♂ gen., 1899.

Holland, Butterfly Book 336, pl. XLV, f. 8, 1898.

Arizona, May to August; California and Colorado.

16. *THANAOS TRISTIS*

Thanaos tristis Boisd., Ann. Soc. Ent. France (2), X, 311, 1852.

Oberthür, Etudes IX, (1), pl. CCXL, f. 2081, 1913, figure of type.

California, June and August. Arizona.

form *TATIUS*

Thanaos tatius Edw., Papilio II, 179, 1882.
Arizona, April, June, July, September.

17. *THANAOS FUNERALIS*

Nisoniades funeralis Scud. & Burg., Proc. Bost. Soc. Nat. Hist. XIII, 293, f. 7, 1870.
Holland, Butterfly Book 336, pl. XLVIII, f. 12, 1898.
Wright, Butt. W. Coast 253, pl. XXXII, f. 468 and 464 (not *clitus*), 1905.

California, June. Arizona, Texas and Colorado, June and July. March in the far south. The rather narrow primaries, of a dull, brownish color, and the broad secondaries are unlike the other species of the genus.

The two following species cannot be fixed at present to any known form:

18. *THANAOS PLAUTUS*

Nisoniades plautus Scud. & Burg., Proc. Bost. Soc. Nat. Hist. XIII, 304, f. 16, 1870.

Described from Florida. The figure of the genitalia has some points of similarity with the genitalia of *juvenalis*.

19. *THANAOS LILIUS*

Thanaos lilius Dyar, Proc. U. S. N. M. XXVII, 788, 1904.

Dyar states (Jn. N. Y. Ent. Soc. XIII, 122) that the genitalia of *lilius* are similar to those of *tibullus* (=*propertius*), while Skinner's description of them in his "Studies" suggests those of *callidus*, which was not correctly fixed at the time when his paper was written. Apparently *lilius* will fall before one of these two species, but an examination of the genitalia of the type will be necessary to settle the matter. I am greatly indebted to Dr. McDunnough for his notes on these species, for all data which I am able to give here are based on his researches.

Genus TIMOCHARES Godman & Salvin

Timochares G. & S., Biol. Cent.-Am., Rhop. II, 417, 1896. Type *Leucochitonea trifasciata* Hew.

Palpi moderately large, much as in *Thanaos*, with a hairy second joint and a stout, conical third joint. Antennae less than one-half as long as primaries; club moderate, fusiform, curved. Costa of primaries convex, with a long fold in the male; apex rectangular, subtruncate; outer margin rounded from vein 6 to anal angle. Secondaries trigonate; inner margin about as long as wing measured through cell; outer margin

wavy. Neuration practically as in *T. juvenalis*. *T. funeralis* is structurally very close to this genus, but the apex of the primaries is never distinctly subtruncate and the anal angle is much more broadly rounded.

1. *TIMOCHARES RUPTIFASCIATUS*

Antigonus ruptifasciatus Plötz, Jahrb. Nass. Ver. XXXVII, 27, 1884.
Biol. Cent.-Am., Rhop. II, 418, pl. 88, pp. 1, 2, 1896.

I have seen one male from Brownsville, Texas, in the Barnes collection.

Genus GRAIS Godman & Salvin

Grais G. & S., Biol. Cent.-Am., Rhop. II, 381, 1894. Type *Anastrus stigmaticus* Mab.

The structure of this genus is very similar to that of the preceding, but the cell of the primaries is of almost equal width throughout, and is approximately equal to the distance between cell and costa. The male has neither costal fold nor tibial tuft.

1. *GRAIS STIGMATICUS*

Anastrus stigmaticus Mab., Bull. Soc. Ent. Belg. XXVI, LIV, 1883.
Antigonus fumosus Plötz, Jahrb. Nass. Ver. XXXVII, 26, 1884.
Biol. Cent.-Am., Rhop. II, 381, pl. 84, ff. 24, 25, 26, 1894.

Kerrville, Texas; September.

Subfamily PAMPHILINAE

Palpi usually upturned; in a few genera porrect. Antennae very variable in length; club usually short and stout with a very slender apiculus but sometimes longer; apiculus sometimes thick or absent. Primaries more or less trigonate; secondaries trigonate to rounded and lobed. Neuration as in the Hesperiinae but with the L. D. C. usually tubular and vein 5 curved toward the base in the primaries, arising nearer to 4 than to 6. Front tibiae usually with the epiphysis; middle tibiae usually with conspicuous spines; hind tibiae usually with two pairs of spurs and never with a tuft. In the species of group A the spinulation of the mid tibiae furnishes a convenient means for separating the insects from the Hesperiinae. Males often with stigma on primaries.

The loss of the apiculus in the Pamphilinae seems to have been brought about by its gradual reduction, a process of evolution which is nicely illustrated by the transition from *Oligoria* to

Chaerephon in Group B. I regard this as furnishing the phylogenetic basis for the separation of Group A from the Hesperiinae, which makes it necessary to explain their resemblance by parallel or convergent evolution.

In place of the two groups into which the Pamphilinae have commonly been divided I believe that a modification of the system used in the Biologia will be of greater convenience. I have therefore divided our fauna into four groups which are characterized as follows:

Group A. Palpi porrect. Vein 5 of primaries straight, intermediate between 4 and 6; cell less than two-thirds as long as wing. Club of antennae blunt. *Carterocephalus* and *Butleria.*

Group B. Palpi upturned; third joint long and slender. Antennae short; club blunt. Vein 5 of primaries curved slightly toward 4 at base. Cell less than two-thirds as long as wing. *Ancyloxypha, Oarisma, Adopaea* and *Copaeodes.*

Group C. Palpi appressed or oblique; third joint moderate or small, long in *Amblyscirtes.* Antennae with a slender apiculus in most genera. Vein 5 of primaries curved at base, usually arising much nearer to 4 than to 6. Cell less than two-thirds as long as wing. All North American genera not included in A, B and D.

Group D. Palpi closely appressed, smoothly and deeply scaled; third joint small. Club of antennae stout, with a fine, abruptly constricted apiculus. Vein 5 arising much nearer to 4; cell about two-thirds as long as wing and with at least a rudiment of a recurrent vein. *Thespieus, Calpodes* and *Prenes.*

GROUP A

Key to the genera

Hind tibiae with one pair of spurs.....*Carterocephalus*
Hind tibiae with two pairs of spurs.....*Butleria*

Genus CARTEROCEPHALUS Lederer

Carterocephalus Led., Verh. z.-b. Ges. Wien II, 26, 49, 1852.

Type: *Papilio palaemon* Pallas.

Second joint of palpi oblique, loosely clothed with long hairs; third slender, moderately long, enveloped by hairs of second. Antennae less than one-half as long as primaries; club large,

elongate ovate, flattened on its posterior surface, blunt. Primaries trigonate with the outer margin rounded, rather narrow. Vein 5 intermediate between 4 and 6; L. D. C. not tubular, faint. Seeondaries rounded; apex prominent and anal angle slightly produced. Hind tibiae with one pair of spurs; middle tibiae spined. Males without secondary sexual structures. Fig. 19.

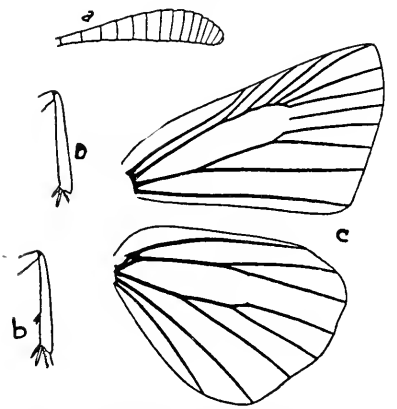


Fig. 19. *Butleria pirus* Edw. a. Club of antenna, b. Hind tibia, c. Neueration, d. Hind tibia of *Carterocephalus palaemon* Pallas

1. *CARTEROCEPHALUS PALAEMON*

Papilio palaemon Pallas, Reise I, 471, 1771.

Papilio paniscus Fab., Syst. Ent. 531, 1775.

Papilio brontes Denn. & Schiff. Wien Verz. 160, 1776.

Hesperia mandan Edw., Proc. Ent. Soc. Phil. II, 20, pl. V, f. 1, 1863.

Hesperia mesapano Scud., Proc. Bost. Soc. Nat. Hist. XI, 383, 1868.

Cyclopides skada Edw., Trans. Am. Ent. Soc. III, 196, 1870.

Stereoptes skada Edw., Trans. Am. Ent. Soc. III, 214, 1871.

Scudder, Butt. New Eng. II, 1569, 1889.

Elwes & Edwards, Rev. Or. Hesp. 167, 1897.

Holland, Butterfly Book 342, XLVII, f. 1, 1898.

Canada, Mountains of New England and Rocky Mountains; June. California, Montana. Europe and Asia. Fort Providence, Mackenzie, July (Cary). Yukon Territory (Winn).

Genus BUTLERIA Kirby

Butleria Kirby, Syn. Cat. 624, 1871. Type *Carterocephalus exornatus* Felder.

Dalla Mab., Gen. Ins. XVII, 107, 1904. Type *Cyclopides eryonas* Hew.

Very similar in structure to *Carterocephalus* but with two pairs of spurs on the hind tibiae. Fig. 19.

Butleria was first characterized by Watson (P. Z. S. 1893, 79) but aeeording to Mabille his description does not fit the genotype. Mabille in turn eharacterized the genus to eorrespond with the typieal speeies in vol. XVII of the Genera Insectorum,

page 106, at the same time dividing it and naming one part *Dalla*. Such differences as he mentions between the two seem to be slight and transitional through the series of species included, and I therefore sink *Dalla*. The description of *Dalla* does not apply to our species as well as Mabille's diagnosis of *Butleria*, so if the genera be separated again there is a possibility that *Butleria*, and not *Dalla* will still be applicable in our region.

Key to the species

Under surface of secondaries immaculate.....*pirus*
With a number of small pale spots.....*microsticta*
With a few large spots.....*polingi*

1. *BUTLERIA PIRUS*

Pholisora pirus Edw., Field and Forest III, 119, 1878.
Colorado, Utah, Arizona; June, July.

2. *BUTLERIA MICROSTICTA*

Butleria microsticta G. & S., Biol. Cent.-Am., Rhop. II, 464, pl. 92, ff, 1, 2, 3, 1900.

I have seen no specimens; the species is said to occur near the Mexican border.

3. *BUTLERIA POLINGI*

Pyrgus polingi Barnes, Can. Ent. XXXII, 44, 1900.
Arizona, June and July.

GROUP B

Key to the genera

1. Wings broadly rounded.....*Ancyloxypha*
   Wings more or less trigonate.....2
2. All wings trigonate; male without stigma; club of antennae about as long as shaft.....*Oarisma*
   Males with stigma; secondaries, at least, rounded; club not as long as shaft.....3
3. Secondaries rounded, primaries trigonate; club small .....*Copaeodes*
   Outer margin of primaries more oblique and rounded; club large, relatively long.....*Adopaea*

Genus ANCYLOXYPHA Felder

Ancyloxypha Feld., Verh. z.-b. Ges. Wien XII, 477, 1862. Type *Hesperia numitor* Fab.

Palpi upturned; second joint normal, deeply scaled; third slender, pointed, almost as long as second. Antennae much less than one-half as long as primaries; club blunt, moderately large. Costa of primaries rounded at base, less so in outer half; outer margin broadly rounded, cell slightly less than three-fifths as long as wing; vein 5 nearer to 4 than to 6; 2 and 3 near end of cell. Secondaries rather long through cell, rounded; outer margin slightly emarginate between veins 4 and 6. Male without stigma. Fig. 20.

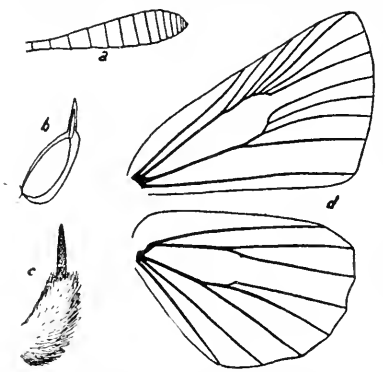


Fig. 20. *Ancyloxypha numitor* Fab. a. Club of antenna, b. Section of palpus; outer line shows limit of vestiture, c. Palpus, d. Neuration

1. *ANCYLOXYPHA NUMITOR*

Hesperia numitor Fab., Ent. Syst. III, (1), 324, 1793.
Thymelicus puer Hbn., Verz. bek. Schmett. 113, 1820.
Heteropterus marginatus Harris, Ins. Inj. Veg., 3rd ed., 308, 1862.
Scudder, Butt. New Eng. II, 1558, 1889.
Holland, Butterfly Book 345, pl. XLVII, f. 2, 1898.

Atlantic coast west to Texas, north into Canada; May to August.

The disk of the primaries is black below, while that of the following species is ruddy fulvous.

ab. *LONGLEYI*

Ancyloxypha longleyi French, Can. Ent. XXIX, 80, 1897.

Described from Illinois. A form in which the primaries are glossy black above.

2. *ANCYLOXYPHA ARENE*

Heteropterus arene Edw., Trans. Am. Ent. Soc. III, 214, 1871.
Copaeodes myrtis Edw., Papilio II, 26, 1882.
Apaustus leporina Plötz, Stett. Ent. Zeit. XLV, 166, 1884, (fide G. & S.).
Holland, Butterfly Book 346, pl. XLVII, f. 11, 1898.
Biol. Cent.-Am., Rhop. II, 472, pl. 92, ff. 35-38, 1900.

Arizona, August. Differs from *numitor* in the absence of black from the under surface of the primaries.

Genus OARISMA Scudder

Oarisma Scudder, Syst. Rev. 54, (75), 1872. Type *Hesperia powesheik* Parker.

Paradopaea G. & S., Biol. Cent.-Am., Rhop. II, 469, footnote, 1900.

Palpi as in *Ancyloxypha*. Antennae much less than one-half as long as primaries; club enlongate obovoid, blunt, as long or nearly as long as shaft. Costa of primaries straight except at base and apex; outer margin curved only opposite cell; entire wing trigonate; cell about three-fifths as long as wing; vein 5 near 4 at base; 3 near end of cell; 2 about as far from 3 as from base of wing, variable. Secondaries trigonate, all margins slightly rounded and anal angle very slightly lobed. Male without stigma. Fig. 21.

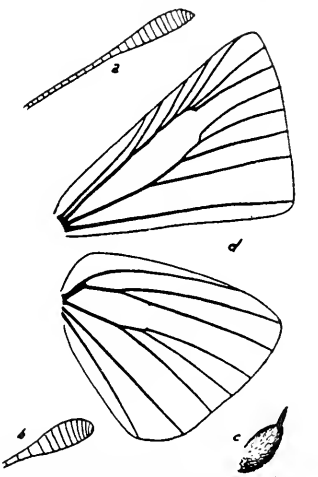


Fig. 21. *Oarisma garita* Reakirt: a. Club of antenna, d. Neuration. *Copaeodes aurantiaca* Hew. b. Club of antenna, c. Palpus

Key to the species

1. Under surface of secondaries with white veins on a dark ground before vein 1b.....*powesheik*
   Veins not much paler than ground color.....2
2. Upper surface bright yellow-fulvous.....*edwardsi*
   Upper surface fuscous, variably powdered with yellow-fulvous..*garita*

1. *OARISMA GARITA*

Hesperia garita Reakirt, Proc. Ent. Soc. Phil. VI, 150, 1866.

Thymelicus hylax Edw., Trans. Am. Ent. Soc. III, 274, 1871.

Paradopaea calega G. & S., Biol. Cent.-Am., Rhop. II, pl. 92, ff. 26-29, 1900.

Paradopaea garita G. & S., Biol. Cent.-Am., Rhop. II, pl. 92, ff. 23-24, 1900.

Oarisma powesheik G. & S., (not Parker) Biol. Cent.-Am., Rhop. II, 469, 1900.

Holland, Butterfly Book 343, pl. XLVII, f. 3, 1898.

Wright, Butt. W. Coast pl. XXX, f. 408, 1905 (not *lena* Edw.)

Manitoba, Montana, Colorado, Idaho, Arizona; July.

Calega G. & S. looks in the figure as if it might be a good species but in the text the authors refer it to *garita*. They also erroneously refer their figures of *garita* to *powesheik*.

2. *OARISMA EDWARDSI*

Thymelicus edwardsi Barnes, Can. Ent. XXIX, 42, 1897.

Paradopaea garita G. & S. (not Reakirt) Biol. Cent.-Am. Rhop. III, pl. 92, f. 25 ♂ genitalia, 1900.

Colorado, Arizona and New Mexico; June and July.

I have seen the type of this species and the pale upper surface is very different from *garita*.

3. *OARISMA POWESHEIK*

Hesperia powesheik Parker, Am. Ent. & Bot. II, 271, 1870.
Thymelicus garita Plötz (not Reakirt), Stett. Ent. Zeit. XLV, 287, 1884.
Scudder, Butt. New Eng. III, 1859, 1889.
Holland, Butterfly Book 343, pl. XLVII, f. 4, 1898.

Described from thirty-one males and two females taken June 21, 1870, at Grinnell, Iowa. It has also been taken in Colorado and South Dakota, and I have observed it personally so near to the Minnesota line in Iowa that it probably enters that state. Michigan (Wolcott).

Genus ADOPAEA Billberg

Adopaea Billb., Enum. Ins. 81, 1820. Type *Papilio thaumas* Hufn.

Similar to *Copaeodes* but with the antennal club larger and relatively longer, and with a rudiment of the apiculus. The outer margin of the primaries is more oblique, relatively shorter, and more deeply sinuate. The stigma of the male is similar.

This genus has been incorrectly used in the past in our fauna for *eunus* and *wrighti*; it is represented only by an introduced species.

1. *ADOPAEA LINEOLA*

Papilio lineola Ochs., Schmett. Eur. I, (2), 230, 1808.
Morris, British Butterflies, 153, pl. 70, 1890.
Spuler, Schmett. Eur. t. 18, ff. 6a, 6b, 1910.
47th Rep. Ent. Soc. Ont. 142, 1917.

Introduced from Europe. The reference in the report of the Entomological Society of Ontario records its capture at London, Ontario, on July 1, 1910, and every year from then until the date of the publication.

Genus COPAEODES Speyer

Copaeodes Speyer, Edw. Cat. Lep. 49, 64, 1877. Type *Heteropterus proeris* Edw.

Palpi upturned; second joint densely scaled; third fine, pointed, not quite as long as in *Ancyloxypha*. Antennae scarcely two-fifths as long as primaries; club rather small, stout, blunt. Primaries trigonate; costa straight except at base and apex; outer margin slightly sinuate; anal angle almost rectangular.

Secondaries rounded, slightly lobed at anal angle. Wings more elongate in female. Primaries of male with a slender, longitudinal stigma. Cell of primaries about three-fifths as long as wing; vein 5 arising much nearer to 4 than to 6. Fig. 21.

1. *COPAEODES AURANTIACA*

Ancyloxypha aurantiaca Hew., Desc. Hesp. 45, 1868.
Hesperia waco Edw., Trans. Am. Ent. Soc. II, 122, 1868.
Heteropterus minima Edw., Trans. Am. Ent. Soc. III, 196, 1870.
Hesperia procris Edw., op. cit. 215.
Thymelicus macra Plötz, Strett. Ent. Zeit. XLV, 284, 1884.
Copaeodes candida Wright, Proc. Cal. Acad. Sci. (2), III, 34, 1890.
Copaeodes nanus Watson, (not H.-S.), Proc. Zool. Soc. London, 1893, 98 (fide G. & S.).
Holland, Butterfly Book 345, pl. XLVII, f. 9, 1898.
Biol. Cent.-Am., Rhop. II, 473, pl. 92, ff. 39-42, 1900.
Wright, Butt. W. Coast 236, pl. XXXI, ff. 409, 411, 1905.
Skinner, Ent. News XXIX, 150, 1918.

Arizona, May, July, August and September. Texas, California, March, May, August.

I cannot agree with Dr. Skinner that this and the following are but one species, but as he suggests, *rayata* may fall before the female of *procris*, in which case the latter name might be restricted to the female type and retained as a species.

2. *COPAEODES RAYATA*

Copaeodes rayata B. & McD., Contributions II, (3), 100, pl. III, ff. 1, 2, 1913.

San Benito, Texas; June and July.

I have seen the types of this species and it is abundantly distinct from *aurantiaca*. The pale ray is variably distinct, but the veins are darker than the ground color and of a somewhat rusty shade on the lower surface of the secondaries. The size is smaller than *aurantiaca*.

GROUP C

Key to the genera

1. Club of antennae blunt or with a rudiment of the apiculus ..... *Chaerephon*
   Club of antennae with a sharp apiculus, sometimes very short 2
2. Vein 5 of primaries well curved toward base, arising conspicuously nearer to 4 than to 6 3
   Vein 5 but slightly curved, only a little nearer to vein 4 at base; L. D. C. weak 11

3. Antennae scarcely longer than width of thorax..*Hylephila*
   Antennae distinctly longer.....4
4. Mid tibiae with spines.....5
   Mid tibiae without spines.....*Atrytone*
5. Apiculus of antennae shorter than thickness of club or not abruptly constricted.....6
   Apiculus at least equal to thickness of club, slender; either abruptly constricted or distinctly longer than thickness of club 9
6. Primaries apically produced and secondaries lobed; apiculus very short.....7
   Primaries and secondaries moderate; apiculus usually moderately long.....8
7. Male stigma slender; wings of female moderate....*Pamphila*
   Male stigma a large blotch; wings of female similar to those of male.....*Atalopedes*
8. Vein 2 of primaries slightly nearer to base of wing than to vein 3. Secondaries well marked with yellow fulvous; see description .....*Augiades*
   Vein 2 variably nearer to 3; when doubtful, secondaries with little fulvous, at the most a transverse band; see description .....*Polites*
   Vein 2 immaterial. Club of antennae very stout, with a fine apiculus, or moderate with a thick apiculus.....*Poanes*
9. Apiculus slender, about twice thickness of club....*Oligoria*
   Apiculus shorter or thick.....10
10. Apiculus slender; male stigma large, with large gray scales; under surface fuscous.....*Catia*
    Apiculus tapered, not abruptly constricted; male without stigma; under surface not fuscous.....*Poanes*
    Apiculus slender, variable, male stigma variable. Under surface gray powdered to dark brown.....*Atrytonopsis*
11. Male stigma large; maculation yellow.....*Epiphyes*
    Stigma not large; maculation not pale yellow.....12
12. Apiculus fine; shorter than thickness of club.....*Lerodea*
    Apiculus longer, or wings immaculate.....13
13. Third joint of palpi long (ex. *nanno*); fringes checkered ....*Amblyscirtes*
    Third joint short; fringes not checkered.....14

14. Vein 5 almost intermediate between 4 and 6; under surface with purplish lustre.....*Lerema*
Vein 5 considerably nearer to 4; under surface otherwise .....*Mastor*

Genus CHAEREPHON Godman & Salvin

Chaerephon G. & S., Biol. Cent.-Am., Rhop. II, 474, 1900. Type *Pamphila citrus* Mab.

Second joint of palpi upturned, deeply scaled; third small, oblique, smooth. Antennae less than one-half as long as primaries; club large, obovoid, subacute but without a reflexed apiculus. Costa of primaries straight except at base; apex produced, rounded acute in males, less sharp in females; outer margin rounded in center and straighter nearer apex and anal angle,though almost evenly rounded in some females. Secondaries rounded, lobed at anal angle in male, slightly so in female. Both wings appear shorter and broader in the male than in the female. Primaries of male with a faint stigma composed of an oblique bar above vein 2 followed by two small round patches in line below the vein. Fig. 22.

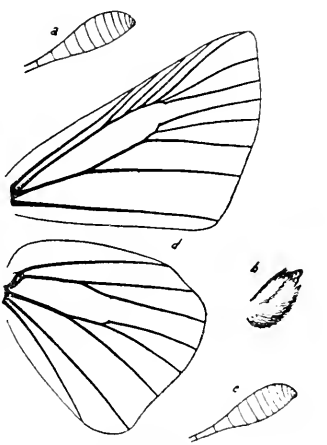


Fig. 22. *Chaerephon*. a. Club of antenna of *rhesus*, b. Palpus of *eunus*, c. Club of antenna of *eunus*, d. Neuration of *eunus*

Key to the species

1. Wings yellow-fulvous.....*eunus, wrighti*
Wings mostly fuscous.....2
2. Under surface gray powdery.....*simius*
Under surface more or less yellowish.....3
3. Yellow of under surface of secondaries interspersed with dark patches; maculation distinct.....*rhesus*
Yellow pale, dull, even; maculation obscure.....*carus*

1. *CHAEREPHON EUNUS*

Copaeodes eunus Edw., Papilio I, 47, 1881.
Holland, Butterfly Book, pl. XLVII, f. 10, 1898 (as *wrighti*).
Wright, Butt. W. Coast 237, pl. XXXI, ff. 412, 414, 1905.
California, June.

2. *CHAEREPHON WRIGHTI*

Copaeodes wrighti Edw., Can. Ent. XIV, 152, 1882.

Wrighti is probably a synonym of *eunus*; the original description fits *eunus*, the type localities are in the same part of California, and we do not know of two species of these general characteristics. Both of these have been erroneously placed in *Adopaea* in the past, whereas *Adopaea* is closely related to *Copaeodes* and *eunus* is not at all similar in structure.

3. *CHAEREPHON RHESUS*

Pamphila rhesus Edw., Field and Forest III, 116, 1878.
Biol. Cent.-Am., Rhop. II, 475, pl. 93, ff. 5-7, 1900.
Skinner, Ent. News XI, pl. II, ff. 19, 20, 1900.
Kellogg, Am. Ins. pl. IX, ff. 19, 20, 1904.
Colorado, Arizona.

4. *CHAEREPHON CARUS*

Pamphila carus Edw., Can. Ent. XV, 34, 1883.
Texas and Arizona, May, July and September.

5. *CHAEREPHON SIMIUS*

Amblyscirtes simius Edw., Trans. Am. Ent. Soc. IX, 6, 1881.
Holland, Butterfly Book 341, pl. XLVII, f. 8, 1898.
Colorado; Sioux County, Nebraska, July.

This is one of our rarer species. I am indebted to Mr. Leussler for a specimen taken in Sioux County, Nebraska, the only one in my possession.

Genus PAMPHILA Fabricius

Pamphila Fab., Ill. Mag. VI, 287, 1807. Type *Papilio comma* Linn.

Ocytes Scud., Syst. Rev. 55, (76), 1872. Type *Erynnis metea* Scud.

Anthomaster Scud., Syst. Rev. 57, (78), 1872. Type *Hesperia leonardus* Harris.

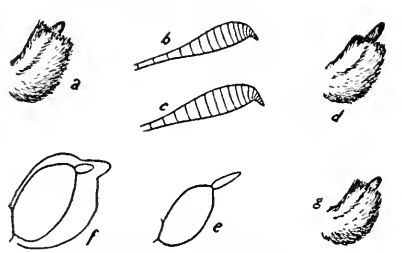


Fig. 23. *Pamphila* and *Atrytone*, a. Palpus of *A. snowi*, b. Club of antenna of *P. viridis* ♂, c. Same, female, d. Palpus of *P. viridis*, e. Same, denuded, f. Section of palpus of *A. sylvanus*; outer line shows limit of vestiture, g. Palpus of *A. napa*

Palpi upturned; second joint with a smooth vestiture of scales and some hairs; third about one-half as long as second but partly concealed. Antennae less than one-half as long as primaries; club large with a very small apiculus which is a little longer in the female. Costa slightly

emarginate to slightly convex; outer margin slightly sinuate to evenly rounded, usually more rounded in the female. Secondaries rounded, slightly lobed at anal angle. In all of the species the wings of the females are longer and more rounded than those of the males. Vein 5 of primaries arising very near to 4; 3 near end of cell; 2 about intermediate between 3 and base of wing; cell slightly over three-fifths as long as wing. Vein 7 of secondaries slightly nearer to end of cell than to 8. Mid tibiae spiny. Male stigma slender, strong, extending from base of vein 3 to basal third of vein 1 and made up of a long piece in front of vein 2 and a shorter piece behind 2 which is set just outside of the first but is continuous with it. Fig. 23.

Key to the species

This key is not to be regarded as a means of ultimate identification; in *Pamphila* no key can be sufficient in itself, for many of our species and forms intergrade to such an extent that only a practiced eye can even sort them properly. The key to the forms of *comma* included here is based on specimens in the Barnes collection which have been compared with the types, and so may be relied on for typical specimens. It will not, however, suffice for the placing of the multitude of intermediate forms which occur in large series.

1. Under surface of secondaries with alternating greenish and fuscous areas; veins white on disk.....*uncas*
   Under surface evenly colored; veins not white.....2
2. Upper surface fuscous with reduced, poorly defined, pale spots; under surface of secondaries with a pale band.....*metea*
   Upper surface more or less fulvous or with well defined spots, or lower surface with separate spots.....3
3. Under surface of secondaries with a pale ray in the cell.....*morrisoni*
   With or without a pale spot in cell.....4
4. Under surface of secondaries yellow to brown with an oblique band of uniform, confluent white spots posterior to vein 6; sometimes with a single spot before this band.....*columbia*
   Spots making up band, when present, not confluent, unequal, irregularly placed or with more than one spot before vein 6. Under surface usually greenish in forms which are likely to confuse.....5
5. Under surface of secondaries with sharply defined white spots or yellowish to greenish with the bent macular band traceable.....6
   Under surface without sharply defined white spots; immaculate or with traces of separate spots, usually poorly defined or not white.....13
6. Under surface of primaries fuscous; spots on secondaries small and rounded .....*seminole*
   Under surface of primaries with some fulvous or spots on secondaries otherwise 7

7. Spot on under surface of secondaries just behind vein 2 nearer base of wing than rest of band or absent. Band sometimes too much modified to show this difference....8
   This spot on a line with rest of band or outside of it; band well marked, white ....*viridis*
8. Spots not confluent, their size variable; under surface usually dark with sparse over-scaling....*woodgatei*
   Spots usually confluent or over-scaling dense....9
9. Upper surface bright with sharp contrasts; costal area of primaries fulvous; white spots of lower surface very large and bright....*juba*
   Upper surface with a variable diffusion of fuscous; when maculation is sharp, the other characters differ. Spots below moderate to greatly reduced, white or yellowish....10
10. Maculation below yellow but not reduced....*sassacus* 12
    Maculation white or greatly reduced....11
11. Macular band with one spot before vein 7, one behind vein 2 followed by a trace of a second; band irregular; superficial vestiture gray-green ....*nevada*
    Band equally contrasting but more regular and abbreviated, usually with no spot before 7 and only one reduced spot behind 2; superficial vestiture green....*colorado*
    Spots dull white; superficial vestiture golden brown....*manitoba*
    Under surface of secondaries very smooth in appearance, yellow; spots white ....*idaho*
    Spots greatly reduced, white....*assiniboia*
    Spots greatly reduced, yellowish....*oregonia*
12. Under surface of secondaries pale; maculation faint....*sassacus*
    Under surface dark; maculation contrasting.*sassacus*, race *manitoboides*
13. Under surface of secondaries dark red-brown with pale, cream-white spots ....*leonardus*
    Under surface otherwise....14
14. Pale maculation above very diffuse; pale area in end of cell of primaries showing two pale nuclei, always vague..*sassacus*, race *dacotae*
    Cell of primaries with two sharply defined spots in end, or with these indistinguishably fused....15
15. Disk of secondaries above with fulvous spots (♂); under surface very dark (♀)....*attalus*, race *seminole*
    Disk more or less broadly fulvous (♂); under surface pale (♀)....16
16. Under surface of secondaries yellow-fulvous, with or without vague traces of large spots....*meskei*
    Under surface of a lighter shade, more or less yellow; spots small or absent....17
17. Southern species, Florida, Texas, Ohio?....*attalus*
    Prairie species, Iowa, Nebraska, Dakota, Montana, and California ....*ottoe, pawnee, pawnee* race *montana*

1. *PAMPHILA UNCAS*

Hesperia uncas Edw., Proc. Ent. Soc. Phil. II, 19, pl. v, f. 3, 1863.
Hesperia ridingsi Reakirt, Proc. Ent. Soc. Phil. VI, 151, 1866.
Hesperia axius Plötz, Stett. ent. Zeit. XLIV, 213, 1883.
Scudder, Butt. New Eng. III, 1862, 1889.
Holland, Butterfly Book 349, pl. XLVII, ff. 27, 28, 1898.
Colorado and Arizona, June and July.

2. *PAMPHILA LASUS*

Pamphila lasus Edw., Papilio IV, 54, 1884.
Described from Arizona. I do not know the species.

3. *PAMPHILA LICINUS*

Pamphila licinus Edw., Trans. Am. Ent. Soc. III, 275, 1871.
I do not know this species.

4. *PAMPHILA METEA*

Hesperia metea Scud., Proc. Ess. Inst. III, 177, 1862.
Scudder, Butt. New Eng. II, 1650, 1889.
Holland, Butterfly Book 348, pl. XLVII, ff. 33, 34, 1898.
New Jersey, New York, Massachusetts, New Hampshire and Rhode Island; May and June. This species is readily distinguished by its dark color, vague, whitish maculation and the tendency of the macular band on the under surface of the secondaries to be produced along the veins. The spots making up this band are neither separate nor very bright as in the other dark colored species.

5. *PAMPHILA MORRISONI*

Pamphila morrisoni Edw., Field and Forest III, 116, 1878.
Hesperia morissoni Plötz, Stett. ent. Zeit. XLIV, 215, 1883.
Biol. Cent.-Am., Rhop. II, 478, pl. 93, ff. 9, 10, 1900.
Colorado, May.
This is a small, bright species which is readily recognized by the elongation of the white mark in the cell of the secondaries below.

6. *PAMPHILA COLUMBIA*

Pamphila columbia Scud., Syst. Rev. 56, (77), 1872.
Pamphila sylvanoides Scud., (not Boisd.) Mem. Bost. Soc. Nat. Hist. II, (3), 351, pl. x, f. 22 (type), pl. XI, pp. 15, 17, 1874.
Pamphila california Wright, Butt. W. Coast 241, pl. XXXI, 423, 1905.
Thymelicus erynnioides Dyar, Jn. N. Y. Ent. Soc. XV, 50, 1907.
California, April and October.
All of the specimens in the Barnes collection have the band very even, as mentioned in the key; in Wright's figure it appears to be somewhat reduced toward the anal angle, but the color of the under surface of the secondary is characteristic.

7. *PAMPHILA NEVADA* (Plate I, Fig. 9)

Pamphila nevada Scud., Mem. Bost. Soc. Nat. Hist. II, 347, pl. x, ff. 1-4, pl. xi, ff. 3, 4, 1874.

Wright, Butt. W. Coast 240, pl. xxx, pp. 418, c, 419, b, c, 421, b, c, 1905.

I follow Dr. McDunnough in making this species distinct from *comma*. There is some difference in the male genitalia and if we restrict *nevada* to the typical form the under surface differs as noted in the key. Arizona to Northern Canada.

8. *PAMPHILA COMMA*

Pamphila comma Linn., Syst. Nat. 484, 1758.

Comma is a European species and does not occur in its typical form in this country.

8a. race *COLORADO* Pl. I, fig. 11

Pamphila colorado Scud., Mem. Bost. Soc. Nat. Hist. II, 349, pl. x, ff. 16, 17, 18, pl. xi, ff. 1, 2, 1874.

Arizona north to Washington, California.

In the typical form the under surface of the secondaries is bright green with the band pure white, short, rather even, and the basal marks united to form a U.

8b. race *MANITOBA*

Pamphila manitoba Scud., Mem. Bost. Soc. Nat. Hist. II, 351, pl. x, ff. 8-11, pl. xi, ff. 7, 8, 1874.

Scud., Butt. New Eng. II, 1646, 1889.

Pamphila manitoba, var. *laurentina* Lyman, Can. Ent. xxiv, 57, 1892.

Northwestern United States and Western Canada.

The typical form is golden brown beneath with whitish maculation.

8c. race *IDAHO*

Pamphila colorado, var. *idaho* Edw., Can. Ent. xv, 148, 1883.

Wright, Butt. W. Coast 241, pl. xxxi, f. 422, 1905.

California, Oregon, north into Canada.

The smooth, yellow appearance of the under surface of the secondaries is characteristic.

8d. race *ASSINIBOIA*

Pamphila manitoba, var. *assiniboia* Lyman, Can. Ent. xxiv, 57, 1892.

Regina, Canada.

8e. race *OREGONIA* Plate I, fig. 13

Pamphila oregonia Edw., Can. Ent. xv, 150, 1883.

Nevada, west to the coast and north into Canada.

The maculation of the under surface is similar to that of *assiniboia* but yellowish instead of white.

9. *PAMPHILA RURICOLA*

Hesperia ruricola Boisd., Ann. Soc. Ent. France (2), x, 315, 1852.
Described from California.

Many things have been referred to this species, which may be one of the forms of *comma*. I know nothing of the type nor of authentic specimens.

10. *PAMPHILA JUBA*

Hesperia comma Boisd. (not Linn.), Ann. Soc. Ent. France (2), x, 313, 1852.

Pamphila juba Scud., Syst. Rev. 56, (77), 1872.

Scudder, Mem. Bost. Soc. Nat. Hist. II, 349, pl. x, ff. 19, 20, pl. xi, ff. 5, 6, 1874.

Wright, Butt. W. Coast 239, pl. xxx, ff. 417, 418b ♂ (not *viridis* ♀), 1905.

Oberthür, Etudes ix, (1), p. 43, pl. cdxl, f. 2082 (*comma* Bdv.).

Utah, Colorado, Nevada, California; May and June.

11. *PAMPHILA WOODGATEI*

Pamphila woodgatei Williams, Ent. News xxv, 266, 1914.

Arizona, Texas and New Mexico; September and October.

This has been placed as a variety of *juba* but I believe that it is distinct. I have had no males for dissection.

12. *PAMPHILA VIRIDIS* (Plate I, Fig. 12)

Pamphila juba var. *viridis* Edw., Can. Ent. xv, 147, 1883.

Colorado, Arizona, New Mexico and Texas; June and September.

The form of the macular band in this species is unique and apparently constant.

13. *PAMPHILA LEONARDUS*

Hesperia leonardus Harris, Ins. Inj. Veg., 3rd ed., 314, f. 138, 1862.

Scudder, Butt. New Eng. II, 1673, 1889.

Holland, Butterfly Book 349, pl. xlvii, ff. 35, 36, 1898.

New York, Rhode Island, Massachusetts, west to the Mississippi; occasional in eastern Iowa; August and September. Scudder records it from Ontario and Florida, the latter in March and April (Butt. New Eng. II, 1676-7).

14. *PAMPHILA CABELUS*

Pamphila cabelus Edw., Trans. Am. Ent. Soc. ix, 4, 1881.

Described from Nevada.

This is another of our lost species of *Pamphila*. Apparently it belongs in the *ottoe* group.

15. *PAMPHILA HARPALUS*

Pamphila harpalus Edw., Trans. Am. Ent. Soc. ix, 3, 1881.

Described from Nevada.

The same may be said of this as of the preceding.

16. *PAMPHILA ATTALUS*

Pamphila attalus Edw., Trans. Am. Ent. Soc. III, 276, 1871.
Scudder, Butt. New Eng. II, 1653, 1889.
Holland, Butterfly Book 349, pl. XLVII, f. 23, 1898.

Florida, Texas. In the Barnes collection several specimens are labelled Ohio, and Scudder (Butt. New Eng. II, 1655) mentions records from Wisconsin, Iowa and New Jersey. I think that the middle western records are more likely to be *pawnee* or *ottoe*. Southern specimens of attalus are darker than these two species, and have the spots of the upper surface darker and more reddish.

16a. race *SEMINOLE*

Ocytes seminole Scud., Syst. Rev. 55, (76), 1872.
Erynnis attalus quaiapen Scud., Butt. New Eng. 1655, 1889.
Pamphila slossonae Skinner, Ent. Amer. VI, 138, 1890.

Florida, April to June, October.

Seminole is very dark both above and below. The maculation is restricted in the male, and the under surface of the primaries very slightly marked with fulvous, while in the female all spots are whitish and the under surface is not marked with fulvous. Scudder describes *quaiapen* as a female form of *attalus*.

17. *PAMPHILA MESKEI*

Pamphila meskei Edw., Can. Ent. IX, 58, 1877.
Pamphila straton Edw., Papilio, I, 78, 1881.

Florida and Texas.

I have seen only three males in the Barnes collection. These resemble *attalus* above; beneath the secondaries are yellow-fulvous, immaculate in one of the three specimens and with traces of large, diffuse, pale spots in the other two.

18. *PAMPHILA OTTOE*

Hesperia ottoe Edw., Proc. Ent. Soc. Phil. VI, 207, 1866.
Scudder, Mem. Bost. Soc. Nat. Hist. II, 348, pl. X, f. 6, pl. XI, f. 13, 1874.

In the typical form the males are tawny above with a very narrow terminal border of fuscous, and compared specimens in the Barnes collection have the under surface bright yellow. I have taken a species at Sioux City, Iowa, in late July and early August which I have placed as *ottoe* and which is distinguished by the ochraceous under surface and the extension of the pale area of the upper surface along the veins into the moderately broad fuscous terminal border. True *pawnee* occurs in this locality at a different season. Specimens in the Barnes collection are from Montana.

19. *PAMPHILA PAWNEE*

Hesperia pawnee Dodge, Can. Ent. VI, 44, 1874.

Montana, July. Colorado, September. Omaha, Neb., June. South Da-

kota, Sioux City, Iowa, late June and early July, late August and early September. Described from Dodge County, Neb.

The under surface is usually immaculate yellow, in the female sometimes grayish and usually with small pale spots. The spots on the upper surface of the primaries in the female are very pale, and this sex closely resembles *attalus*. The males of this species may be distinguished by the more extensive pale areas of the upper surface and their lighter shade.

19a. race *MONTANA*

Pamphila pawnee subsp. *montana* Skinner, Ent. News XXII, 413, 1911.
California, Colorado, Montana.

A specimen in the Barnes collection which has been compared with the type is much darker than normal *pawnee*, both above and below.

20. *PAMPHILA SASSACUS*

Hesperia sassacus Harris, Ins. Inj. Veg., 3rd ed., 315, 1862.
Scudder, Butt. New Eng. II, 1641, 1889.
Holland, Butterfly Book 348, pl. XLVI, f. 13, 1898.
Holland, Butterfly Book pl. XLVII, f. 44, 1898, (not *sylvanoides*).
Kellogg, Am. Ins. pl. X, f. 5, 1904.

New Jersey, New York and Connecticut, westward into Iowa; June, July, August.

20a. race *MANITOBOIDES*

Pamphila manitoboides Fletcher, Rep. Ent. Soc. Ont. for 1888, p. 85, 1889.
Ontario, Canada.

Dr. W. T. M. Forbes has called my attention to this relationship of *manitoboides*, which seems so close that I am adopting his arrangement. Formerly it has been called a distinct species or a form of *comma*, but it is identical with *sassacus* except in the darker color and greater contrast of the markings of the lower surface.

20b. race *DACOTAE*

Pamphila sassacus, subsp. *dacotae* Skinner, Ent. News XXII, 412, 1911.
South Dakota, June. Sioux City, Iowa.

I have seen paratypes of both sexes in the Barnes collection, and in the males the only difference which I can formulate between this form and *sassacus* is a general darkness of color and obscureness of the under surface. The females have the markings of the upper surface greatly reduced and diffuse, and the lower surface grayish with small, indefinite spots.

21. *PAMPHILA HORUS*

Hesperia horus Edw., Trans. Am. Ent. Soc. III, 277, 1871.
Barnes & McDunnough, Contributions IV, (2), 80, 1918.

Type locality Dallas, Texas. Apparently this species belongs in *Pamphila*, but I know nothing of it except from the description and Barnes and McDunnough's note.

Genus HYLEPHILA Billberg

Hylephila Billb., Enum. Ins. 81, 1820. Type *Papilio phylaeus* Drury.

Euthymus Scud., Syst. Rev. 56, (77), 1872. Type *P. phylaeus* Drury.

This genus closely resembles *Pamphila* in structure but differs in the very short antennae and the straighter stigma. The female, as in *Atalopedes*, does not differ much in general structure from the male; some are almost indistinguishable from *campestris*, but they never have hyaline spots on the primaries. We have but one species of *Hylephila*.

1. *HYLEPHILA PHYLAEUS*

Papilio phylaeus Drury, Ill. Ex. Ent. I, 25, pl. XIII, ff. 4, 5, 1770 and II, app., 1773.

Phemiades augias Hübner, (not Linn.), Zutr. exot. Schmett. II, 10, pl. 531, ff. 227, 228, 1821-23.

Pamphila bucephalus Steph., Ill. Brit. Ent. Haust. I, 102, pl. 10, ff. 1, 2, 1828.

♀ *Pamphila hala* Butler, Trans. Ent. Soc. London, 1870, 504, (fide G. & S.).

Scudder, Butt. New Eng. II, 1631, 1889.

Holland, Butterfly Book, 354, pl. XLVII, f. 40, (not *brettus* ♂), pl. XLVI, ff. 18, 19, 1898.

Wright, Butt. W. Coast pl. XXXI, f. 437 (not *brettus* ♂), 438 ♂, b and c ♀ (not *brettoides*), 1905.

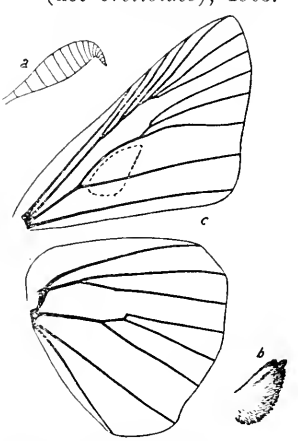


Fig. 24. *Atalopedes campestris* Boisd, a. Club of antenna, b. Palpus, c. Neuration

Pennsylvania, August; Illinois, April and October. Southern United States from Florida to Arizona, April to October. California, June and July.

Genus ATALOPEDES Scudder

Atalopedes Scudder, Syst. Rev. 57, (78), 1872. Type *Hesperia huron* Edw.

Pansydia Scud., Syst. Rev. 60, (81), 1872. Type *Hesperia mesogramma* Poey.

Apiculus of antennae longer than in *Pamphila*, over one-half thickness of club in female. Stigma a large, black blotch, so greatly developed as to

cause distortion of the posterior margin of the cell so that opposite the stigma the width of the cell is less than its distance from the margin. Base of vein 3 strongly curved; apical angle of cell more produced than in *Pamphila;* vein 7 of secondaries nearer to 8 than to end of cell in male. There is much less difference in structure between the sexes in this genus than in *Pamphila.* Fig. 24.

1. *ATALOPEDES CAMPESTRIS*

Hesperia campestris Boisd., Ann. Soc. Ent. France (2), x, 316, 1852.

♀ *Hesperia sylvanoides* Boisd., Ann. Soc. Ent. France (2), x, 313, 1852.

Hesperia huron Edw., Proc. Ent. Soc. Phil. II, 16, pl. I, ff, 1, 2, 1863.

Scudder, Butt. New Eng. II, 1661, 1884.

Holland, Butterfly Book 352, pl. XLVI, ff, 4, 5, 1898.

Wright, Butt. W. Coast 245, pl. XXXI, f. 435, 1905.

Oberthür, Etudes IX, (1), pl. CCXL, ff. 2082, ♂ type; 2085, ♀ type of *sylvanoides,* 1905.

Atlantic to Pacific, Gulf to northern Iowa and Illinois; March to October.

The large stigma of the male and the hyaline spots on the primaries of the female furnish a convenient means for the identification of this species.

Genus AUGIADES Hübner

Augiades Hbn., Verz. bek. Schmett. 112, 1820. Type *Papilio sylvanus* Esper.

Ochlodes Scud., Syst. Rev. 57, (78), 1872. Type *Hesperia nemorum* Boisd.

Palpi upturned; third joint oblique, very small, without its vestiture about one-quarter as long as the second. Apiculus of antennae variable but never longer than diameter of club. Costa of primaries flattened; outer margin more strongly curved toward apex; cell about three-fifths as long as wing; vein 5 curving slightly toward 4; discocellulars very oblique. Secondaries rounded, slightly lobed at anal angle. Stigma straight, moderately heavy, extending from base of vein 3 to basal two-fifths of 1, broken on 2. Mid tibiae weakly spined. Fig. 23.

I group this rather varied lot of species because of the extremely short third joint of their palpi. This is not readily seen except when bleached or denuded, but I have carefully examined *sylvanus, sylvanoides, agricola,* and *snowi* and find that they agree, while the others can readily be associated on superficial resemblance. Other structures are rather variable.

Key to the species

1. Spots of primaries shaply defined, often hyaline or subhyaline.....2
   Spots more or less ill defined, never hyaline.....3
2. Expanse over one inch; fulvous spots restricted.....*snowi*
   Less than one inch; fulvous of secondaries a diffused discal patch .....*milo, agricola*
3. Large; wings pale, tawny, with a little fuscous along the outer margin .....*yuma*
   Smaller; wings not broadly tawny.....4
4. Under surface of secondaries with a variably distinct pale transverse band; ground color not pure pale yellowish.....*sylvanoides, napa*
   Under surface without a pale band, yellow.....*nemorum, pratincola*

1. *AUGIADES SYLVANOIDES*

Hesperia sylvanoides Boisd., Ann. Soc. Ent. France (2), x, 313, 1852.
♀ *Hesperia pratincola* Boisd., Ann. Soc. Ent. France (2), x, 315, 1852.
Hesperia agricola Plötz, (not Boisd.), Stett, ent. Zeit. XLIV, 219, 1883.
Hesperia francisca Plötz, Stett. ent. Zeit. XLIV, 220, 1883.
Wright, Butt. W. Coast 243, pl. XXXI, ff. 430, c, 432, 433, b, c, 1905.
Oberthür, Etudes IX, (1), pl. CCXL, ff. 2083, 2084, 2089, 1913.
California, Oregon, Washington, British Columbia; June to August.

1a. race *NAPA*

Hesperia napa Edwards, Proc. Ent. Soc. Phil. IV, 202, pl. I, ff. 3, 4, 1864.
Colorado, August.
This is practically the same in appearance as *sylvanoides* but is larger and the under surface of the secondaries is less variable.

2. *AUGIADES NEMORUM*

Hesperia nemorum Boisd., Ann. Soc. Ent. France (2), x, 314, 1852.
Pamphila verus Edw., Trans. Am. Ent. Soc. IX, 4, 1881.
Wright, Butt. W. Coast, pl. XXXI, ff. 430b, 431, 431c?, 1905.
Oberthür, Etudes IX, (1), pl. CCXL, f. 2086, 1913 (type).
California, June.

2a. race *PRATINCOLA*

Hesperia pratincola Boisd., Ann. Soc. Ent. France (2), x, 315, 1852.
Oberthür, Etudes IX, (1), pl. CCXL, f. 2088, 1913 (type).
I follow Barnes and McDunnough's Check List in placing this form. The insect is not represented in the Barnes collection, but Oberthür's excellent figure looks like a specimen of *nemorum* with the fuscous marginal areas of the upper surface greatly reduced.

3. *AUGIADES AGRICOLA*

Hesperia agricola Boisd., Ann. Soc. Ent. France (2), x, 314, 1852.
Hesperia yreka Edw., Proc. Ent. Soc. Phil. VI, 207, 1866.
Pamphila milo Edw., Can. Ent. XV, 34, 1883.

Pamphila nemorum Skinner (not Boisd.), Ent. News XI, pl. II, f. 21, 1900.
Kellogg, Am. Ins. pl. IX, f. 21, 1904.
Oberthür, Etudes IX, (1), pl. CCXL, f. 2087, 1913 (type).
California, May to July.

Edward's description states that *milo* has hyaline spots in the primaries and *agricola* none; Oberthür's figure proves that they are present in the type of *agricola*, hence *milo* is probably merely a synonym.

4. *AUGIADES SNOWI*

Pamphila snowi Edw., Can. Ent. IX, 29, 1877.
Holland, Butterfly Book 350, pl. XLVII, ff. 29, 30, 1898.
Biol. Cent.-Am., Rhop. II, 483, pl, 93, ff. 19-23, 1900.
Arizona and Colorado, June and July.

5. *AUGIADES YUMA*

Hesperia yuma Edw., Trans. Am. Ent. Soc. IV, 346, 1873.
Pamphila scudderi Skinner, Ent. News X, 111, 1899.
Skinner, Ent. News XI, pl. II, ff. 9, 10, 1900.
California, June. Utah and Arizona, July.

Genus POLITES Scudder

Polites Scud., Syst. Rev. 57, (78), 1872. Type *Hesperia peckius* Kirby.

Hedone Scud., op. cit. 58, (79), Type *Hesperia brettus* Bd. & Lec.

Limochores Scud., op. cit. 59, (80). Type *Hesperia manataaqua* Scud.

Pyrrhosidia Scud., Mem. Bost. Soc. Nat. Hist. II, 346, 1874. Type *Hesperia mystic* Edw.

Palpi upturned; third joint about one-half as long as second, slender, distinct. Antennae shorter than in *Augiades*, varying from two-fifths as long as the primaries in some females to one-half in some males; club rather large, usually longer in the female and occasionally almost as long as the shaft; apiculus abruptly constricted and reflexed, shorter than thickness of club though variable in length. Wings variable; costa of primaries usually straight except at base and apex but sometimes slightly emarginate or convex; outer margin very slightly sinuate to evenly rounded, more rounded in the female. Primaries often apically produced in the male, less so in the female. Secondaries broadly rounded, very slightly lobed at the anal angle. Cell of primaries about three-fifths as long as wing; vein 5 much

nearer to 4 than to 6 at base; 2 always arising nearer to 3 than to base of wing but variable; discocellulars moderately oblique. Mid tibiae with prominent spines. Stigma of male in its most complex form made up of an outer oblique black line, a black dash from end of cell to vein 2 and a black spot above the basal third of vein 1, the enclosed space filled with gray scales, and the entire stigma followed by a patch of raised gray scales. In many of the species the stigma is much simpler. Fig. 25.

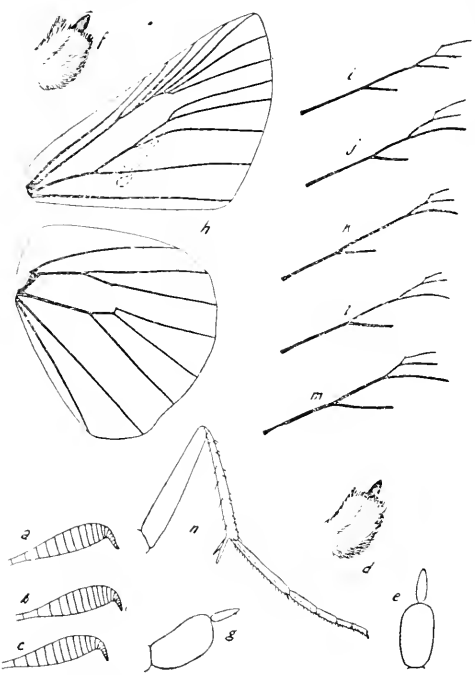


Fig. 25. *Polites*. Antennal clubs: a. *verna*, b. *manataaqua* ♂, c. *manataaqua* ♀. Palpi: d. *verna*, e. *verna*, denuded, dorsal aspect, f. *manataaqua*, g. *brettus*, denuded. Neuration and details: h. *peckius* ♂, i. Posterior margin of cell of primaries of *peckius* ♂, j. Same, *taumas* ♂, k. Same, *mystic* ♀, l. Same, *sonora* ♂, m. Same, *manataaqua* ♀, n. Middle leg of *verna*

I believe that the action of Barnes and McDunnough with reference to this group of species (Contributions III, 130) is the best possible treatment. It may be possible to split off *Limochores* but I find such a complete transition in the structures that I hesitate to do so. I place *verna* here because its relation to *manataaqua* seems to me much closer than with the species of *Atrytonopsis*, where Barnes and McDunnough place it. The gentitalia of the male are closer to *deva*, but those of the two genera are of a very similar type. The apiculus of the antennae is usually longer than in *Polites*, but I have found it variable, and in some specimens fairly short.

Key to the species

1. Under surface of secondaries immaculate or with a transverse band of pale spots, never sharply bent opposite cell nor with spot at this point much the largest.....2
   Secondaries otherwise below.....7

2. Upper surface of secondaries immaculate or with a few very vague spots 3
Upper surface always with the transverse row of spots, more or less suffused; usually with a spot in cell..... 5

3. Small Florida species. Stigma of male very small, female usually with a few powdery whitish spots on the under surface of the secondaries ..... *baracoa*
Usually moderate to large. Stigma large. Spots, when present, not superficial and powdery, and usually showing slightly on upper surface 4

4. Smaller; male stigma with several velvety black areas; female with maculation of primaries tinged with fulvous, costa and cell often partly fulvous..... *cernes*
Larger; stigma of male continuous or broken only on vein 2; maculation of female pale, whitish, rarely with a little pale fulvous in cell ..... *manataaqua*

5. Under surface of secondaries powdered with yellowish to green scales; macular band slender..... *sonora*
Color straw yellow to brown; band broader..... 6

6. Male stigma slender, broken on vein 2; female usually with much yellow-fulvous above; in western specimens pale below and well marked above ..... *mystic*
Male stigma with three black areas; female with hazy transverse rows of spots on all wings and some fulvous in cell, not extensively marked; dark below, powdered with yellow. Western species..... *mardon*

7. Pale areas on under surface extending in pale lines along the veins ..... *sabuleti*
Pale areas at most angulate on veins..... 8

8. All spots of macular band large, but not equal, that between 4 and 6 largest; color yellow..... *peckius*
Spots small except the one between 4 and 6; color white or whitish ..... *draco*
Pale area covering entire wing except a few dark patches, not divided into separate spots and rarely defined as a band; secondaries sometimes entirely yellow below. Female with yellow areas heavily powdered with dark scales; secondaries immaculate above..... 9

9. Male stigma very broad..... *stigma*
Male stigma moderate..... *brettus, chuska* (?)

1. *POLITES VERNA*

Pamphila verna Edw., Proc. Acad. Nat. Sci. Phil. 1862, 57.
Pamphila pottawattomie Worth., Can. Ent. XII, 50, 1880.
Scudder, Butt. New Eng. II, 1742, 1889.
Holland, Butterfly Book 360, pl. XLVI, f. 32, 1898.
Eastern United States, west to Colorado, July.

2. *POLITES MANATAAQUA*

Hesperia cernes Harris, (not Boisd.), Ins. Inj. Veg., 3rd ed., 316, 1862.
Hesperia manataaqua Scudder, Proc. Ess. Inst. III, 175, 1863.
Scudder, Butt. New Eng. II, 1720, 1889.
Holland, Butterfly Book 357, pl. XLVI, f. 30, 1898.

Northeastern United States west into Nebraska and South Dakota; June and July.

Holland's figure looks like a dark female of *taumas*. *Manataaqua* is readily distinguished from *taumas* in the female sex by its darker color, paler maculation and larger size, though the difference is difficult to explain in a key.

2a. race *RHENA*

Pamphila rhena Edw., Field and Forest III, 115, 1878.
Pamphila alcina Skinner, Ent. News IV, 212, 1893.
Skinner, Ent. News XI, 414, pl. II, f. 25, 1900 (type of *alcina*).
Kellogg, Am. Ins. pl. IX, f. 25, 1904 (type of *alcina*).

Although retained for many years as a species this is apparently only the western race of *manataaqua*. It is distinguished from the typical form by its paler color, more extensive markings and the larger amount of pale tawny or yellow fulvous which marks the upper surface. Colorado.

3. *POLITES TAUMAS*

Papilio taumas Fab., Mant. Ins. II, 84, 1787.
Hesperia thaumas Fab. (not Hufn.), Ent. Syst. III, (1), 327, 1793.
Hesperia phocion Fab., Ent. Syst., Supp. 431, 1798.
Hesperia cernes Bd. & Lec., Lep. Am. Sept. pl. 76, ff. 1, 2, 1833.
Hesperia ahaton Harris, Ins. Inj. Veg. 3rd ed., 317, f. 140, 1862.
Butler, Cat. Fab. Diurn. Lep. B. M., 277, pl. 2, f. 14; pl. 3, f. 9, 1869.
Scudder, Butt. New Eng. II, 1725, 1889.
Holland, Butterfly Book 357, pl. XLVII, f. 20, 1898.

United States and Canada, April to August.

I see no reason to doubt that Fabricius' name applies to this species.

4. *POLITES BARACOA*

Hesperia baracoa Lucas, Sagra's Hist. Cuba VII, 650, 1857.
Pamphila amadis H.-S., Corr.-Blatt Regensb. XVII, 142, 1863.
Pamphila myus French, Can. Ent. XVII, 33, 1885.

Florida, February to April, July, September. I have seen one record of its occurrence at Toronto, Canada (A List of Butterflies taken at Toronto, Gibson, Ont. Nat. Sci. Bull. No. 6, 1910, 35-44. *Baracoa* det. Skinner) but the only specimens which I have seen came from Florida.

The species is smaller and darker than *taumas* and the males are easily distinguished by the small stigma. Some females of *taumas* run very close, but in most specimens of *baracoa* the powdery spots mentioned in the key are present.

5. *POLITES MARDON*

Pamphila mardon Edw., Papilio I, 47, 1881.
Holland, Butterfly Book 354, pl. XLVII, f. 26, 1898.
Washington, Oregon.

6. *POLITES PECKIUS*

Hesperia peckius Kirby, Faun. Bor. Am. IV, 300, pl. 4, ff. 2, 3, 1837.
Hesperia wamsutta Harris, Ins. Inj. Veg. 3rd ed., 318, f. 141, 1862.
Scudder, Butt. New Eng. II, 1683, 1889.
Holland, Butterfly Book, 353, pl. XLVII, ff. 24, 25, 1898.
Atlantic coast to Texas and Arizona, southern Canada; May to July.
It requires more imagination than I possess to see *peckius* in Cramer's figure of *coras*.

7. *POLITES SABULETI*

Hesperia sabuleti Boisd., Ann. Soc. France (2), X, 316, 1852.
Hesperia genoa Plötz, Stett. ent. Zeit. XLIV, 207, 1883.
Wright, Butt. W. Coast 246, pl. XXXI, 440, 1905.
Oberthür, Etudes IX, (1), pl. CCXL, ff. 2091, 2092, 1913.
California, April, July to September.
The pale marks of the lower surface are yellowish on a background of darker yellowish color.

7a. race *TECUMSEH*

Pamphila sabuleti, var. *tecumseh* Grinnell, Ent. News XIV, 11, 1903.
Pamphila chispa Wright, Butt. W. Coast 247, pl. XXXI, f. 441, 1905.
California, June to August.
Tecumseh is smaller than typical *sabuleti* and has the fulvous areas of the upper surface more restricted. The under surface has a greenish-gray tone and the pale spots are smaller.

8. *POLITES DRACO*

Pamphila draco Edw., Trans. Am. Ent. Soc. III, 274, 1871.
Skinner, Ent. News XI, pl. II, f. 23, 1900.
Kellogg, Am. Ins. pl. IX, f. 23, 1904.
California, Utah and Colorado, June to August.

9. *POLITES SONORA*

Ochlodes sonora Scud., Syst. Rev. 57, (78), 1872.
Pamphila siris Edw., Papilio I, 47, 1881.
Pamphila sylvanoides Skinner, Syn. Cat. N. Am. Rhop. 84, 1898.
Wright, Butt. W. Coast 242, pl. XXXI, f. 425, 426 (not *columbia*), 1905.
Washington, Oregon, California; May, June, July and August.
The only difference which I can see between this and Skinner's variety in the series in the Barnes collection is the more yellow color of the under surface of its secondaries.

9a. race *UTAHENSIS*

Pamphila sylvanoides, subsp. *utahensis* Skinner, Ent. News XXII, 413, 1911.

Idaho, Wyoming, Colorado and Utah; July and August.

I would apply this name to the specimens of *sylvanoides* which are green below.

10. *POLITES MYSTIC*

Hesperia mystic Scud., Proc. Ess. Inst. III, 172, 1863.

Holland, Butterfly Book 351, pl. XLVI, ff. 22, 23, 1898.

New Jersey, north into Canada and west beyond the Missouri River; May to July.

Most specimens from the western limits of the range are of the race *dacotah*, but I have typical *mystic* from Sioux City, Iowa. In this form the under surface of the secondaries is fairly dark with a contrasting pale band.

10a. race *DACOTAH*

Hesperia dacotah Edw., Trans. Am. Ent. Soc. III, 277, 1871.

Pamphila mystic, subsp. *pallida* Skinner, Ent. News XXII, 412, 1911.

Colorado, June; eastward into Iowa. South Dakota.

The under surface of the secondaries is yellow, scarcely darker than the pale transverse band in extreme specimens.

ab. WEETAMOO

Thymelicus mystic weetamoo Scudder, Butt. New Eng. II, 1707, 1889.

A dark brown melanic aberration occurring in the female sex. Ordinary maculation much reduced, of separate spots.

ab. NUBS

Thymelicus mystic nubs Scudder, Butt. New Eng. II, 1707, 1889.

Also a female aberration; dark areas suffused with tawny scales.

11. *POLITES BRETTUS*

Hesperia brettus Boisd. & Lec., Lep. Am. Sept. pl. 75, ff. 3-5, 1833.

Hesperia wingina Scud., Proc. Ess. Inst. III, 173, 1863.

Hesperia unna Plötz, Stett. ent. Zeit. XLIV, 204, 1883.

Scudder, Butt. New Eng. II, 1701, 1889.

Holland, Butterfly Book 351, pl. XLVII, f. 41, 1898.

Gibson, Ont. Nat. Sci. Bull. No. 6, 42, 1910.

Florida, north to Virginia, west to Texas; April, July, August and October. Gibson lists one specimen from Toronto, Canada, determined by Dr. Skinner.

11a. race *BRETTOIDES*

Pamphila brettoides Edw., Papilio III, 71, 1883.

Western Texas and Arizona.

Brettoides has very narrow dark outer margins on the upper surface in the male, with no more than a trace of the patch at the end of the stigma; the under surface is likewise broadly tawny yellow. I do not know the female.

12. *POLITES STIGMA*

Pamphila stigma Skinner, Can. Ent. XXVIII, 188, 1896.
Skinner, Ent. News XI, pl. II, f. 15, 16, 1900 (15 Cotype).
Kellogg, Am. Ins. pl. IX, ff. 15, 16, 1904 (15 Cotype).
Texas, New Mexico.

I have seen the type of *stigma* in the Strecker collection, and it is similar to *brettus* but dark, heavily marked above, and has a very large stigma. *Vibex* is intermediate between it and *brettus* but at present I am not prepared to agree with Dyar's suggestion that they are all the same species (Jn. N. Y. Ent. Soc. XIII, 128, 1905). Godman and Salvin make *stigma* synonymous with *vibex* (Biol. Cent.-Am., Rhop. II, 480, 1900).

13. *POLITES CHUSKA*

Hesperia chuska Edw., Trans. Am. Ent. Soc. IV, 346, 1873.

I know nothing of this species. It is placed between *sabuleti* and *draco* in Barnes and McDunnough's Check List, but this was done merely with a knowledge of the description. The type locality is Arizona.

Genus CATIA Godman & Salvin

Catia G. & S., Biol. Cent.-Am., Rhop. II, 481, 1900. Type *Hesperia druryi* Latreille.

Catia is structurally similar to *Polites* but differs in the long slender apiculus of the antennae, which always exceeds the diameter of the club, and in the form of the male stigma. The stigma is composed of a velvety black patch below the end of the cell and a similar patch above the inner third of the anal vein, with large, silky, gray scales between. In the bleached wing it appears as two similar oval spots, one on each side of vein 1. Fig. 26.

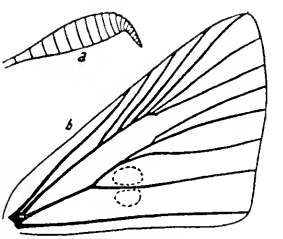


Fig. 26. *Catia otho* A. & S. a. Club of antennae, b. Neuration

In describing *Catia* Godman and Salvin say of the peculiar structure of the stigma that it "is so remarkable that we think it of sufficient importance to put the species possessing this character into a separate genus." *Otho* is closely related to the species now included in *Polites* and was formerly associated with some of them in *Thymelicus*, but the form of the apiculus separates them, and no fundamental or superficial similarity can be traced in the stigmata.

1. *CATIA OTHO*

Papilio otho A. & S., Lep. Ins. Ga. I, 31, pl. 16, 1797.
Hesperia drury Latr., Enc. Meth. IX, 767, 1823.
Thymelicus pustula Geyer, Zutr. exot. Schmett. IV, ff. 625, 626, 1832.
Hedone aetna Scud. (not Boisd.), Syst. Rev. 58, (79), 1872.
Scudder, Butt. New Eng. II, 1696, 1889.
Biol. Cent.-Am., Rhop. II, 482, pl. 93, f. 18, ♂ gen., 1900.

Florida and Texas, May and June.

The southern specimens which I refer to *otho* tend to a reddish shade on the under surface; on the upper surface of the secondaries there are some discal spots, while the primaries have fulvous on the basal half of the costa, a complete series of subapical spots, and sometimes other fulvous marks in addition to those found in *egeremet*.

1a. race *EGEREMET*

Hesperia egeremet Scud., Proc. Ess. Inst. III, 174, 1863.
Pamphila ursa Worth., Can. Ent. XII, 49, 1880.
Hesperia cinna Plötz, Stett. ent. Zeit. XLIV, 58, 1883.
Scudder, Butt. New Eng. II, 1696, 1889.
Holland, Butterfly Book 351, pl. XLVI, ff. 28, 29, 1898.

United States and southern Canada, west to the Rocky Mountains; July. Texas in October.

Under surface pale fuscous, sometimes tinged with brown; secondaries rarely with a trace of discal marks above, and pale spots of primaries limited to three or less beyond the stigma and one or two subapical points.

The females of *otho* and *egeremet* have the same pale marks as the males.

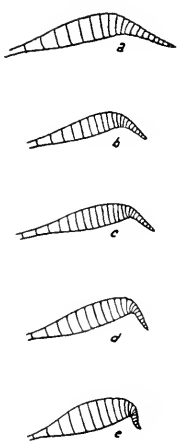


Fig. 27. Antennal clubs of *Poanes*. a. *viator*, b. *massasoit*, c. *hobomok*, d. *taxiles*, e. *melane*

Genus POANES Scudder

Poanes Scudder, Syst. Rev., 55, (76), 1872. Type *Hesperia massasoit* Scud.

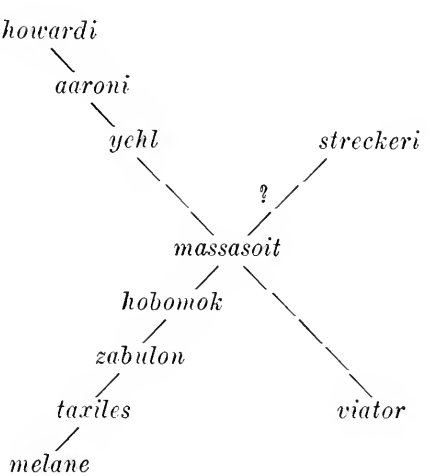
Phycanassa Scud., op. cit. 56, (77). Type *Hesperia viator* Edw.

Paratrytone Dyar, Jn. N. Y. Ent. Soc. XIII, 136, 1905. Type *Pamphila howardi* Skinner.

Palpi oblique; second joint shaggy, third small, not long though sometimes rendered prominent by its vestiture. Antennae about one-half as long as primaries; club large, apiculus varying from rather slender and slightly shorter than thickness of club to long, thick, tapering and not well reflexed. Primaries trigonate; costa slightly convex; outer margin slightly to prominently rounded; apex rather

prominent. Secondaries broadly rounded, slightly lobed at anal angle. Cell of primaries well over one-half as long as wing; vein 5 moderately curved in basal half, arising nearer to 4 than to 6; 2 nearer to 3 than to base of wing. Cell of secondaries less than one-half as long as wing. Mid tibiae with a few long spines. Fig 27.

Hobomok, zabulon, taxiles, and *melane* were first placed in *Poanes* by Barnes and McDunnough (Contributions III, 132, 1916). Although *melane* is rather anomalous, it apparently belongs with the other species, whose relation to *massasoit* through *hobomok* is obvious. Owing to the great range of variation thus introduced into the genus in the structure of the antennae, palpi, and wings, I have added also *viator,* which differs somewhat in wing form, and the species placed by recent writers in *Paratrytone.* These last possess the stigma in the male but it is so variable that I regard it as in the process of development. In *howardi, aaroni,* and *streckeri* it is very slender, sometimes scarcely visible but often well marked, and in *yehl* it is heavier but very variable. In one of the types it is slender, while in the other it is as heavy as in some specimens of *conspicua.* Including all of these species *Poanes* becomes such a complex genus that I have drawn up the following diagram to show the apparent relations of the several groups:



Key to the species

1. Under surface of secondaries with bright yellow marks.....2
   No clear yellow on under surface.....4
2. Yellow a broad transverse band crossed by a broad ray through cell..3
   Yellow much more extensive.....*zabulon*
3. Wings broadly yellow-fulvous with narrow fuscous margins; yellow of under surface rather dull.....*taxiles*
   Wings less broadly fulvous and more or less fuscous within outer margin; yellow of under surface of secondaries very bright.....*hobomok*
   Wings dark, with or without small pale spots.....*massasoit*
4. Upper surface of secondaries with pale markings indefinite, or faint; sometimes immaculate.....5
   This surface with a bright yellow-fulvous patch.....8
5. Pale spot in cell of primaries at least faintly indicated....*pocahontas*
   No trace of this spot.....6
6. Wings immaculate above.....*massasoit* form *suffusa*
   Wings with pale spots.....7
7. Under surface with some bluish irroration.....*zabulon* ♀
   Without bluish irroration.....*melane*
8. Primaries with definite spots or a dark stigma.....9
   Spots diffuse, extended, or discal area broadly yellow-fulvous; male stigma pale, slender.....10
9. ♂ with stigma; ♀ with three small, round, pale spots on under surface of secondaries.....*yehl*
   ♂ without stigma; ♀ without such spots.....*viator*
10. Under surface of secondaries with a vague, pale dash through cell .....*howardi, aaroni*
    Under surface partly greenish-fuscous with contrasting pale veins .....*streckeri*

1. *POANES VIATOR*

Hesperia viator Edw., Proc. Ent. Soc. Phil. IV, 202, pl. I, f. 5, 1865.
Scudder, Butt. New Eng. II, 1604, 1889.
Holland, Butterfly Book 362, pl. XLVI, f. 15, 1898.

New York, New Jersey, Michigan, Southeastern Canada, Omaha, Neb., (Leussler); June to August.

2. *POANES MASSASOIT*

Hesperia massasoit Scud., Proc. Ess. Inst. III, 171, 1863.
Scudder, Butt. New Eng. II, 1597, 1889.
Holland, Butterfly Book 361, pl. XLVI, ff. 21, 22, 1898.

New Jersey, New York, Rhode Island, Iowa, July. Skinner (Cat. p. 80) records it westward and southward to Texas and Colorado.

The male is either immaculate blackish brown above or with a few small yellow-fulvous spots, while the female frequently has the spots of large size an . a very pale shade.

Form *SUFFUSA*

Pamphila massasoit, var. *suffusa* Laurent, Ent. News III, 15, 1892.
Skinner, Ent. News XI, pl. II, f. 22, 1900.
Kellogg, Am. Ins. pl. IX, f. 22, 1904.

New Jersey, New York; June and July.

The pale area of the under surface of the secondaries of this form is heavily powdered with rusty brown scales.

3. *POANES HOBOMOK*

Hesperia hobomok Harris, Ins. Inj. Veg. 3rd ed., 313, f. 137, 1862.
Atrytone zabulon Scud., (not Bd. & Lec.), Butt. New Eng. II, 1617, 1889.
Atrytone zabulon Holland (not Bd. & Lec.), Butterfly Book 364, pl. XLVII, ff. 37, 38, 1898.

West Virginia north into Canada and west into Nebraska; May and June.

♀ form *POCAHONTAS*

Hesperia pocahontas Scud., Proc. Ess. Inst. III, 171, 1863.
Hesperia quadaquina Scud., Proc. Bost. Soc. Nat. Hist. XI, 381, 1868.
Scudder, Butt. New Eng., II, 1617, 1889.
Skinner, Ent. News XI, pl. II, ff. 3, 4, 1900 (not normal *hobomok* ♀).

Northeastern United States, Quebec; June.

Pocahontas differs from the normal female in the pale shade and greater restriction of the spots on the upper surface, and the brown powdering of the secondaries below.

4. *POANES ZABULON*

Hesperia zabulon Boisd. & Lec., Lep. Am. Sept. pl. 76, ff. 6, 7, 1833.
Hesperia zabulon, form *pocahontas* Holland (not Scudder), Butterfiy Book 364, pl. XLVII, f. 39, 1898.

Illinois, Pennsylvania, Kentucky, North Carolina; May and August.

Holland's figure looks much more like the true female of *zabulon* than like *pocahontas*, though it is impossible to identify a figure of the upper surface accurately. The under surface of the secondaries of the male of *zabulon* is bright yellow with a few marks of brown. In the female the brown areas are more extensive and the entire wing is so heavily powdered with rusty scales that it is difficult to trace the pale areas at all.

5. *POANES TAXILES*

Pamphila taxiles Edwards, Trans. Am. Ent. Soc. IX, 5, 1881.
Holland, Butterfly Book 365, pl. XLVII, ff. 31, 32, 1898.

Colorado and Arizona, June and July. Nevada, N. M.

6. *POANES MELANE*

Hesperia melane Edw., Trans. Am. Ent. Soc. II, 312, 1869.
Biol. Cent.-Am., Rhop. II, 494, pl. 94, ff. 30-34, 1900.
Holland, Butterfly Book 365, pl. XLVI, ff. 7, 8, 1898.
Wright, Butt. W. Coast 249, pl. XXXI, f. 453, 1905.

California, south into Mexico; May.

Melane and the female of *taxiles* are similar but they are not difficult to separate; usually the locality from which the specimens come is sufficient.

7. *POANES HOWARDI*

Pamphila howardi Skinner, Can. Ent. XXVIII, 187, 1896.

Phycanassa viator Holland, (not Edwards), Butterfly Book pl. XLVI, f. 14, 1898. Op. cit. pl. XLVI, f. 38.

Florida.

The expanse of specimens which I have seen runs between thirty-two and thirty-six millimeters. Aside from this and its darker color the species does not differ superficially from *aaroni*.

8. *POANES AARONI*

Pamphila aaroni Skinner, Ent. News I, 6, 1890.

Holland, Butterfly Book 363, pl. XLVI, f. 37, 1898.

New Jersey, June and August. I have seen specimens only from Anglesea and Atlantic City.

Aaroni expands twenty-seven to thirty-three millimeters and is paler, more yellowish, than *howardi*. *Howardi* may yet prove to be a southern race of *aaroni*.

9. *POANES YEHL*

Pamphila yehl Skinner, Ent. News IV, 212, 1893.

Holland, Butterfly Book 359, pl. XLVI, f. 40, 1898.

Tennessee, Georgia, Mississippi; August and September.

Superficially this species looks more like a relative of *A. conspicua* but the mid tibiae are spined. The white spots on the under surface of the secondaries in the female are unique.

10. *POANES RADIANS*

Hesperia radians Lucas, Sagra's Hist. Cuba VII, 650, 1857.

Pamphila streckeri Skinner, Ent. News IV, 211, 1893.

Skinner, Ent. News XXVIII, 82, 1917.

Florida.

The only specimen which I have seen is the type of *streckeri* and since it lacks the middle legs it is impossible to place the species definitely. Barnes and McDunnough place it in the genus Euphyes in the check list, but without specimens at hand. Its superficial resemblance is rather with *aaroni*.

Genus ATRYTONE Scudder

Atrytone Scud., Syst. Rev. 56, (77), 1872. Type *Hesperia iowa* Scud.

Euphyes Scud., Syst. Rev. 59, (80), 1872. Type *Hesperia metacomet* Harris.

Anatrytone Dyar, Jn. N. Y. Ent. Soc. XIII, 140, 1905. Type *Hesperia delaware* Edwards.

Palpi upturned; second joint closely appressed, smoothly and deeply scaled; third moderate, oblique. Antennae about one-half as long as primaries; club long, moderately thick; apiculus about as long as thickness of club, sometimes a little shorter. Costa of primaries flattened or very slightly convex; outer margin moderately and almost evenly rounded; apex usually prominent. Secondaries rather small, rounded, slightly lobed at anal angle; a little more apically elongate in the females. Cell of primaries normal; discocellulars oblique, weak; vein 5 curved, nearer to 4 than to 6; 2 about intermediate between 3 and base of wing. Stigma present or absent, composed of two similar, slender, elliptic pieces placed end to end on opposite sides of vein 1. Mid tibiae without spines.

The long antennal club and spineless mid tibiae make this a very distinct genus as used here, but no characters are available for the separation of *Atrytone* and *Euphyes* of other writers except the male stigma, which is present only in the species formerly placed in *Euphyes*. The types of the two do not resemble each other, but in the species congeneric with them we find an excellent connecting series, in which *arpa* and *byssus* differ very slightly except in the stigma.

Key to the species

1. Under surface of secondaries immaculate or with a faint, pale, transverse band on disk 2
   Under surface of secondaries with two pale rays ..... *dion*
   Under surface with a few diffuse spots forming a curved transverse row ..... *conspicua*
2. Fringe of inner margin of secondaries white ..... *bimacula*
   Fringe of this margin not white 3
3. Wings immaculate fuscous above and below or with a few small pale spots on primaries (♀) ..... *vestris*
   Wings with more pale markings 4
4. Wings mostly dark brownish-gray below ..... *palatka*
   Wings tinged with yellow or red below 5
5. Stigma present ..... *arpa* ♂
   Stigma absent 6
6. Upper surface of secondaries fuscous 7
   Secondaries with fulvous discal marks 8

7. Primaries with a transverse row of fulvous spots.....*arpa* ♀
   With diffuse pale fulvous areas.....*arogos* ♀
8. Veins black.....9
   Veins not black.....*arogos*
9. Wings usually broadly yellow-fulvous with a terminal fuscous band above; immaculate yellow or brownish yellow below.....*logan*
   Wings with the fulvous definitely limited; under surface of secondaries in most specimens with a faint pale transverse band, never clear yellow .....*byssus*

1. *ATRYTONE AROGOS*

Papilio vitellius A. & S., (not Fab.), Lep. Ins. Ga. I, 33, pl. XVII, 1797.
Hesperia arogos Boisd. & Lec., Lep. Am. Sept. pl. 76, ff. 3, 4, 5, 1833.
Hesperia iowa Scud., Proc. Bost. Soc. Nat. Hist. XI, 401, 1868.
Hesperia mutius Plötz, Stett. ent. Zeit. XLIV, 199, 1883.
Atrytone vitellius Holland (not Fab.), Butterfly Book 364, pl. XLVI, f. 6, 1898.

Florida, August and September. Nebraska and Iowa, June and July. Ocean County, N. J., July (Davis).

The pale tawny wings with their broad, even, fuscous borders distinguish the male; the female is readily associated with the male, but the fuscous is more extensive, encroaching upon the discal area and often almost obliterating the tawny color.

2. *ATRYTONE LOGAN*. .

Hesperia logan Edw., Proc. Ent. Soc. Phil. II, 18, pl. I, f. 5, 1863.
Hesperia delaware Edw., op. cit. p. 19, pl. 5, f. 2.
Scudder, Butt. New Eng. II, 1614, 1889.
Biol. Cent.-Am., Rhop. II, 490, pl. 94, ff. 4-6, 1900.
Holland, Butterfly Book 365, pl. XLVI, f. 24, 25, 1898.

Florida to Texas, north to Montana and Illinois; July and August.

2a. race *LAGUS*

Pamphila lagus Edw., Trans. Am. Ent. Soc. IX, 5, 1881.

I regard this as scarcely worth separating from *logan*. It is the western race, and in extreme forms has the fuscous terminal borders reduced to very slender lines and the under surface very pale.

3. *ATRYTONE BYSSUS*

? *Hesperia bulenta* Bd. & Lec., Lep. Am. Sept. pl. 67, ff. 1-5, 1833.
Pamphila byssus Edw., Can. Ent. XII, 224, 1880.
Holland, Butterfly Book 358, pl. XLVI, f. 20, 1898.

Florida, August. Skinner includes Texas (Cat. p. 89).

Dr. McDunnough places *bulenta* tentatively as a synonym of *byssus*. The figure is a striking thing, unlike any known species of North America, but it does bear a remote resemblance to this species.

4. *ATRYTONE ARPA*

Hesperia arpa Boisd. & Lec., Lep. Am. Sept. pl. 68, 1833.

Florida, June, September and October.

The stigma is present in the males of this and all of the following species, which make up the former genus *Euphyes*.

5. *ATRYTONE PALATKA*

Hesperia palatka Edw., Trans. Am. Ent. Soc. I, 287, 1867.
Hesperia floridensis Plötz, Stett. ent. Zeit. XLIV, 196, 1883.
Scudder, Butt. New Eng. III, 1863, 1889.
Holland, Butterfly Book 358, pl. XLVI, f. 21, 1898.

Florida, May, August to October. Skinner gives its range as "Gulf States, Neb." (Cat. p. 89).

In the original description the name of this species was spelled *pilatka* but this was amended by Edwards himself in his later writings. It is the largest species of the genus.

6. *ATRYTONE DION*

Pamphila dion Edw., Can. Ent. XI, 238, 1879.

New York, Ohio, Wisconsin, Michigan, Illinois and Omaha, Neb. (Leussler); June and July. St. Louis, Mo. (Knetzger).

The pale dashes on the under surface of the secondaries are unique in this genus.

7. *ATRYTONE CONSPICUA*

Hesperia conspicua Edw., Proc. Ent. Soc. Phil. II, 17, pl. 5, f. 5, 1863.
♂ *Hesperia pontiac* Edw., op. cit. 17, pl. XI, f. 5.
Hedone orono Scud., Syst. Rev. 58, (79) 1872.
Scudder, Butt. New Eng. II, 1732, 1889.
Holland, Butterfly Book 358, pl. XLVI, ff. 16, 17, 1898.

New Jersey north to Massachusetts and west into Nebraska; July.

8. *ATRYTONE BIMACULA*

Hesperia bimacula G. & R., Ann. Lyc. Nat. Hist. N. Y. VIII, 433, 1867.
Hesperia acanootus Scud., Proc. Bost. Soc. Nat. Hist. XI, 381, 1868.
Hesperia illinois Dodge, Can. Ent. IV, 217, 1872.
Scudder, Butt. New Eng. II, 1718, 1889.

Ontario, New Jersey, New York, Iowa; July. Skinner lists Nebraska (Cat. p. 88). I have taken one specimen at Sioux City, Iowa.

The under surface of the secondaries is usually pale with the veins marked in white. The upper surface has a little yellow-fulvous on each side of the stigma in the male, and only two or three small extradiscal spots in the female which are of a very pale color.

9. *ATRYTONE VESTRIS*

Hesperia vestris Boisd., Ann. Soc. Ent. France (2), X, 317, 1852.
Hesperia metacomet Harris, Ins. Inj. Veg. 3rd ed., 317, 1862.

Pamphila rurea Edw., Proc. Acad. Nat. Sci. Phil. 1862, 58.
Hesperia kiowah Reakirt, Proc. Ent. Soc. Phil. VI, 150, 1866.
Hesperia osyka Edw., Trans. Am. Ent. Soc. I, 288, 1867.
Pamphila osceola Lint., 30th Rep. N. Y. Mus. Nat. Hist. 170, 1878.
Scudder, Butt. New Eng. II, 1739 and III, 1865, 1889.
Holland, Butterfly Book 360, pl. XLVI, f. 31, 1898.
Wright, Butt. W. Coast 247, pl. XXXI, f. 442, 1905.
Oberthür, Etudes IX, (1), pl. CCXL, f. 2093, 1913 (type).
United States and Southern Canada; May to July.

♀ form *IMMACULATUS*

Pamphila vestris, var. *immaculatus* Williams, Ent. News XXV, 267, 1914.

Described from the Jemez Mts., New Mexico. I have seen it from the White Mts., Arizona, but not from more northern localities. As the name implies, it lacks the whitish spots usually found on the primaries of the female.

Genus ATRYTONOPSIS Godman & Salvin

Atrytonopsis G. & S., Biol. Cent.-Am., Rhop. II, 497, 1900. Type *Hesperia deva* Edw.

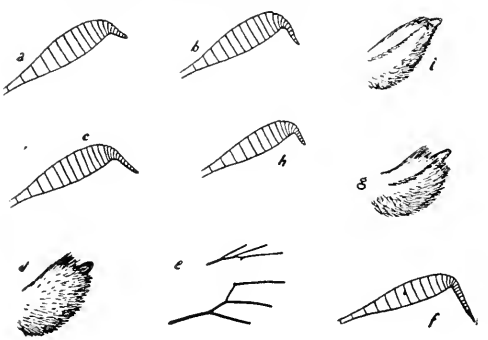


Fig. 28. Antennal clubs: a. *Atrytonopsis deva* Edw., b. *A. pittacus* Edw., c. *A. edwardsi* B. & McD., f. *Oligoria maculata* Edw. h. *Lerodea eufala* Edw., Palpi. d. *A. deva* Edw., g. *Mastor bellus* Edw., i. *Lerodea eufala* Edw., e. Detail of neuration: end of cell of primaries, *Lerema accius* S. & A.

Palpi upturned; third joint moderate, oblique, not concealed in vestiture of second. Antennae slightly less than one-half as long as primaries; club moderate, longer in female than male; apiculus shorter than thickness of club in male, equal to it or longer in female. Primaries of male apically produced; costa nearly straight; outer margin slightly rounded; apex rounded-acute. Secondaries rounded; outer margin flattened at end of cell; anal angle slightly lobed; length from humeral angle to anal angle greater than through cell in male and less in female. Cell of primaries three-fifths as long as wing; vein 5 curved at base, nearer to vein 4 than to 6; L. D. C. almost transverse; M. D. C. scarcely visible, very oblique; vein 2 almost inter-

mediate between 3 and base of cell. Stigma rudimentary, consisting of a few modified scales faintly indicating the position of the structure; well developed in a few species, where it is similar to that of *Atrytone* but more slender. Mid tibiae spiny. Fig. 28.

The absence of yellow-fulvous, frequent occurrence of gray scales on the under surface of the wings, and the acute apices of the primaries in the males of most of the species give this genus a very distinctive habitus.

Key to the species

1. Fringes not checkered....2
   Fringes checkered....7
2. Under surface of secondaries with a transverse row and three subasal white spots; not heavily gray-powdered....*loammi*
   Spots partly obsolete or hyaline....3
3. Secondaries with hyaline spots....*pittacus*
   Secondaries without hyaline spots....4
4. Fringes of secondaries white or whitish....5
   Fringes concolorous with wings or slightly paler....6
5. Fringes dirty white, usually dark at anal angle....*lunus*
   Fringes pure white, rarely intermixed with dark scales, usually not very dark at anal angle....*dera*
6. Wings very dark....*hianna*
   Wings pale....*viereckii*
7. Under surface marbled with purplish; spots semi-hyaline....*cestus*
   Under surface heavily gray powdered....8
8. Spots yellowish, opaque or nearly so....*python*
   Spots white, subhyaline....*edwardsi*

1. *ATRYTONOPSIS LOAMMI*

Lerema loammi Whitney, Can. Ent. VIII, 76, 1876.
Pamphila regulus Edw., Trans. Am. Ent. Soc. IX, 5, 1881.
Skinner, Ent. News XI, pl. II, f. 24, 1900.
Kellogg, Am. Ins. pl. IX, f. 24, 1904.

Florida, March and October. North Carolina, July.

The dark brown ground color and the pure white, opaque spots on the under surface of the secondaries separate *loammi* readily from the rest of the genus.

2. *ATRYTONOPSIS HIANNA*

Hesperia hianna Scudder, Proc. Bost. Soc. Nat. Hist. XI, 382, 1868.
Hesperia grotei Plötz, Stett, ent. Zeit. XLIV, 54, 1883.
Scudder, Butt. New Eng. II, 1771, 1889.
Holland, Butterfly Book, 366, pl. XLVI, ff. 9, 10, 1898.

Northeastern United States westward into Nebraska, Manitoba; June.

3. *ATRYTONOPSIS LUNUS*

Pamphila lunus Edwards, Papilio IV, 56, 1884.

Arizona, June to August.

Similar to *deva* but larger and darker, and with the white areas not so pure as in *deva*.

4. *ATRYTONOPSIS DEVA*

Hesperia deva Edw., Trans. Am. Ent. Soc. v, 292, 1876.

Biol. Cent.-Am., Rhop. II, 498, pl. 95, ff. 6-10, 1900.

Arizona and Utah. Skinner lists southern Colorado (Cat. p. 87).

5. *ATRYTONOPSIS VIERECKI*

Pamphila vierecki Skinner, Ent. News XIII, 213, 1902.

Ft. Wingate, New Mexico, June; two males, one compared with the type, in the Barnes collection are all that I have seen.

Vierecki is similar to *deva* but smaller, paler and more grayish, with two spots in the end of the cell of the primaries, sometimes connected, and a well marked stigma in the male.

6. *ATRYTONOPSIS PITTACUS*

Pamphila pittacus Edw., Papilio II, 138, 1882.

Biol. Cent.-Am., Rhop. II, 498, pl. 95, ff. 11-13, and 14, 15 (not *python* Edw.), 1900.

Skinner, Ent. News XI, pl. II, ff. 17, 18, 1900.

Kellogg, Am. Ins. pl. IX, ff. 17, 18, 1904.

Arizona, July.

The straight row of hyaline spots on the secondaries characterizes *pittacus* among our species.

7. *ATRYTONOPSIS PYTHON* (Plate I, Fig. 1)

Pamphila python Edw., Papilio II, 139, 1882.

Arizona, May and June.

Python is the only one of our species in which the spots are distinctly yellowish.

7a. race *MARGARITA*

Pamphila margarita Skinner, Can. Ent. XLV, 426, 1913.

Described from Jemez Springs, New Mexico.

I am not familiar with this form.

8. *ATRYTONOPSIS CESTUS*

Pamphila cestus Edw., Papilio IV, 57, 1884.

Southern Arizona. I am not familiar with this species.

9. *ATRYTONOPSIS EDWARDSI*

Atrytonopsis edwardsi B. & McD., Contributions III, (2), 135, pl. VIII, ff. 9, 10, 1916.

Pamphila cestus Wright, (not Edw.), Butt. W. Coast 249, pl. XXXII, f. 482, 1905.

Arizona.

This species was described to correct a common misconception of *cestus* and the types are undoubtedly distinct from the species on which the description of *cestus* was based. I believe that the name will fall before *Hesperia ovinia* Hew., illustrated in the Biologia (Pl. 97, ff. 1, 2, 1900) under the name *Thespieus ovinia*. The type of *ovinia* in the British Museum will have to be examined to settle the matter definitely, but even from the figures it is easy to see that the species can hardly belong in *Thespieus*.

Genus OLIGORIA Scudder

Oligoria Scud., Syst. Rev. 61, (82), 1872. Type *Hesperia maculata* Edw.

Structure not much different from *Atrytonopsis*. Male primaries less apically prolonged and without stigma. Vein 5 nearer to 4 than in the preceding genus. Middle tibiae with a few long spines. Apiculus of antennae abruptly constricted, sharply reflexed, very slender and usually about twice as long as thickness of club.

Dyar remarks (Jn. N. Y. Ent. Soc. XIII, 137, 1905) that he is unable to separate this genus from *Lerodea* and therefore places *maculata* in the latter. He is followed in this by Barnes and McDunnough in the Check List, but the differences between *maculata* and *eufala* are so striking that they must be separated. Since *maculata* agrees with no other genus known to me, I retain *Oligoria* for the one species. Fig. 28.

1. *OLIGORIA MACULATA*

Hesperia maculata Edw., Proc. Ent. Soc. Phil. IV, 202, pl. I, f. 6, 1865.

Hesperia norus Plötz, Stett. ent. Zeit. XLIV, 36, 1883.

Scudder, Butt. New Eng. II, 1761, 1883.

Holland, Butterfly Book 361, pl. XLVI, f. 35, 1898.

Florida, May to July. Skinner gives its range as the Gulf States and occasionally New York. (Cat. p. 87).

Genus LEREMA Scudder

Lerema Scud., Syst. Rev. 61, (82), 1872. Type *Papilio accius* A. & S.

Palpi oblique; third joint moderate, partly concealed by vestiture of second. Antennae about one-half as long as primaries; club moderate; apiculus slender, longer than thickness of club.

Primaries rather long; costa flattened in middle; outer margin curved, flattened before anal angle; apex rounded-rectangular. Secondaries lobed slightly at anal angle, otherwise rounded. Cell of primaries over three-fifths as long as wing; discocellulars weak, slightly oblique; vein 5 arising a little nearer to 4 than to 6, almost straight. Male with a slender, well developed stigma running from the base of vein 3 to just within the middle of vein 1. Middle tibiae with a few long spines. Fig. 28.

1. *LEREMA ACCIUS*

Papilio accius A. & S., Lep. Ins. Ga. I, 45, pl. 23, 1797.
Hesperia monoco Scud., Proc. Ess. Inst. III, 178, 1863.
Hesperia punctella G. & R., Trans. Am. Ent. Soc. I, 1, 1867.
Hesperia nortonii Edw., Trans. Am. Ent. Soc. I, 287, 1867.
Scudder, Butt. New Eng. II, 1768, 1889.
Holland, Butterfly Book 366, pl. XLVIII, f. 8, 1898.
Biol. Cent.-Am., Rhop. II, 554, pl. 99, f. 44, 1900.

Southern half of United States east of Rockies; May, July, August, October, November. Skinner (Cat. p. 87) mentions a record by Aaron from Eastern Pennsylvania.

Genus EPIPHYES Dyar

Epiphyes Dyar, Jn. N. Y. Ent. Soc. XIII, 132, 1905. Type *Pamphila carolina* Skinner.

I have seen but one poor specimen of the female of *carolina*. From it nothing can be told except that vein 5 is but slightly curved and not much nearer to 4 than to 6. It therefore belongs with Lerema and allied genera, and according to Dyar's description of the male stigma it should constitute a good genus. The original description of Epiphyes is as follows: "Antennal club cylindrical, the point rather obtuse and about equal to the diameter of the club. Palpi with the third joint moderate, rather slender; wings normal, vein 2 arising at the middle of the cell, 3 before the end. Mid tibiae spiny. Male stigma a large, ill defined blotch. Type *Pamphila carolina* Skinner."

1. *EPIPHYES CAROLINA*

Pamphila carolina Skinner, Ent. News III, 222, 1892.
Holland, Butterfly Book 367, pl. XLVI, f. 36, 1898 (type).

North Carolina.

The species is easily recognized by the well defined, pale yellow maculation and the form of vein 5 of the primaries.

Genus MASTOR Godman & Salvin

Mastor G. & S., Biol. Cent.-Am., Rhop. II, 567, 1900. Type *Mastor anubis* G. & S.

? Megistias G. & S., op. cit. 571. Type *Hesperia tripunctata* Latr.

Palpi upturned; third joint small. Antennae slightly more than one-half as long as primaries in male, less in female; apiculus shorter than thickness of club and variously reflexed; club short, rather stout. Costa of primaries flattened; outer margin slightly rounded; apex somewhat produced. Secondaries broadly rounded, relatively small; in the female the primaries are less produced and the apex of the secondaries more prominent than in the male, much as in *Atrytone*. The male possesses a small stigma made up of a dot of scales below vein 2 and a longer patch above, variably developed in different specimens. It is much larger in *bellus* than in *phylace*, very small in oslari and absent in *fusca*. Cell of primaries normal; vein 5 slightly curved, arising a little nearer to 4 than to 6. Mid tibiae with a few spines. Fig. 28.

I believe that *oslari* is more closely related to *A. nanno* than to *bellus*, and am placing *fusca* in this genus rather doubtfully. Unfortunately I have not had sufficient material for dissection in this group and have therefore been unable to make a careful study of the anatomy of the doubtful species. I am unable to find a good basis of separation for *fusca*, which Godman and Salvin say belongs in *Megistias*, but I am not familiar with *tripunctata* so *Megistias* may not fall before *Mastor*.

Key to the species

1. Vestiture of head and fringes golden.....*bellus*
   Head golden; fringes whitish.....*phylace*
   Without golden vestiture.....2
2. Under surface powdery gray.....*oslari*
   More or less yellowish below, never powdery gray.....*fusca*

1. *MASTOR FUSCA*

Hesperia fusca G. & R., Trans. Am. Ent. Soc. I, 2, 1867.

Southern United States, New Jersey, Pennsylvania; April to July. St. Louis, Mo., (Knetzger).

Fusca is usually immaculate grayish fuscous above and slightly tinged with yellowish below, especially on the veins of the secondaries. Occasion-

al specimens show a faint trace of spots on the upper surface of the primaries, and frequently the ground color is darker.

2. *MASTOR BELLUS*

Pamphila bellus Edw., Papilio IV, 57, 1884.
Biol. Cent.-Am., Rhop. II, 568, pl. 100, f. 36, ♂ gen., 1900.
Skinner, Ent. News XI, pl. II, ff. 11, 12, 1900.
Kellogg, Am. Ins. pl. IX, ff. 11, 12, 1904.
Wright, Butt. W. Coast 247, pl. XXXI, f. 443, 1905.
Arizona, May to July.

3. *MASTOR PHYLACE*

Pamphila phylace Edw., Field and Forest III, 117, 1878.
Arizona, Colorado, New Mexico; June.

4. *MASTOR OSLARI*

Pamphila oslari Skinner, Ent. News X, 112, 1899.
New Mexico, Arizona, Colorado; April, June to August.

Oslari is usually pale fuscous above, but occasionally a series will show some yellow fulvous scales on the disk of the primaries and a faint trace of indefinite spots such as are always present in *A. nanno*. Such specimens may be separated from *nanno* by the gray under surface of the secondaries with vague pale spots instead of small sharp ones.

Genus AMBLYSCIRTES Scudder

Amblyscirtes Scud., Syst. Rev. 54, (75), 1872. Type *Hesperia vialis*. Edw.
Stomyles Scud., op. cit. 55 (76). Type *Pyrgus textor* Hbn.

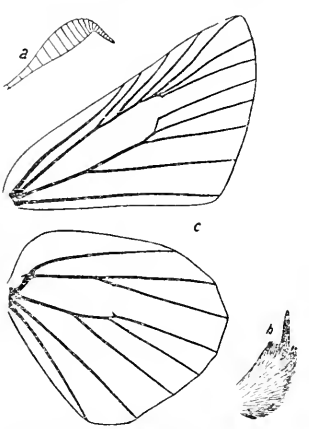


Fig. 29. *Amblyscirtes vialis* Edw. a. Club of antenna, b. Palpus, c. Neuration

Palpi large, upturned; second joint with shaggy vestiture; third slender, smooth, vertical; almost as long as second except in *nanno*. Antennae moderate; club large; apiculus longer than thickness of club. Primaries in most species similar in the two sexes, less apically produced than in the related genera; costa flattened; apex rounded-rectangular; outer margin strongly rounded except toward anal angle; cell about three-fifths as long as wing; discocellulars very weak and only slightly oblique; vein 5 weakly curved

toward base, a little nearer to 4 than to 6; secondaries rounded, in most of the species longer through the cell than in the related genera. Male stigma small, sometimes scarcely visible, composed of a short, oblique dash above the base of vein 2 and a smaller longitudinal dash below it. Middle tibiae spiny. Fig. 29.

The checkered fringes of this genus are a convenient superficial character, and indeed the only one by which *nanno* can readily be placed. The other species are readily referred to the genus by the long third joint of the palpi, taken with the apiculus of the antennae. Whether *nanno* should be left in *Amblyscirtes* is a question which I have been unable to settle; its similar habitus would cause me to hesitate to remove it.

Key to the species

1. Vestiture of under surface of secondaries with no suggestion of green. 2
   Under surface of secondaries more or less greenish. 9
2. Spots on under surface of secondaries connected by pale lines on veins . . . . . *textor*
   No such lines. 3
3. Under surface of secondaries with diffused pale spots or immaculate. . 4
   With well defined pale spots. 8
   With a brown patch in the middle. . . . . *nysa*
4. All maculation above yellow-fulvous. . . . . *cassus*
   Subapical spots of primaries, at least, whitish. 5
5. Secondaries without pale spots below. . . . . *vialis*
   With a transverse row of powdery pale spots. 6
6. Maculation of upper surface tinged with yellow-fulvous. . . . . *aenus*
   No trace of yellow-fulvous. 7
7. Irroration of under surface smooth, fine. . . . . *alternata*
   Irroration with a rough appearance. . . . . *celia*
8. Under surface dark, irroration sparse; spots small and powdery but sharply contrasting. . . . . *nanno, elissa*
   Under surface finely and smoothly grayish-irrorate; spots very sharply defined, moderate. . . . . *comus*
9. Under surface pale greenish-gray; primaries with spots between veins 4 and 6 above; southwestern species. . . . . *nereus*
   Darker greenish-gray; very bright in fresh specimens; spots at end of cell of primaries usually lacking; eastern species. . . . . *hegon*

1. *AMBLYSCIRTES NANNO*

Amblyscirtes nanno Edw., Papilio II, 142, 1882.
Biol. Cent.-Am., Rhop. II, 504, pl. 95, ff. 31-34, 1900.
Wright, Butt. W. Coast 250, pl. XXXI, f. 455, 1905.
Arizona, July.

The primaries of *nanno* are more apically produced and the secondaries relatively smaller and more rounded than in the normal species of *Amblyscirtes*.

2. *AMBLYSCIRTES ELISSA*

Amblyscirtes elissa G. & S., Biol. Cent.-Am., Rhop. II, 505, pl. 95, ff. 40, 41, 1900.

Skinner, Ent. News XV, 344, 1904.

I have not seen this species. Apparently it is very similar to *nanno*. Skinner reports it from Cochise County, Arizona.

3. *AMBLYSCIRTES AENUS*

Amblyscirtes aenus Edw., Field and Forest III, 118, 1878.

Holland, Butterfly Book 341, pl. XLVII, f. 7, 1898.

Colorado, Texas, Arizona, New Mexico; May to July.

4. *AMBLYSCIRTES CASSUS*

Amblyscirtes cassus Edw., Papilio III, 72, 1883.

Amblyscirtes simius Wright, (not Edw.), Butt. W. Coast pl. XXXI, f. 454, 1905.

Arizona; June, July and September.

The under surface of the secondaries of *cassus* is heavily irrorate with pale gray scales which give these wings a roughened appearance. The spots are large and distinct but vaguely defined.

5. *AMBLYSCIRTES CELIA*

Amblyscirtes celia Skinner, Ent. News VI, 113, 1895.

Texas, March, April and July.

There is a specimen in the Barnes collection which has been compared with the type, and from which I have noted that the under surface of the secondaries is finely but rather sparsely and roughly powdered with gray; spots small but not clear-cut.

6. *AMBLYSCIRTES VIALIS*

Hesperia vialis Edw., Proc. Acad. Nat. Sci. Phil. 1862, 58, 1862.

Scudder, Butt. New Eng. II, 1582, 1889.

Holland, Butterfly Book 340, pl. XLVII, f. 5, 1898.

United States and Southern Canada; May, June, July, August.

7. *AMBLYSCIRTES HEGON*

Hesperia hegon Scud., Proc. Ess. Inst. III, 176, 1863.

Hesperia samoset Scud., op. cit. 176.

Hesperia nemoris Edw., Proc. Ent. Soc. Phil. II, 507, 1864.

Scudder, Butt. New Eng. II, 1589, 1889.

Holland, Butterfly Book 340, pl. XLVII, f. 6, 1898.

Georgia north into Canada and west to central Iowa; May and June; August in the north.

Hegon is more commonly known as *samoset*. It is similar to *nereus* but the transverse row of spots on the primaries is usually less complete and fresh specimens are much more greenish below. The distribution is sufficient to separate specimens which bear locality labels.

8. *AMBLYSCIRTES NEREUS*

Hesperia nereus Edw., Trans. Am. Ent. Soc. v, 207, 1876.
Biol. Cent.-Am., Rhop. II, 502, pl. 95, ff. 27-30, 1900.
Arizona, June to August.

9. *AMBLYSCIRTES ALTERNATA*

Hesperia alternata G. & R., Trans. Am. Ent. Soc. I, 3, 1867.
Hesperia cos Edwards, Trans. Am. Ent. Soc. III, 276, 1871.
Amblyscirtes meridionalis Dyar, Jn. N. Y. Ent. Soc. XIII, 135, 1905.
Georgia; Skinner lists *cos* from Texas, Georgia and Florida.

A specimen which Dr. McDunnough placed as *alternata* in the Barnes collection proved to be the same as Dyar's types of *meridionalis* in the Streeker collection, and the descriptions of all of the species lead me to believe that they are synonyms. The primaries are apically produced, so that the outer margin is longer than in *vialis*, and the fringes are an unusually pure white, as in *nysa*. The under surface has a transverse row of faint, powdery spots on the secondaries and is otherwise similar to *vialis*.

10. *AMBLYSCIRTES NYSA*

Amblyscirtes nysa Edw., Can. Ent. IX, 191, 1877.
Pamphila similis Streeker, Lep. Rhop. & Het. 131, 1878.
Texas and Arizona, March to June.

The under surface of the secondaries is distinctive and the fringes are a clearer white than in any other species than *alternata*. The upper surface of *nysa* is very similar to that of *alternata* in all particulars.

11. *AMBLYSCIRTES COMUS*

Hesperia comus Edw., Trans. Am. Ent. Soc. v, 206, 1876.
Amblyscirtes nilus Edw., Field and Forest III, 118, 1878.
Pamphila quinquemacula Skinner, Ent. News XXII, 413, 1911.
Biol. Cent.-Am., Rhop. II, 502, pl. 95, ff. 25, 26, 1900.
Texas and Arizona, August.

From a specimen in the Barnes collection compared with Edward's material I have noted that the under surface is finely and smoothly grayish irrorate and the spots small, white, sharply defined and not crowded together.

12. *AMBLYSCIRTES TEXTOR*

Pyrgus textor, Hübner, Zutr. exot. Schmett. pl. 89, ff. 515, 516, 1825.
Hesperia oneko Scud., Proc. Ess. Inst. III, 176, 1863.
Hesperia wakulla Edw., Trans. Am. Ent. Soc. II, 311, 1869.
Holland, Butterfly Book 341, pl. XLVII, f. 16, 1898.

North Carolina and Kentucky to Texas; August.

The under side of the secondaries is very strikingly different from any other species, but I see no structural basis for *Stomyles*, of which *textor* is the type.

Genus LERODEA Scudder

Lerodea Scud., Syst. Rev. 59, 1872. Type *Hesperia eufala* Edw.

Palpi upturned, very smoothly scaled; third joint about half as long as second but buried in vestiture of second almost to its tip. Antennae much less than one half as long as primaries; apiculus slender, shorter than thickness of club. Primaries apically produced; costa slightly emarginate or straight except at apex and humeral angle; outer margin slightly sinuate, convex from apex to vein 2. Secondaries rounded, lobed at anal angle. Both primaries and secondaries longer and more rounded in the female than in the male. Cell of primaries about three-fifths as long as wing; discocellulars weak, scarcely oblique; vein 5 almost straight, about two-thirds as far from 4 as from 6; 2 much nearer to 3 than to base of wing in both sexes. Male without stigma. Mid tibiae spined. Fig. 28.

1. *LERODEA ARABUS*

Pamphila arabus Edw., Papilio II, 26, 1882.

Arizona, April.

Differs from *eufala* in the presence of a dark brown discal shade on the under surface of the secondaries.

2. *LERODEA EUFALA*

Hesperia eufala Edw., Trans. Am. Ent. Soc. II, 311, 1869.
Pamphila floridae Mab., Bull. Soc. Ent. France (5), VI, p. IX, 1876.
Holland, Butterfly Book 356, pl. XLVI, f. 33, 1898.
Biol. Cent.-Am., Rhop. II, 500, pl. 95, ff. 16-18, 1900.
Wright, Butt. W. Coast pl. XXXI, f. 445a, b, 1905 (as *nereus*).

Florida, Texas, Arizona; April to July, October and November.

GROUP D

Key to the genera

1. Middle tibiae without spines.....*Prenes*
   Middle tibiae spined.....2
2. Male with stigma; under surface of secondaries mottled with several shades.....*Thespieus*
   Male without stigma; under surface of secondaries uniformly colored.....*Calpodes*

Genus THESPIEUS Godman & Salvin

Thespieus G. & S., Biol. Cent.-Am., Rhop. II, 519, 1900. Type *Hesperia dalmani* Latr.

This genus is very close to *Calpodes* and the male genitalia of the two illustrated by Godman and Salvin are similar, but I have very little material of *Thespieus* and have not seen the typical species, so I hesitate to sink it.

1. *THESPIEUS MACAREUS*

Goniloba macareus H.-S., Corr. Blatt Regensb. XXIII, 192, 1869.
Biol. Cent.-Am., Rhop. II, 520, pl. 96, ff. 41-43, 1900.
Skinner, Ent. News XIII, 183, 1902.

Macareus has been recorded from the southwestern part of our country and Marco Id., Fla.; I have not seen the species.

Genus CALPODES Hübner

Calpodes Hbn., Verz. bek. Schmett. 107, 1820. Type *Papilio ethlius* Cr.

Palpi upturned, closely appressed; third joint small, almost entirely concealed. The palpi resemble those of most species of Group A of the Hesperiinae. Antennae less than one-half as long as primaries; club stout, apiculus exceeding thickness of club, sharply reflexed. Primaries with the apex produced and subtruncate, longer in the female than in the male; secondaries strongly lobed at the anal angle, broader and more rounded in the female than in the male. Neuration as in *Prenes*. Mid tibiae with short prostrate spines on the inner surface. Fig. 30.

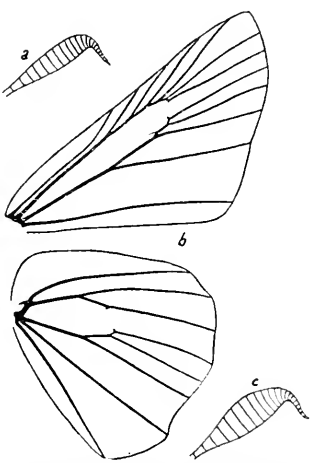


Fig. 30. *Prenes* and *Calpodes*. a. Club of antenna of *P. ocola* Edw., b. Neuration of *ocola*, c. Club of antenna of *C. ethlius* Cramer

1. *CALPODES ETHLIUS*

Papilio ethlius Cramer, Pap. Exot. IV, 212, pl. CCCXCII, ff. A, B, 1782.
Hesperia chemnis Fab., Ent. Syst. III, (1), 331, 1793.
Eudamus olynthus Bd. & Lec., Lep. Am. Sept. pl. 75, ff. 1, 2, 1833.
Scudder, Butt. New Eng. II, 1750, 1889.
Holland, Butterfly Book 355, pl. XLV, f. 3, 1898.

Biol. Cent.-Am., Rhop. II, 507, pl. 95, ff. 45, 46, 1900.

Florida to Texas, June. Skinner lists it as occasional in New York, (Cat. p. 88). St. Louis, Mo., (Knetzger).

Ethlius is readily distinguished by its large size, the long cell of the primaries, the form of the palpi and the presence of hyaline spots on the secondaries.

2. *CALPODES COSCINIA*

Goniloba coscinia H.-S., Corr.-Blatt Regensb. XIX, 54, 1865.

? *Hesperia ares* Feld., Verh. z.-b. Ges. Wien XII, 477, 1862.

Brownsville and San Antonio, Texas, May.

Barnes and McDunnough list *ares* as a doubtful synonym of *coscinia* while Godman and Salvin in the Biologia make it a synonym without qualification. If the two names refer to the same species, *ares* should be used; I know of nothing which will settle the matter at present. *Coscinia* differs from *ethlius* and *T. macareus* in the absence of hyaline spots from the secondaries.

Genus PRENES Scudder

Prenes Scud., Syst. Rev. 60, (81), 1872. Type *Hesperia panoquin* Scud.

Similar to *Calpodes* but with the wings more angular and the mid tibiae without spines. Fig. 30.

Prenes is very close to the Old World genus *Parnara* and may fall before it. Dr. W. T. M. Forbes tells me that he is unable to separate the two, and from a superficial study of the genotypes I have found nothing which will differentiate them. I prefer to retain *Prenes*, however, until I can make dissections of the type of *Parnara* for more accurate study.

Key to the species

1. Secondaries with a few pale spots below.....2
   Secondaries immaculate below or with pale dashes or very faint traces of spots.....4
2. Upper surface powdered with yellowish scales.....*panoquinoides*
   Upper surface without yellowish scales.....3
3. A pale spot in end of cell of primaries; spots on under surface bluish .....*nero*
   No spot in cell; spots below not bluish.....*errans*
4. Two pale dashes on under surface of secondaries.....*panoquin*
   Usually immaculate; never with dashes.....*ocola*

1. *PRENES NERO*

Hesperia nero Fab., Ent. Syst., Supp. 433, 1798.

Hesperia nyctelius Latr., Enc. Meth. IX, 746, 1823.

Goniloba corrupta H.-S., Corr.-Blatt Regensb. XIX, 54, 1865.
Goniloba sylvicola H.-S., op. cit., p. 55.
Hesperia fusina Hew., Desc. Hesp. 30, 1868.
Hesperia fufidia Hew., Ann. & Mag. Nat. Hist. (4), XIX, 81, 1877.
Biol. Cent.-Am., Rhop. II, 509, pl. 96, ff. 4-7, 1900.

Florida.

Differs from *ocola* in the presence of a pale spot in the end of the cell of the primaries and a transverse row of faint, bluish spots on the under surface of the secondaries. The synonymy is that of Godman and Salvin.

2. *PRENES PANOQUIN*

Hesperia panoquin Scud., Proc. Ess. Inst. III, 178, 1863.
Hesperia ophis Edw., Trans. Am. Ent. Soc. III, 216, 1871.
Scudder, Butt. New Eng. III, 1867, 1889.
Skinner, Ent. News XI, pl. II, ff. 13, 14, 1900.
Kellogg, Am. Ins. pl. IX, ff. 13, 14, 1904.

Florida, New Jersey; April, May, August.

3. *PRENES PANOQUINOIDES*

Pamphila panoquinoides Skinner, Ent. News II, 175, 1891.
Skinner, Ent. News XI, pl. II, f. 26, 1900 (type).
Kellogg, Am. Ins. pl. IX, f. 26, 1904 (type).

Florida. This species is slightly powdered with yellowish scales above but less heavily than panoquin, from which it differs also in the absence of the large dashes of the under surface.

4. *PRENES ERRANS*

Pamphila errans Skinner, Ent. News III, 174, 1892.
Wright, Butt. W. Coast pl. XXXI, f. 445, 1905 (as *nereus*).

California, July and August.

Differs from *ocola*, which it closely resembles, in the presence of a transverse row of pale spots on the under side of the secondaries, which are not bluish as in *nero*.

5. *PRENES OCOLA*

Hesperia ocola Edw., Proc. Ent. Soc. Phil. II, 20, pl. XI, f. 4, 1863.
Prenes hecebolus Scud., Syst. Rev. 60, (81), 1872.
Pamphila ortygia Möschl., Verh. z.-b. Ges. Wien XXXII, 328, 1882.
Scudder, Butt. New Eng. III, 1866, 1889.
Pamphila parilis Mab., Comp. Rend. Soc. Ent. Belg. XXXV, CLXXI, 1891.
Holland, Butterfly Book 355, pl. XLVI, f. 34, 1898.
Biol. Cent.-Am., Rhop. II, 511, pl. 96, ff. 13-15, 1900.

Kentucky, Florida, Mississippi and Texas; May, July to October. Skinner (Cat. p. 88) adds Indiana and Eastern Pennsylvania.

Ocola is usually immaculate below but some specimens show a trace of the spots which mark *errans*, though they are not, as a rule, sufficiently well marked as to cause difficulty in separating the species. They never

have the marked blue shade found in *nero*. In the synonymy of *ocola* I follow Godman and Salvin (Biol. 511), who say that they have seen the types of all three synonyms and find them to "show no tangible difference."

DOUBTFUL SPECIES AND GENERA

Genus POTANTHUS Scudder

Potanthus Scud., Syst. Rev. 54, (75), 1872. Type *Hesperia omaha* Edw.

1. *POTANTHUS OMAHA*.

Hesperia omaha Edw., Proc. Ent. Soc. Phil. II, 21, 1863.
Hesperia mingo Edw., Proc. Ent. Soc. Phil. VI, 207, 1866.
Potanthus californica Scud., Syst. Rev. 54, (75), 1872.
Scudder, Butt. New Eng. III, 1861, 1889.
Potanthus dara Dyar (Kollar?), Bull. 52, U. S. N. M., p. 48, 1902.

The early literature gives the range of this species as West Virginia, Colorado and California. Edwards places the species next to *palaemon* in his catalogue (Cat. Diurn. Lep. 48, 1877), and Dyar regards it as the Oriental species, *Padraona dara* Kollar. It is very difficult to say what it may be from the scanty evidence available.

2. *ATRYTONE KUMSKAKA*

Hesperia conspicua Scud. (not Edw.), Trans. Chi. Acad. Sci. I, 336, 1869.
Atrytone kumskaka Scud., Can. Ent. XIX, 45, 1887.

According to the description this is a true *Atrytone* which Scudder has mistaken for the female of *conspicua*. Dr. McDunnough tells me that Scudder's figure of the male genitalia resembles those of *byssus*, but it seems to me that the description itself suggests a dark female of *hobomok*. The type locality is Dennison, Iowa, but I have never taken anything in western Iowa which might be the species.

3. *THANAOS RUTILIUS* (*nomen nudum*)

Nisoniades rutilius Mead, U. S. Geog. Surv. W. 100th Merid. V, 787, 1875.

The reference reads as follows: "One individual, now in Mr. Scudder's hands for description, was taken June 23, at Turkey Creek Junction." The specimen was probably placed by Scudder with another species.

Family MEGATHYMIDAE

Barnes and McDunnough, Contributions I, number III, 1912, Revision of the Megathymidae.

Head small, much narrower than the thorax. Palpi rather small, oblique. Antennae moderate; club large, stout and pyriform to more cylindrical with a rudimentary apiculus. Venation much as in the Pamphilinae; vein 3 of the primaries varying in

position between the sexes of several species. Larvae borers in stems of plants. Fig. 31.

Barnes and McDunnough's revision of this family is so satisfactory that I am going into very little detail in treating it. I have worked out the following key to the North American species of Megathymus from the material in the Barnes collection, and believe that it will suffice for the determination of most of the material likely to fall into the hands of collectors; those who are deeply interested in the family will doubtless obtain the few articles which are useful to students who make these insects a hobby. Only one genus is represented in our fauna.

Fig. 31. *Megathymus streckeri* Skinner. Club of antenna

Genus MEGATHYMUS Scudder

Megathymus Scud., Syst. Rev. 62, (83), 1872. Type *Eudamus yuccae* Boisd. & Lec.

Characters of the family.

Key to the species

1. Under surface with a large white patch contiguous to vein 8 of the secondaries, or this spot the largest on the wing; no more than a trace of extra-median pale spots on secondaries.....*yuccae* 2
   Under surface of secondaries with a more or less complete transverse row of pale spots and with larger spot on vein 8 outward.....3
2. Size large, 55 to 75 mm. Spots of upper surface bright yellow. Under surface of secondaries gray at margins.....*yuccae*
   Size smaller, seldom over 55 mm. Spots pale yellow. Outer margin of secondaries narrowly or not at all pale.....race *coloradensis*
   Size similar to *coloradensis*. Spots yellowish to white. Secondaries with a broad pale outer border.....race *navajo*
3. Size very large, 65 to 90 mm. Spots of primaries bright yellow. Secondaries without discal spots above and with at most a slender, linear pale margin.....*ursus*
   Size smaller, not over 70 mm. Secondaries with discal spots, a crenulate marginal band or with pale areas not bright yellow.....4
4. Under surface of secondaries smooth, powdered with blue-gray scales at outer margin.....*cofaqui*
   Under surface of shaggy appearance, washed with gray scales and hairs over entire surface, sometimes most evidently between transverse row of spots and outer margin.....5
5. Upper surface of primaries with a pale basal area contiguous to vein 1; spots yellow to yellowish-fulvous, or with a transverse sub-basal row of spots on the under surface of the secondaries.....6
   This area seldom present, if so powdery and not contiguous to vein 1

and with maculation not bright yellow. No transverse row of spots near base of secondaries below.....7

6. Expanse 40 to 50 mm. Larger specimens females with pale spots of primaries broadly confluent and veins concolorous.....*polingi*
Expanse 50 to 70 mm., smaller specimens males with spots separated by dark veins or by broader dark areas.....*aryxna, neumoegeni*
Expanse 50 mm. or slightly over. Spots small, rounded and whitish. Southern California.....race *stephensi*

7. Spots yellowish white to pale yellow; at least one extra-discal spot on under surface of secondaries and rarely some above.....*streckeri*
Spots deeper yellow; extra-discal spots obsolete, not more than one or two fine points present, or with discal spots above.....race *texana*
Spots greatly reduced, yellowish; extra-discal band on under surface of secondaries evenly curved but irregular. Spot in end of cell of primaries linear, bent, in apical angle.....*smithii*

1. *MEGATHYMUS YUCCAE*

Eudamus yuccae Boisd. & Lec., Lep. Am. Sept. pl. 70, 1833.
Riley, 8th Rep. St. Ent. Mo., 169-182, 1876 (Biol.).
Florida, Georgia, South Carolina; April and May.

1a. race *COLORADENSIS*

M. yuccae, var. *coloradensis* Riley, Trans. Acad. Sci. St. Louis III, 567, 1877.
Colorado, April.

1b. race *NAVAJO*

M. yuccae, var. *navajo* Skinner, Ent. News XXII, 300, 1911.
Skinner, Trans. Am. Ent. Soc. XXXVII, 209, pl. x, 1911.
Texas, New Mexico, Arizona, S. California; April to June.

2. *MEGATHYMUS URSUS*

Megathymus ursus Poling, Ent. News XIII, 97, pl. 4, 1902.
Skinner, Trans. Am. Ent. Soc. XXXVII, 205, 1911.
Pima County, Arizona; August.

3. *MEGATHYMUS COFAQUI*

Aegiale cofaqui Strecker, Proc. Acad. Nat. Sci. Phil. 148, 1876.
Skinner, Trans. Am. Ent. Soc. XXXVII, 203, 1911.
Georgia, Florida; March.

The male type is a form of *streckeri* to which Barnes and McDunnough have given the name *texana*. The female type represents *cofaqui*. This sex may be distinguished by the slightly emarginate outer margin of the primaries and the resultant sharpness of the apex.

4. *MEGATHYMUS STRECKERI*

Aegiale streckeri Skinner, Can. Ent. XXVII, 179, 1895.
Skinner, Trans. Am. Ent. Soc. XXXVII, 204, 1911.

Southwestern Colorado, New Mexico, Cherry County, Nebraska (Leussler); May and June.

race *TEXANA*

M. streckeri, subsp. *texana* B. & McD., Contr. I, no. III, 39, pl. II, f. 9, 1912. Southern Texas.

5. *MEGATHYMUS SMITHI*

Megathymus smithi Druce, Biol. Cent.-Am., Het. II, 320, pl. 69, f. 5, 1896. Skinner, Trans. Am. Ent. Soc. XXXVII, 205, 1911.

I have seen one specimen from Corpus Christi, Texas, in the Barnes Collection.

6. *MEGATHYMUS NEUMOEGENI*

Megathymus neumoegeni Edw., Papilio II, 27, 1882.

Megathymus aryxna Dyar, Jn. N. Y. Ent. Soc. XIII, 141, 1905 (partim); (fide B. & McD.).

Skinner, Trans. Am. Ent. Soc. XXXVII, 206, 1911.

Skinner, Trans. Am. Ent. Soc. XXXVII, 207, 1911 (fide B. & McD.).

Arizona, September.

According to Barnes and McDunnough's revision the females can readily be separated from *aryxna*. They say: "in every instance the ♀ could be separated at once on wing pattern, the yellow band on primaries being much broader and either touching or broadly coalescing with the costal spot at end of cell." Of the male they say that *neumoegeni* is usually a smaller and slighter species, and give the following points of difference:

"(1) in *neumoegeni* the spots are often small, well separated, irregularly rounded; when forming a more or less coalescent band spot 2 from anal angle is usually almost square and its inner margin is not prominently wedge-shaped as in *aryxna*.

"(2) The fulvous hairing at base of both wings is much more extended in *neumoegeni*, covering on the secondaries most of the area between the subterminal spots and the base of wing. The presence or size of yellow spots in the basal area beneath the fulvous hairs we have found of no specific value.

"(3) The underside of secondaries of *neumoegeni* is usually distinctly paler in color, due to a greater sprinkling of white scales (compare Figs. 2 and 7). The whitish subterminal band is very variable in both species, in both distinctness and extent, and of no value for purposes of separation."

In spite of this great similarity of the two species, the form of the male genitalia verifies their distinctness.

6a. race *STEPHENSI*

Megathymus neumoegeni Wright (not Edw.), Butt. W. Coast 255, pl. XXXII, f. 483, 1905.

Megathymus neumoegeni subsp. *stephens*i Skinner, Ent. News XXIII, 126, 1912.

Barnes & McDunnough, Contributions I, (5), 44, 1912.
Southern California, Texas.

7. *MEGATHYMUS ARYXNA*

Megathymus aryxna Dyar, Jn. N. Y. Ent. Soc. XIII, 141, 1905.
Arizona; July, September and October.

8. *MEGATHYMUS POLINGI*

Megathymus polingi Skinner, Ent. News XVI, 232, 1905 (♀ only, fide B. & McD.).

Skinner, Trans. Am. Ent. Soc. XXXVII, 207, 1911.
Arizona, September.

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