

	No. of Specimens
1. Uniform dark chocolate brown, markings indistinct.....	18
2. Very dark, with the band on outer margin and the reniform and orbicular spots showing distinct but dark	9
3. Dark, with the same markings lighter and more contrasting	13
Total.....	40

The female parent of the brood belonged to group No. 2. It is curious that there should be fewer of this type than the others.

A REVISION OF THE BRITISH COLUMBIA SPECIES OF THE GEOMETRID GENUS HYDRIOMENA HUB.

By E. H. Blackmore, Victoria, B.C.

During the past four years I have endeavoured to try and straighten out this most difficult and perplexing group, as far as it concerned our British Columbia species. I have given papers on this genus at some of our previous meetings, bringing the changes up to date as our knowledge became more extended. In consequence of further additional research, other changes have been made which brings this particular genus pretty near perfection. What has made this genus so perplexing in the past is the fact that many species which could not be conveniently placed in any other genera, were all dumped in here, with the result that there was a heterogenous mass of species which bore no apparent relationship to each other; either in maculation or generic structure.

In 1892, Mr. Meyrick, of London, England, published a "Classification of Geometrina of the European Fauna" (Trans. Ento. Socy. London 1892, Part 1, pp. 53-140), in which he endeavoured to arrange the family on the basis of invariable structure. This classification was not entirely adopted, as he had not taken into account the known existence of intermediate forms in nature. The strictest application of his fundamental rules of classification, made some of his genera, especially the one we have under consideration, cover almost sub-family differences.

The Rev. Geo. Hulst, some four years later, published a "Classification of the Geometrina of North America" (Trans. Am. Ent. Socy., Vol. XXIII., pages 245-386), and while following Meyrick's classification in the main, he made several changes, notably in this genus **Hydriomena**, separating from it five other genera which Meyrick had placed with it, viz.: **Mesoleuca**, **Cænocalpe**, **Triphosa**, **Euchoria** and **Gypsochroa**. Even then, Hulst admitted that he had drawn an artificial line in this genus, as he says:

"I have in a sort of way made **Hydriomena** the refuge of species whose males I have not seen, and whose exact reference cannot therefore be given. The species under it are yet, in respect to palpi, antennae, and thoracic tuftings, very variable, but I hesitate to make any further divisions, as the bulk of the species lie midway between the extremes."

This is how the position stood until quite recently, although it has been felt by workers in this group for a long time past that something would have to be done to further limit this unwieldy and cumbersome genus. The true **Hydriomenas** were easily separable, and fell into a natural group, but what to do with the others was the great trouble. Out of 28 species listed by Dr. Dyar (U.S.N.M. Bull. 52, 1902) in 1902, only 8 were true **Hydriomenas**. However, in that monumental work, "Seitz Macro-Lepidoptera of the World," parts of which were first published in 1913, and which owing to the war, has never been completed, and perhaps never will be, Louis B. Prout, of the British Museum, the greatest geometridist we have today, and in whose charge the geometrid part was placed, has completely revised the whole of the family, with the result that all those fugitive species which had found a resting-place in this genus, were removed to other genera or else had new genera erected for them.

In the 1906 Check List of B.C. Lepidoptera, 13 species were listed under the genus **Hydriomena**, of which only seven were true species of this genus—the other six species have since been placed in four other different genera.

Having shown you the difficulties we have had to contend with in this group, and brought you down to the point where the true **Hydriomenas** have been at last placed by themselves, I will now go on to give a brief resume of these true species.

Previous to 1911, very little was known about the forms described by the older authors, several of them having been described from females only. In that year Mr. L. W. Swett, of Boston, Mass., published an article in the *Can. Ent.*, Vol. 43, p. 73 et seq., in which he separated them into three main groups according to the length of the palpi—short, moderate and long. This was a distinct advance on anything attempted before, and reduced them from an unwieldy mass into something like approaching order.

In the new Check List they are placed practically as Swett worked them out, but since then Messrs. Barnes and McDunnough have published a revision of this group (*Cont. N.H. Lept. No. Amer.*, Vol. IV., No. 1, May, 1917). This revision is based on the structure of the male genitalia, with special reference to the shape of the uncus, and has certainly led to a number of radical changes. The authors have retained Swett's palpal subdivisions, so that with taking these two principal char-

acters in conjunction with each other, it will be easier to separate our British Columbia species than has hitherto been the case. Messrs. Barnes and McDunnough are certainly to be congratulated on their work, which, as far as our present knowledge goes, is pretty nearly perfect.

I may state here that it is not necessary to break off the body of a cherished specimen to examine the genitalia, as by simply removing a few hairs with a fine brush from the anal segment, the uncus is exposed to view and can be readily examined under a strong lens or low-power microscope.

There are three distinct types of uncus in this group—truncate, conical and bifurcate—each of which has its own modifications and variations.

I will not take up your time in going over the whole list of British Columbia species separately, but will give you a few remarks on the new forms, with their distinguishing characteristics, and also on those which may be difficult to determine, contenting myself with giving you a list of those species that are well known and of which the names have not been changed. In their proper sequence, the latter consists of **furcata periclata** Swett; **nubilofasciata cupidata** Swett (Mr. Day, of Duncan, has taken the only specimen in British Columbia, that I have any record of); **manzanita** Taylor; **irata** Swett; **californiata** Pack; and **speciosata** Pack, with its forms **taylori** Swett, and **ameliata** Swett. The latter of which only two specimens have been taken, both of which were collected by myself.

There has been considerable doubt in the past about the two species **furcata** Thun., and **quinquefasciata** Pack. An examination of the genitalia of the two forms shows quite a difference, and they are easily separable by this character alone.

The shape of the uncus in **furcata** (page 25, Fig. 1), is identical with the figure given in Pierce's "Genitalia of the British Geometridae." The colour of the primaries of this species is either smoky or else decidedly reddish. There is also a European form that occurs with it, **fuscoundata** Don., which is very strongly marked, and having a greenish tinge with the median space ruddy. It is practically identical in maculation with the next species **quinquefasciata** Pack., and can only be separated by the shape of the uncus (page 25, Fig. 3) being convex instead of concave, having the base broader and the lateral apical points much reduced. With this species goes the form **viridata** Pack., which is greener, has no ruddy shades, and is more indistinct in its markings. I have specimens of these forms, all taken in Victoria.

We are all pretty well acquainted with the species hitherto known as **reflata** Grt. This name has now been relegated in a varietal sense

to a form which occurs in Arizona, and which is listed as a race of **albifasciata** Pack., the latter, although only an aberrant form, having priority over **reflata**. This left our Vancouver Island form without a name, as although it is identical in maculation with the Arizona form, it differs in colour, the latter being a dark grey form, while ours is a dull green with slight rosy sprinklings along the veins. Messrs. Barnes and McDunnough have named it **victoria**, the types being three males and two females from this locality.

A new species is described from Ketchikan, Alaska, under the name of **exculpata** B. & McD., and a grey form of this species occurs with it, called **tribulata** B. & McD. This latter form also occurs at Kaslo amongst other places, and therefore must be included in our B.C. List.

The form of **niveifasciata** Swett, described as a variety of **californiata** and of which I have the allotype, is now placed as a form of **irata** on account of the shape of the uncus, which, as will be seen by the figures on page 25, is much closer to the type of **irata** than it is to that of **californiata**.

This concludes the new forms in the short palpi group. In the next group, those with moderate palpi, there have been more changes than in any of the others. The name of **autumnalis** Strom., which is a European species, and which was applied to a species occurring in the Atlantic States, has been discarded, as the genitalia of our North American species do not coincide with it; also several forms which were associated with it in a varietal sense have been raised to specific rank, notably **perfracta** Swett, which is a very rare insect, of which only three specimens are known, two from Calgary and one from the Catskill Mts. There is a race of this species from Vancouver Island, which has just been described by Barnes and McDunnough under the name of **exasperata** from two specimens in the Taylor collection, taken at Departure Bay and Wellington, respectively. I had the good fortune to take a single male in May, 1914. This had stood in my collection as an undescribed form of **autumnalis**. It is evidently as rare as the typical species, as the three mentioned are the only ones known; so far no female specimens have been taken.

We now come to the race named **columbiata** by the late Rev. Taylor. It has been removed from its previous association, and is now considered a race of **renunciata** Walk., on account of the shape of the uncus, which is deeply bifurcated, leaving practically no neck. There is a melanic form of this race, which has been named **pernigra** by Barnes and McDunnough. This is of special interest to us, as although the types are from Montana, the three paratypes are from British Columbia—a male and female from Skagit Basin and a male from Stickeen River. It is more than probable that the latter was taken by Theodore Bryant when in that district many years ago with a survey party.

Crokeri Swett has been raised to specific rank. The only locality this species has been recorded from is Victoria, with the exception of a solitary male from Salem, Ore.

In the long palpi group, the only change affecting our British Columbia species is in **edenata** Swett. This species was described from Eden Valley, Monterey Co., Calif., and although our Vancouver Island form is identical in maculation, it is very much larger, measuring 38 mm. in both sexes.

On account of this large size, Barnes and McDunnough propose the racial name of **grandis** for our Vancouver Island form. It also differs slightly in colouring, as our local form possesses a greenish tinge, which is lacking in the typical species.

In this long palpi group **speciosata** Pack., and its varieties, occur, and it is interesting to note the totally different shape of the uncus from those we have been discussing.

There are slight but distinct differences in the uncus of **speciosata**, and its two forms, **taylori** and **ameliata**, especially in the basal portion of the neck. I have a long series of each of the two former, and the differences appear to be constant.

In conclusion, it may be of interest to mention that out of a grand total of 68 described forms in Boreal America (that is, North of Mexico to the Arctic Circle), twenty or nearly one-third occur in British Columbia. Of these 20 forms, no less than 18 occur on Vancouver Island, this Island thus containing more species than any other locality in North America. This is quite an advance on the 1906 B.C. Check List, which contains seven species, and one of these—**ruberata**—was listed in error. Furthermore, out of the 18 forms occurring on Vancouver Island, it is gratifying to note that eleven of them were described from here, the types being from Victoria (5), Wellington (2), Departure Bay (2), Goldstream (1), and Duncan (1).

Author's Note (September, 1919).

Since the above article was written, another new species of this genus has been described by L. W. Swett under the name of **Hydriomena macdonnoughi**, vide Can. Ent., Vol. 50, p. 296, Sept. 1918. It was taken at Atlin in June, 1914, and apparently belongs to the **ruberata** group. It is named after Dr. J. McDunnough in recognition of his splendid work on this genus.

In the same article Mr. Swett verifies the conclusion that I had arrived at in my article in the Proc. B.C. Ent. Socy., No. 10, March, 1917 (Author's Note, page 20), that **periclata** is a form of **quinquefasciata** Pack. rather than of **furcata** Thun. Upon the recent receipt of two males

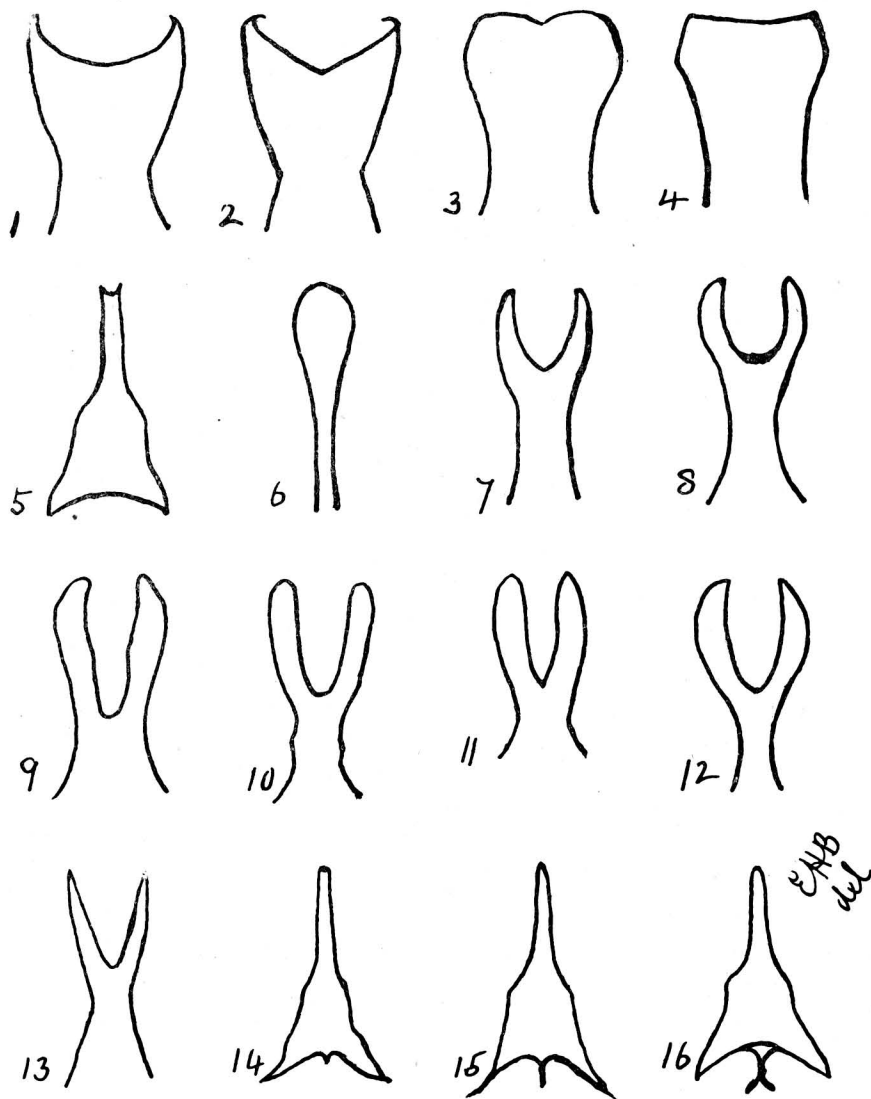
from the nymotypical locality, he was enabled to see that this form had the same type of uncus that is associated with *quinquefasciata*.

Recently, in working over my material in this genus, I have found a male specimen which undoubtedly belongs to *speciosata* form *ameliata* Swett. It was taken at Garden City (the type locality), a suburb of Victoria, on June 26th, 1914, and is the first male recorded, the type and paratype both being females (Can. Ent., Vol. 47, p. 64, Feb., 1915). A figure of the uncus will be found on page 25. E. H. B.

EXPLANATION OF FIGURES ON PAGE 25

- | | |
|--------------------------------------|-------------------------------------|
| Fig. 1. <i>H. furcata</i> Thun. | Fig. 9. <i>H. renunciata</i> |
| “ 2. <i>H. furcata</i> | race <i>columbiata</i> Taylor. |
| form <i>fuscoundata</i> Don. | “ 10. <i>H. crokeri</i> Swett. |
| “ 3. <i>H. quinquefasciata</i> Pack. | “ 11. <i>H. californiata</i> Pack. |
| “ 4. <i>H. quinquefasciata</i> | “ 12. <i>H. macdunnoughi</i> Swett. |
| form <i>viridata</i> Pack. | “ 13. <i>H. edenata</i> |
| “ 5. <i>H. albifasciata</i> | race <i>grandis</i> B. & McD. |
| race <i>victoria</i> B. & McD. | “ 14. <i>H. speciosata</i> Pack. |
| “ 6. <i>H. manzanita</i> Taylor. | “ 15. <i>H. speciosata</i> |
| “ 7. <i>H. irata</i> Swett. | form <i>taylori</i> Swett. |
| “ 8. <i>H. irata</i> | “ 16. <i>H. speciosata</i> |
| form <i>niveifascia</i> Swett. | form <i>ameliata</i> Swett. |

These figures were all drawn with the aid of a low-power binocular from specimens in my own collection.



TYPES OF **UNCUS** OF BRITISH COLUMBIA SPECIES OF THE GENUS **HYDRIOMENA** HUB.

**COMPLETE LIST OF SPECIES OF HYDRIOMENA
OCCURRING IN BRITISH COLUMBIA**

As it may be some time before the new Check List of British Columbia Lepidoptera is published, I have thought it best to append a list of our species in this genus, with their localities, insofar as they are known to me.

HYDRIOMENA HUB.

SHORT PALPI GROUP:

- furcata* Thun. - - - - - Vancvr. Island, Princeton, Lillooet,
Chilcotin, Quesnel, Rossland,
Atlin.
- form *fuscoundata* Don. - - - - - Victoria.
- quinquefasciata* Pack. - - - - - Victoria, Duncan.
- form *viridata* Pack. - - - - - Victoria.
- form *periclata* Swett - - - - - Victoria.
- albifasciata* Pack.
- race *victoria* B. & McD. - - - - - Victoria, Duncan.
- nubilofasciata* Pack.
- form *cupidata* (?) Swett - - - - - Duncan.
- manzanita* Taylor - - - - - Goldstream, Duncan, Wellington.
- exculpata* B. & McD.
- form *tribulata* B. & McD. - - - - - Kaslo.
- irata* Swett - - - - - Vancouver Island, Vancouver.
- form *niveifascia* Swett - - - - - Victoria, Goldstream, Duncan.

MODERATE PALPI GROUP:

- perfracta* Swett
- race *exasperata* B. & McD. - - - - - Victoria, Departure Bay, Wellington.
- renunciata* Walk.
- race *columbiata* Taylor - - - - - Vancouver Island, Agassiz, Hope.
- form *pernigrata* B. & McD. - - - - - Skagit River, Stickeen River.
- crokeri* Swett - - - - - Victoria.
- californiata* Pack. - - - - - Vancouver Island.

LONG PALPI GROUP:

- macdunnoughi* Swett - - - - - Atlin.
- edenata* Swett
- race *grandis* B. & McD. - - - - - Victoria, Duncan.
- speciosata* Pack. - - - - - Vancouver Island.
- form *taylori* Swett - - - - - Vancouver Island.
- form *ameliata* Swett - - - - - Victoria.