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# PROCEEDINGS

OF THE

# ENTOMOLOGICAL SOCIETY

OF

# BRITISH COLUMBIA

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JUNE, 1915

NUMBER 6, N.S.



THE GOVERNMENT OF  
THE PROVINCE OF BRITISH COLUMBIA.

VICTORIA, B.C.:

Printed by WILLIAM H. CULLIN, Printer to the King's Most Excellent Majesty.

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*The Honourable H. E. Young, M.D.,*  
*Provincial Secretary, Victoria, B.C.*

SIR,—I have the honour to submit herewith the Proceedings of the Entomological Society of British Columbia, Bulletin No. 6, N.S., which you have authorized me to have published under the direction of the Provincial Museum of Natural History.

I have the honour to be,

Sir,

Your obedient servant,

F. KERMODE,

*Director.*

*March 5th, 1915.*

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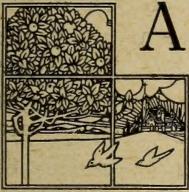
# BRITISH COLUMBIA ENTOMOLOGICAL SOCIETY

PROCEEDINGS, 1915

## NOMENCLATURE AND CLASSIFICATION.

(PRESIDENTIAL ADDRESS.)

BY G. O. DAY, F.E.S., DUNCAN, V.I., B.C.



A SOCIETY such as ours labours under a serious disadvantage by reason of its members being comparatively few, and those scattered over a great extent of country. You, in Vancouver, are fortunate in having a small band of workers within easy reach of each other; in Victoria there are a few entomologists who can meet together if they desire to; but in the outlying districts

members are isolated and far apart, and where men have no fellow-workers there lacks an incentive to devote much time and attention to our particular study. This incentive of friendly rivalry and mutual help is, to my mind, one of the charms of the pursuit of collecting.

Bearing in mind the drawbacks I have mentioned, I think we, as a Society, ought to be well satisfied with the result we have accomplished so far. During the last year we have published, by the generosity of the Department of Agriculture and the exertions of our Secretary, a very creditable pamphlet comprising most of the papers given at our annual meeting in January last. We also held a special summer meeting at Kelowna on August 20th last, an account of which it is hoped will be included in a later bulletin of our Proceedings. Another drawback which the Society suffers from is the want of a "local habitation." We have at present no room in which to keep our library or to house any collections we might want to form. The supplying of such a desideratum is, I think, an object which should ever be kept in view by the committee. Our finances, I am glad to say, are in a healthy condition, as has been shown by the Treasurer's statement.

It is gratifying to know that some of our members, notably Dr. Seymour Hadwen and Mr. E. H. Blackmore, have been doing good practical work, as evidenced by the papers presented to-day. Personally, I have not been able to add much to our general knowledge, but I am contributing two life-histories which will be printed with the Proceedings if there is space available. The descriptions may prove useful for reference when in printed form.

It is generally understood that the *systematic* side of entomology should mainly occupy the attention of our January meeting; and it has

been suggested to me that I should take the questions of nomenclature and classification as the subjects of my address on this occasion. Taking into consideration the very limited time at my disposal, it seems ridiculous that I should attempt such large subjects. However, I will try to deal with them in a simple manner and as briefly as possible. It must be taken that I speak for the most part from the standpoint of a lepidopterist, but the principles are much the same for the other orders.

To take nomenclature first: When natural-history objects came to be seriously classified (nearly two centuries ago), it was found that in order to avoid confusion it was absolutely necessary to have names that would be known to apply to the same object *all the world over*. It is due to the famous Swedish naturalist, Linnæus (or Von Linné, as he took the title of in 1757), that order was commenced to be rescued from chaos. He it was who introduced the binomial system in his great work, the "Systema Naturæ," first published in 1735. Linnæus was primarily a botanist, but afterwards he turned his attention to the whole system of nature. At first he seems to have ransacked heathen mythology and ancient Roman history for his names. A great many European species bear to-day the names he gave them. Among well-known butterflies the names **Machaon**, **Daphnidice**, **Hyale**, **Antiopa**, **Io**, **Iris**, etc., readily occur to one as examples of these. Succeeding workers and classifiers adopted the principles Linnæus laid down—namely, a family name and a single specific name.

The text-books lay down the rule that the name of a genus (family) or of a subgenus is always a single word, and should be a noun of the singular number and in the nominative case. The names of all *groups* of genera (i.e., families, orders, classes, and branches) consist each of a single word, and this word should be a plural noun in the nominative case. No fixed rule appears to have been adhered to in the bestowal of specific names. The following quotation taken from the preface to a work published by the Entomological Societies of Oxford and Cambridge in the year 1858 bears upon this subject:—

"Linné, the author of that binary system of nomenclature which has now been adopted in every department of natural history of organized beings, lays down various maxims for regulating the selection of names. His object was to exclude barbarism and confusion; nevertheless, many names given by Linné himself are fanciful enough and not peculiarly applicable; they are casual or arbitrary appellations. His precept concerning the formation of the names of species is one of considerable latitude; for, when the name of the genus is assigned, the species, he says, may be marked by adding to it a 'nomen triviale,' a single word taken at will from any quarter. Such names, whether appropriate or not, when once established by adequate authority, soon lose their inconvenience; and accordingly it is now recognized as a rule that in every case the trivial name first published shall be retained and all later synonyms rejected."

Farther on, the same authorities say:—

“May we be allowed to ask the attention of scientific authors and nomenclators to the following considerations?

“1. Although the name of an insect is to be regarded as a *mere name*, and not as a compendious description, yet it is desirable that it should denote some peculiarity or express some property or habit pertaining to that particular insect.

“2. It is convenient to form generic names from the Greek, specific names from the Latin.

“3. That the names should be formed on the analogy of existing Greek or Latin words; but that it is advisable to maintain a uniformity of termination throughout each tribe to assist the memory.

“4. Names taken from localities commonly become inappropriate from the occurrence of the species in other places; and names taken from persons should not be lightly applied.”

It will be seen from the foregoing that the rules apply to the first naming of a species, and that when once a species has received a name with a published description of the object, whether the name be appropriate or not, or wrongly spelled, so long as that name has not been used before to designate an individual of the same genus, it *must* be used, unaltered, by any one referring to that species. It is not even permissible to alter the ending of the word to make it agree with what the user thinks would be correct. As an example of this, I may adduce the case of *Deilephila gallii*. There can be no doubt that when Rottemburg named the species in 1775 he meant to call it “*gallii*,” but by some means, probably a misprint, it was spelt “*gallii*.” Though several subsequent authorities have referred to the species as “*gallii*,” in would-be correction, the law of priority has stepped in and the original printed word “*gallii*” is now accepted as being the correct one.

One of the most important nomenclatural movements which has ever taken place, and one to which science owes much, was the preparation of the so-called Stricklandian Code, also known as the British Association Code, prepared in 1842-43 by a committee of the British Association for the Advancement of Science. This Code, together with the Linnæan Code (1751), forms the basis of all subsequent study of the subject.

Mr. Raphael Blanchard (Paris) proposed a Code which was adopted by the first and the second International Congresses in 1889 and 1892; but it evidently did not find general acceptance, for in 1894 the German Zoological Society adopted a Code of its own, and other countries were following various different codes. The question was brought up at the succeeding triennial International Congress in 1895, when an International Commission of five members was appointed. The Commission was afterwards increased to fifteen members. This larger Commission reported progress to the Fifth International Congress, held in Berlin, 1901, and the Code then proposed was adopted. The Code covers the

whole field of zoology. The committees meet every three years and decide various points that are brought before them. There are still conflicting opinions on the subject of nomenclature, and in order that rules may be adopted that lead to finality, and the division of entomology receive due attention, the Second International Congress of Entomology (you know we now have an International Congress for our own special division), held at Oxford, England, in August, 1912, advised the formation of national committees in each country to collect opinions and consider changes required in the International Committee, and to communicate their resolutions to the International Committee on Zoological Nomenclature. The next Congress is due to be held this year.

As I have already stated, the International Code is a valuable foundation and guide to the generally accepted rules of nomenclature. In the introduction to the rules it is stated:—

“While not attempting to dictate to men of science what they shall or shall *not* do, the Commission submits the rules to the serious consideration of all workers in the spirit advanced by Strickland (1842), namely, ‘we offer them to the candid consideration of zoologists in the hope that they may lead to sufficient uniformity of method in future to rescue science from becoming a mere chaos of words.’”

The Code is too long to read to you *in extenso* on this occasion, but I will quote a few articles which I think may be of interest:—

“Article 3. The scientific names of animals must be words which are either Latin or Latinized, or considered and treated as such in case they are not of classic origin.

“Article 4. The name of a family is formed by adding the ending ‘*idæ*’; the name of a sub-family by adding ‘*inæ*’ to the root of the name of its type genus.

“Article 8. A generic name must consist of a single word, simple or compound, written with a capital initial letter, and employed as a substantive in the nominative singular.

“Article 13. While specific substantive names derived from names of persons *may* be written with a capital initial letter, all other specific names are to be written with a small initial letter.

“Article 14. Specific names are:—

“(a.) Adjectives which must agree grammatically with the generic name. Example: *Felix marmorata*.

“(b.) Substantives in the nominative in apposition with the generic name. Example: *Felix leo*.

“(c.) Substantives in the genitive. Examples: *Rosæ, sturionis, antillarum, galliæ, sancti-pauli, sanctæ-helenæ*.

“Article 16. Geographic names are to be given as substantives in the genitive, or are to be placed in an adjectival form. Examples: *Sancti-pauli, Sanctæ-helenæ, edwardiænsis, diemenensis, magellanicus, burdi-galensis, vindobonensis*.

“Article 19. The original orthography of a name is to be preserved unless an error of transcription, a *lapsus calami*, or a typographical error is evident.

“Article 20. In forming names derived from languages in which the Latin alphabet is used, the exact original spelling, including diacritic marks, is to be retained. Recommendations: The prefixes ‘*sub*’ and ‘*pseudo*’ should be used only with adjectives and substantives—‘*sub*’ with Latin words, ‘*pseudo*’ with Greek words; and they should not be used in combination with proper names. The terminations ‘*oides*’ and ‘*ides*’ should be used in combination only with Greek or Latin substantives; they should not be used in combination with proper names.

“Article 21. The author of a scientific name is that person who first publishes the name in connection with an indication, a definition, or a description, unless it is clear from the contents of the publication that some other person is responsible for said name and its indication, definition, or description.

“Article 22. If it is desired to cite the author’s name, this should follow the scientific name without interposition of any mark or punctuation; if other citations are desirable, these follow after the author’s name, but are separated from it by a comma or by parentheses.

“Article 25. The valid name of a genus or species can be only that name under which it was first *designated*, on the condition:—

“(a.) That this name was published and accompanied by an indication or a definition or a description; and

“(b.) That the author has applied the principles of binary nomenclature.

“Article 26. The tenth edition of Linné’s *Systema Naturæ*, 1758, is the work which inaugurated the consistent general application of the binary nomenclature in zoology. The date 1758 therefore is accepted as the starting-point of zoological nomenclature and of the law of priority.”

There are many other points in the rules which it is important to have authoritatively laid down, and I would recommend that all naturalists who take the study seriously should have a copy of the International Code in their possession for reference and information.

If I am not tiring you too much, I will now proceed to the subject of classification.

There are two ways of dealing with the classification of all natural objects—either taking the most advanced and specialized forms and tracing their relationship to existing forms or their evolution from more primitive forms, or else commencing at the other end and taking the most primitive forms first, tracing the evolution of the more specialized forms. In the following remarks I shall confine myself to insects in general and to Lepidoptera in particular. In the best-known works on Lepidoptera, Dyar, Smith, Staudinger, Meyrick, and others take the higher forms first and work downward. Comstock and the late J. W. Tutt considered the other way best, and worked upwards from the lower

forms. My own feeling in the matter is that the latter method is the more convenient and understandable one. You know that in most catalogues of Lepidoptera the butterflies come first. Well, even according to their own principles of classification, the authors acknowledge that in the natural order of things some of the other families are equally specialized, but, with the exception of Meyrick, they do not seem to have the courage of their convictions, and prefer to follow precedent. In the preface to Dr. Dyar's List it is stated:—

“I have placed the butterflies first since they seem, on the whole, ‘higher’ than the moths, and this course agrees with the usual custom. I follow with the Sphingidæ and Saturnians for the same reasons, although, in veneration, they are more generalized than some of the Noctuid groups. The list, as a whole, proceeds from higher to lower forms, as in Staudinger and Rebel's catalogue.”

The following quotation is from the same preface:—

“Within the last ten years (1892 to 1902) the classification of the Lepidoptera has been radically altered. No exact consensus of opinion as to the proper sequence of families and genera has been reached; but the recent workers are so closely in accord as to the principles involved and the resultant general scheme that we seem to be somewhere near a natural classification.”

The radical alteration of the classification just referred to was principally caused by the discovery of the importance of the neururation of the wings of Lepidoptera in determining their phylogeny. In 1895 Edward Meyrick published a Handbook of British Lepidoptera on this scheme which revolutionized the study. Although many authors have not agreed with Meyrick's arrangement, the result of his method is very remarkable and convincing. I will quote what Meyrick says in his introduction:—

“It is now admitted that the resemblances of allied genera and species are to be explained by community of descent. Hence a system of classification will be natural or artificial, according as it does or does not keep steadily in view this principle, with which all sound results must be consistent. When it has been decided that a number of genera possess so much mutual resemblance in structure that they may be regarded with probability as constituting a distinct branch of the genealogical tree of the Lepidoptera (and this is what is meant by family grouping), the question must arise: Which of these genera are older than the others and which are the latest developments? It may often be difficult and sometimes impossible to answer this, but in most cases an *approximate* result can be reached by a consideration of the following laws, viz.:—

“1. No new organ can be produced except as a modification of some previously existing structure.

“2. A lost organ cannot be regained.

“3. A rudimentary organ is rarely redeveloped.

“Certain other considerations may likewise be of assistance. A large genus, especially if also of very wide distribution, cannot be a very recent one, since it must have required a long period for the differentiation of numerous species, though it must be remembered that as the genus grows larger the process may become more rapid from increased basis of production. On the other hand, a small genus may be of any age; but one which is closely related to a large genus will almost always be later than it, and a small genus which is widely distributed must generally be an old one.

“In applying the above-mentioned laws in practice, it must be constantly borne in mind that because two genera are now more closely allied together than to any other, it does not follow that either is descended from the other; it is very frequently the case that both are equally derived from a third genus now no longer existent. In such a case they are said to be correlated. Further, when one genus is said to be derived from another, and the earlier genus is rich in species, it is not usually meant that the later genus springs from the more advanced forms of the earlier one, but much more commonly from a species standing very near the bottom of the list.

“From a consideration of the laws enunciated there can be no doubt that the Micropterygina are the ancestral group of the Lepidoptera, from which all others have descended. This is sufficiently proved by the existence of the four or more additional veins in the hind-wings of that group, for these veins, if not originally present, could not have been afterwards produced. Now, if the neuration of the whole of the Lepidoptera is compared with that of all other insects, it will be found that in no instance is there any close resemblance, except in the case of the Micropterygidæ; but the neuration of these so closely approaches that of certain Trichoptera (caddis-flies) as to be practically identical. The conclusion is clear that the Lepidoptera are descended from the Trichoptera, and that the Micropterygidæ are the true connecting-link. It may be worth while to point out that we may assume as the primitive type of trichopterous neuration a system of numerous longitudinal veins gradually diverging from the base, mostly furcate terminally, and connected by a series of irregularly placed cross-bars near the base, and another series beyond middle.”

Before I leave this phase of the subject, it is instructive to know what Professor Comstock has written with regard to the descent and relationship of the various orders of insects. He divides the class **Hexapoda** into nineteen orders. He says:—

“The Thysanura (bristle-tails, spring-tails, fish-moths, and others) is doubtless the most primitive order. Then follow first the orders that undergo an incomplete metamorphosis, and last, those that undergo a complete metamorphosis. Within these two orders those with biting mouth-parts are placed first, and these are followed by those with sucking mouth-parts, except that in the second group the Coleoptera and

Hymenoptera are placed last for want of a better position. We do not intend to indicate by this that these two orders are closely related, or that they are more specialized than the Diptera. In fact, with regard to at least five of the orders of insects (Hemiptera, Lepidoptera, Diptera, Coleoptera, and Hymenoptera), it seems idle to us to discuss which is the more highly specialized. Each has been specialized in a direction peculiar to itself; and to attempt to describe which is the 'highest' seems as futile as the discussion by children of the question: 'Which is better, sugar or salt?'

The application of the principle of neuriation has been, as I have already stated, the main foundation for determining the phylogeny and relationship of Lepidoptera, but other important features have been taken into account, viz.: the *jugum* and the *frenulum*; the eggs, whether flat or upright; the arrangement of the tubercles on larvæ; the movable incisions of pupa; and the hooks on prolegs of larvæ.

In a paper on the classification of Lepidoptera printed in the Transactions of the Entomological Society of London, 1895, Mr. J. W. Tutt states as follows:—

"No scheme based on a single set of characters belonging to only one stage of an insect's existence could possibly be even approximately perfect. It is possible to conceive that—especially in those orders in which the methods of life differ so greatly in the various stages, and different means of defence and protection are thus rendered necessary—an insect may be very greatly modified in one particular stage without any corresponding modification in the other stages being at all necessary. It may happen to be of advantage for the larva to be of a generalized type, and for the imago to be much more specialized, or vice versa. If this be granted, it follows that no scheme of classification that is not founded upon a consideration of the structural details and peculiarities of the insects in *all* their stages can be considered as really sound, or as founded upon a natural basis. It is also evident that the results of the various systems—whether based on larval, pupal, or imaginal characters—must be compared, and the sum total of evidence brought together, if a satisfactory result is to be obtained."

The conclusion come to by Mr. Tutt concerning the characters considered important by various authors, including Comstock, Packard, Dyar, in America, and Chapman in England, is as follows:—

"1. *The Jugum*.—As Chapman has already pointed out, this is the 'remnant of a wing-lobe, well developed in many Neuroptera, and appears to have no such function as is attributed to it (i.e., of combining the wings in flight).' The hind-wing of **Micropteryx (Eriocrania)** has 'also an external lobe or "jugum"' (Packard). The classificatory value of the jugum by which Comstock separates the whole order Lepidoptera into Jugatæ and Frenatæ, therefore, is such as to shut off the two or three most generalized superfamilies, such separation giving us no clue what-

ever to the more specialized superfamilies that have risen from the stirps, of which these are now the lowest representatives.

"2. *The Frenulum*.—Chapman has pointed out that one of the superfamilies (Micropterygids) placed with the Jugatæ has also distinct traces of a connecting frenulum in the development of some strong hairs; whilst Kellogg finds, in the Trichopterygid genus *Hallesus*, 'the beginning of the frenate method of wing-tying,' there being 'present on the base of the costal margin of the hind-wing two long, strong hairs, the very counterpart of the generalized frenulum (i.e., frenulum in which the hairs are not united into one single strong spine) of the lepidopterous wing.' That the frenulum had its origin much lower than is usually assumed, e.g., in Trichoptera, and, therefore, probably in Lepidoptera, before they were differentiated as such, leads us to suppose that, possibly in the earlier Lepidoptera (now extinct), many frenate and jugate families, otherwise closely related, ran on side by side. Of the latter only the Micropterygids, Eriocraniids, and Hepialids are left, and these, although retaining this primitive trait, have become greatly modified in other directions.

"3. *Neuration*.—It is now generally accepted that the most generalized superfamilies exhibit the most complicated system of neuration, and that the more reduced in number the nervures become, the more specialized is the family, superfamily, etc. This with certain limitations we consider to be generally true. The neuration of the Micropterygids (Eriocephalids), Eriocraniids, and Hepialids is perhaps more generalized than that of any other Lepidoptera. Broadly, on these lines, the neuration allows us to separate the more generalized from the more specialized superfamilies. When, however, one comes to detail—i.e., to the consideration of the characters arising from the modification of the neuration—we find the characters to be so variously interpreted and applied by different authors that, standing alone, the neurational characters appear to be of very little value.

"4. *Movable Incisions of Pupa*.—Chapman's pupal characters of movable segments divide off sharply, and with definiteness, the generalized from the specialized superfamilies—the Incompletæ representing the former, the Obtectæ the latter; but it is only in the details such as those of the dorsal head-piece, the maxillary palpi, etc., that we get any clue to the real relationships of the superfamilies to one another, although the amount of incompleteness of the pupa (i.e., the actual number of movable segments) affords, in a comparative sense, valuable aid.

"5. *Hooks on Prolegs*.—The arrangement of the hooks on the larval prolegs is largely associated with a concealed or exposed habit of life, yet, with scarcely an exception, the character is sound in separating the generalized from the specialized superfamilies, and it is remarkable that even when a species belonging to one of the specialized superfamilies reverts to a concealed mode of life, the prolegs do not revert to the generalized, but maintain the specialized proleg structure.

"6. *Larval Tubercles*.—The arrangement of the tubercles is remarkable from the fact that, more than any other larval structure, they have undergone modification for protective purposes. In concealed-feeding larvæ the tubercles have usually remained simple, the setæ often being suppressed until they form mere points on the chitinous button of the tubercle. On the other hand, in exposed-feeding larvæ they vary from entire absence (where their presence would interfere with the protective coloration adopted by the larvæ) to raised warts bearing many setæ; or they may form a prolonged spiny base bearing several setiferous branches; or develop fascicles of urticating spines; or hairs may arise from the normal base. In spite of this, however, two characters remain fairly constant: (1.) Tubercles I. and II. tend to form (by union or by the atrophy of I. or II.) a single sub-dorsal wart, or, on the other hand, tend to become arranged as anterior and posterior trapezoidals. (2.) Tubercles IV. and V. both remain as sub-spiracular tubercles, or, on the other hand, V. remains as a sub-spiracular and IV. becomes a post-spiracular tubercle. We do not think the pre-spiracular tubercle (which is more or less adventitious) of much value in classification, but the two above characters appear to be so.

"Now, it is evident from the above brief summary that the structure of the larval prolegs, the characters offered by the movable pupal segments, the broad characters of neurulation, and of the jugum, only help us to separate, as it were, the generalized from the more specialized superfamilies. These characters still leave them unsorted, and give us no clue to their relationship to each other.

"It is quite evident that the evolution of the many specialized superfamilies has taken place from the generalized, and that the former are the most recent evolutionary products of certain stems of which the generalized are the older offshoots. What is needed, then, is some character or characters that will not slice off horizontally, as it were, all the branches of the genealogical tree, leaving (1) the upper superfamilies, composed of the Obtectæ or specialized Frenatæ, and (2) the lower, comprising the Incompletæ or generalized Frenatæ, but one which will give us clues as to the development of the branches themselves vertically, and separate into their own particular branch the specialized and generalized superfamilies belonging thereto. In this way alone can we get a true conception of the genealogical relationship of the various families to each other."

Mr. Tutt then goes on to show how the groups work out according to Dr. Dyar's studies of the larval tubercles, but considers that the arrangement leaves us much as we were. He then continues:—

"There was sufficient material here for the basis on which to construct the broad lines of a natural genealogical tree, if used in conjunction with the tables given us by Chapman and Hampson. But the desiderated clue as to the actual details of such was not obtained until the publication of Chapman's valuable paper, 'The Phylogeny and

Evolution of the Lepidoptera from a Pupal and Oval Standpoint.' In this we had a factor which could be applied in the way desired, and that showed us, not which were specialized and which generalized superfamilies, but which of the specialized and which generalized superfamilies of the various stirpes were related to each other. This paper showed that the form of *egg* found in each different superfamily is very constant, and that there appears to be no rapid transition from one form to the other among the Lepidoptera. There are, broadly, among the higher Obtect families two forms of egg, the flat and the upright egg, the former being divisible into the Geometrid and the Bombycid. The Geometrid egg is generally marked by a greater roughness and by coarser ribbing or network; the Bombycid is smoother and more polished, although there are many striking exceptions to this otherwise pretty general rule.

"Chapman is inclined to derive these two forms of flat eggs from distinct origins, very low down in the evolutionary scale, but thinks it probable that the various forms of the upright egg (Noctuid, Papilionid, etc.) had a common origin, though very low down. He is supported in this conclusion by the presence of the chin-gland, which is found only in Papilionids, Noctuids, Notodonts, and other superfamilies with upright eggs, but nowhere among those with flat eggs, and we may accept Chapman's conclusion that, however widely the butterflies are separated from the Noctuids (and the evidence of the Hesperid pupa shows that the butterfly stirps separated from the Noctuid stirps a very considerable way below any *Noctua*-like form usually placed with the *Macros*), the evidence of the egg and the presence of the larval chin-gland suffice to show that they jointly separated from the Geometrids and Bombycids still lower down. The evidence of the egg, too, shows that the Noctuids and Papilionids were not derived, as Meyrick suggests, from any *Pyralid* form, as the *Pyralids* are, in some respects, of a higher type than the *Hesperids*, and yet the former still belong very markedly to one of the flat-egged stirpes. No very clear indication has yet been obtained to show where the upright egg branched from the flat egg. The most probable point is between the *Cossids* and the *Zeuzerids*. These superfamilies are, in many respects, somewhat closely allied. The former has an upright, the latter a flat, egg, and Chapman considers that we have here, probably, the point where the two forms are still unfixated and capable of easy variation. The alliance (by pupa) of *Castnia* with *Cossus* would perhaps point to this also as being somewhat near the origin of butterfly stirps.

"Accepting the principles here laid down, there can be no doubt that the flat egg is the ancestral form, and the upright egg a more specialized structure. Examination of a large number of eggs of species belonging to several superfamilies shows that the upright eggs which characterize the *Notodonts*, *Noctuids*, *Lithosiids*, *Euchromiids*, *Lymantriids*, and *Papilionids* are modifications of one and the same structure."

Mr. Tutt concludes: "That the details of such an arrangement as this will be modified by further observation is highly probable, but that this will form a sound basis for future work we feel convinced. We shall find, for example, in future schemes, no derivation of generalized from specialized superfamilies, nor a flat-egged family from an upright-egged one, the former giving rise again to another upright-egged family, as repeatedly occurs in the work of Packard, Dyar, and Meyrick."

This is a general outline of the principle on which classification is based. Our attention has been confined to probable descent and the relationship of *families*. When we come to consider the *genera* and the respective *members* thereof, there are several special features and structures which have been found to be constant; that is, not varying in different individuals of the same species. Amongst them I may mention the palpi, the eyes, whether hairy or smooth, the venation, the spines on the tibiae (*vide* Mr. Wolley-Dod). Mr. Pearsall states that in the Geometridæ he has found the following characters reliable: Antennæ, frontal tubercles and tufts, the tongue, the claws on fore tibiae, the tibial spurs and the hair-pencil on hind tibiae of male, besides other characters. There is also another structure which lately has been found of great importance, and this is the genitalia of male insects. Professor Smith and Doctors Barnes and McDunnough have drawn attention to this feature as a means of determining closely allied species. And Mr. F. N. Pierce, of Liverpool, has recently published two volumes giving illustrations of the genitalia of all the British Macrolepidoptera. I have brought this work with me to-day so that you will be able to see how infinitely diversified the structures are. I have also brought two microscope-slides with preparations of the organs of two specimens for your inspection.

I fear I have occupied too much of your time; I did not intend to be so long when I began to prepare my address, but the subjects of nomenclature and classification are so important and controversial that even now I have only treated them in a cursory manner. I can only hope that in what I have brought before you I have been able to convey some acceptable information.

Mr. President: The next paper is on "The Salal-moth, *Lithocolletis gaultheriella*," by R. N. Chrystal. (Read by Mr. Sherman.)

NOTES ON LITHOCOLLETIS GAULTHERIELLA WALS.  
(LEAF-MINER IN GAULTHERIA SHALLON).

BY R. NEIL CHRYSAL, ASSISTANT FOREST INSECTS, DOMINION DIVISION  
OF ENTOMOLOGY.

The abundant evidence of the work, of what eventually proved to be the above species, in the leaves of *Gaultheria shallon*, a shrub which is very plentiful in Stanley Park, and indeed in the Coast region generally, is the basis upon which the following notes are presented.

*Nature of the Injury.*—The mine is on the upper side of the leaf, and is irregular in form, as a rule, causing the leaves to appear blotched. Frequently these mines may cover the whole surface, as many as five larvæ being found at work in the same leaf. The details of the early life-history of this species have not as yet been studied, the larvæ being first examined on June 23rd, at which time their average length was 5 mm., the mines being then fairly extensive and the larvæ nearly full-grown.

The first pupæ actually found in nature were collected on July 18th, three and one-half weeks later. These changed to adults on July 20th and 21st, this putting the time of change from larva to pupa between the last week in June and the first and second week in July. The writer is inclined to think that the date of emergence of the adults bred in captivity (July 20th) coincided with their first appearance in nature, as it was about this time that the empty pupa-cases could be found sticking half-way out of the deserted mines; and in the sunlit spots of the woods the adults could be seen at rest on the leaves or flying about near by.

About the time of pupation the leaf becomes puckered up and the pupa is found lying in a silk-lined cell covered over by an opaque silken web, closely attached to the sides of the leaf immediately around it. This web was generally found to be circular in shape. The pupa is thrust through a transverse slit near one end of the cocoon.

On January 2nd, 1915, Mr. R. C. Treherne kindly collected material from the *Gaultheria* in Stanley Park and forwarded it to Ottawa. An examination of this material showed that fresh mines had been started, varying in size and shape, none of them, however, being very large. Larvæ in various stages of development, varying in length from 1 to 4 mm., were found in the tunnels. The following statement by Miss Annette F. Braun, in her paper "Revision of the Genus *Lithocolletis*," Trans. Amer. Ent. Soc., Vol. 34, page 321, is worthy of note: "In almost all the species, however, the cocoon is only made in the brood of which the imagoes are to appear in the same summer. In a later brood hibernation takes place in larval state, with one or two exceptions." This was found to be the case with *L. gaultheriella*, the larvæ being in all stages of development, none, however, being nearly full-

grown. On July 18th many of the mines were found to be tenanted by two species of hymenopterous parasites; one in a small white cocoon some 4 to 5 mm. long, and the other a black pupa 3 mm. in length. The adults of both species hatched out at approximately the same time as the moths. In August their exit-holes were clearly visible on the mined leaf-surface. The species of these have not yet been determined.

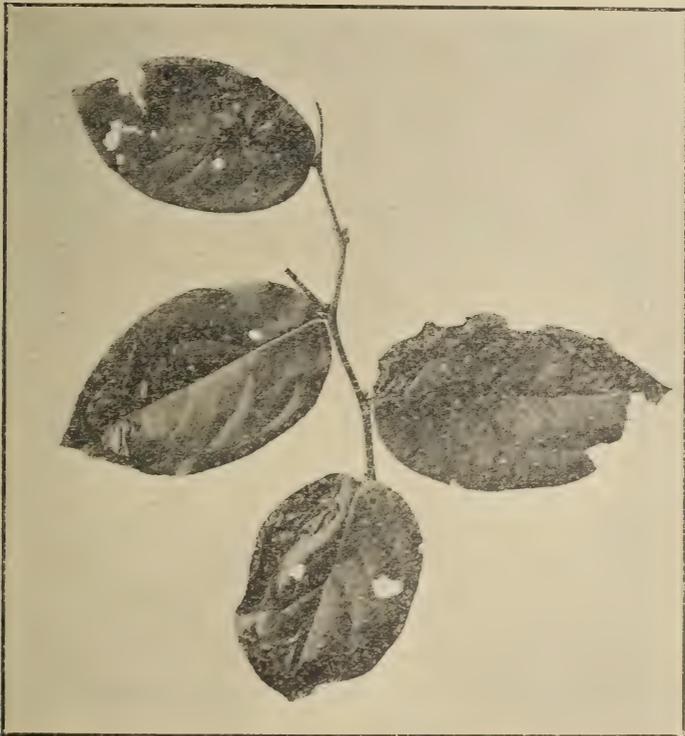
*Larva*.—In the genus *Lithocolletis* we have an example of "larval dimorphism," the genus being divided into two groups, those having a flat larva and those having a cylindrical larva respectively. Miss Braun states that in the entire genus the first three instars are of the flat type, the cylindrical group gaining their typical form with the third moult; while in the flat group the change to an approach to cylindrical form occurs in the last larval instar preceding the pupa. In the larvæ at present collected the two forms are believed to be present, but the subject needs further study before any definite pronouncement can be made. At present, therefore, a short description of the salient features of each form must suffice.

*Flat Larva*.—Larvæ of the flat type were found ranging from 1 to 7 mm. in length, and the following general description holds good for all: The larva is distinctly depressed. The body tapers towards hind end, this being especially noticeable in the smaller specimens, in which the body tapers very rapidly, assuming a "V" shape. The head is very much flattened, sub-triangular in shape, two-thirds the breadth of the thorax. In the smaller specimens of the living material examined it was seen to be much retracted into the first thoracic segment. The mouth-parts are clearly visible, being thrust out prominently in front. The presence of dark-brown coloured processes, referred to as "apodemata" by Ivar Tragårdh, Experimentalfältet, Sweden, in his paper "Contributions towards the Comparative Morphology of the Trophi of the Lepidopterous Leaf Miners" (Arkiv För Zoologi. Band 8, No. 9, 1913), is well marked, both dorsally and ventrally, in all the larvæ examined. The form of these appears to differ in the two forms of larva. Tragårdh also points out that there is a difference in the genus *Lithocolletis* in the arrangement of the ocelli of the young and full-grown larva respectively. This has not yet been observed in the species.

The number of segments following the head is thirteen; the sides of the segments are protuberant, the lateral outline of the body being in consequence strongly crenate. On the dorsal and ventral aspects of the thoracic and abdominal segments, dark patches or "maculæ" appear. These are found to remain constant in shape for corresponding segments in members of the same species in each stage. In the smaller specimens their shape was not so clearly marked. The colour of the living larvæ is light green, the maculæ being of a brownish colour. The legs of the smaller specimens are very difficult to make out, being merely tubercular projections, surmounted with a circle of hooks. Abdominal legs are present on segments 7, 8, 9, and 13.

*Cylindrical Larva*.—The cylindrical form of larva presents the following differences:—

- (1.) The dorsal and ventral "apodemata," respectively, differ in their outline:
- (2.) The form of the body becoming more cylindrical, the crenate outline disappears:
- (3.) The "maculæ," both dorsal and ventral, are not so well marked:
- (4.) The legs are better developed:
- (5.) Changes in the head region, mouth-parts, etc., are apparent.



Mines of *Lithocolletis gauthericella* Wals. on *Gautheria shallon*.

*The Pupa*.—The pupa is 5 mm. in length and is light brown in colour and shining. The head end tapers off to a very sharp point, the hind end being quite blunt.

At a later date it is hoped to amplify these few notes; more observations are necessary, however, on the structure and habits of this species before this can be done.

Mr. President: I think it is one of the duties of this Society to have records like that.

Mr. Tom Wilson: A little over a year ago Mr. Swaine was out and took stock of it, but it is not very generally distributed. It is local. We seem to have most of it in Stanley Park. I do not think it is at Agassiz, and at Sechelt it may very occasionally be seen.

Mr. Day: The next paper is by Mr. E. H. Blackmore, of Victoria, on: "(a.) Further Notes on the Genus *Hydriomena*. (b.) Notes on the Geometridæ of Vancouver Island, with Additions and Corrections of the British Columbia List."

### FURTHER NOTES ON THE SPECIES OF THE GENUS *HYDRIOMENA*, OCCURRING ON VANCOUVER ISLAND, B.C.

BY E. H. BLACKMORE, VICTORIA, B.C.

Owing to the exceptionally fine weather which prevailed in this district during the past season, and which has been very favourable to Geometers, I have collected a large number of specimens, some of which are new to science and some new to the British Columbia List. I have also had the privilege of studying several private collections which, combined with my own captures, has enabled me to make some further additions to our list and to supplement the notes contained in my article on page 44 of Bulletin 4 of our Proceedings. I will confine myself in this short paper to a few notes on the different species of the genus *Hydriomena*.

Some little time ago Mr. F. Wolley-Dod, of Midnapore, Alberta, sent me a short series of *Hydriomena furcata* var. *quinquefasciata*, and comparing them with Victoria specimens in my collections, I was rather surprised to find how much they differed, both as to size and colouring. The Calgary specimens are smaller, ranging from 30 to 32 mm. and being a greyish-green colour, while the Victoria forms measure from 33 to 35 mm. and are in most cases of a warm brown colour, differing in individual specimens in the depth of the colouring, but none approaching the colour of the Calgary specimens. During the past summer Mr. E. M. Anderson, of the Provincial Museum, Victoria, while on a collecting trip around Atlin, B.C., secured, amongst other interesting things, a series of this insect, and it is worthy of note how clearly they resemble the Calgary forms, both in size and colour. As Mr. Anderson's specimens have been compared with Packard's type in the University Museum of Harvard College and pronounced identical, it seems to me that our Vancouver Island specimens are a distinct geographical race.

A new addition to the British Columbia List is *Hydriomena furcata* var. *viridata* Pack., of which I have taken two specimens, one at light on May 22nd, 1914, and the other resting on a pine-tree trunk on June 18th, 1914. According to Mr. L. W. Swett, this is an exceedingly rare variety, and I believe that previously it has not been found outside of California, which is the type locality.

In October last, while looking over the collection of Mr. E. M. Skinner, of Duncan, B.C., I noticed a red variety of *H. furcata* which I thought might be the var. *resecta* of Swett. Through the kindness of Mr. Skinner I obtained the loan of it and sent it to Mr. Swett, who reported that it slightly resembled *resecta*, but was not that species, being closer to the European variety *testaceata* Prout. However, as it is the only one that I have seen so far, it will have to be left at that for the present.

Since writing my last article on this interesting genus I have been fortunate enough to capture two specimens of *Hydriomena autumnalis* var. *columbiata* Taylor. I obtained them at Duncan, B.C., on April 19th, 1914, resting on tree-trunks. They puzzled me for some time, but through the kindness of Mr. Swett, who loaned me the photo of Taylor's type, I was able to recognize them at once, and there is no doubt of their identity. Incidentally this is the only insect of which the late Rev. G. W. Taylor wrote a poor description.

It does not seem to occur in the Victoria District, as I have not seen or taken a specimen from here. *Hydriomena autumnalis* var. *crokeri* Swett, while always uncommon, seems to have been very scarce this season, for while constantly on the look-out for it, in the early spring I only managed to secure two specimens. One of these, however, was unique in having the ground colour decidedly greenish, although having the intensely black, irregular, median band typical of this variety. Commenting on this insect, Mr. Swett says: "I have not seen this green variety of *crokeri* before, and it is very interesting to me to see my theory proved." Speaking of his theory, he is referring to his colour scheme, which is fully explained in his article in the *Canadian Entomologist* for March, 1911.

Before leaving this highly interesting and difficult group I would like to mention one other that was taken by our worthy President, Mr. G. O. Day, of Duncan, B.C. Unfortunately it is an only specimen, and being a female it remains as an unique for the present, but I am living in hopes that he will take a male of the same species and so make another addition to our already swelling list. Writing on this insect, Mr. Swett says: "This is a most remarkable form, and I have not seen anything like it. It is an undescribed variety of *ruberata*, possibly a new species, but I would not like to describe it without the male."

NOTES ON THE CHANGES IN GEOMETRID NOMENCLATURE,  
WITH RECORDS OF SPECIES NEW TO THE LIST OF  
GEOMETRIDÆ FOUND IN BRITISH COLUMBIA.

BY E. H. BLACKMORE, VICTORIA, B.C.

As a kind of preface to my paper, I would like to say that I think the time is fast approaching when we, as a Society, shall have to prepare a new check-list of British Columbia Lepidoptera. There have been many revisions of genera and changes in nomenclature in the nine years which have elapsed since our last list was published, also there are quite a number of new records in nearly all the families to be added to the list.

Speaking of the Geometridæ, the family in which I am most interested, perhaps the time is hardly quite ripe; as there are still many knotty problems remaining to be solved and much research-work yet to be done. I am at present, in conjunction with Mr. L. W. Swett, of Boston, Mass., working on several groups, particularly the two genera *Petrophora* and *Mesoleuca* and the *Alcis latifasciaria-imitata* group, which we expect to get straightened out this year, and the results of which I hope to read at the next annual meeting of our Society. Fortunately, Mr. Swett is in close touch with the University Museum of Harvard College, which, in addition to housing his own large collection, contains most of Packard's types, many of which came from Victoria, B.C., being collected by a Mr. G. R. Crotch some forty years ago.

The purpose of my paper is to give some of the most important changes in nomenclature affecting our British Columbia Geometridæ, and by including the records new to British Columbia making it of some little help to those interested in this particular family. In the following additions to the list I would like to remark that those species taken in the Okanagan Falls District in 1913, and in the Atlin District in 1914, were all collected by Mr. E. M. Anderson, of the Provincial Museum, who has made extensive collecting trips in those localities during the past two seasons.

Taking the Geometers in order as they appear in Dyar's List, which in the main is the same as Hulst's classification, the name of *Cladora atroliturata* Walker is the first one to be added to the list, taken on April 20th, 1913, at Okanagan Falls. This is a decidedly interesting record, as it is a distinctly Eastern species, occurring in the Atlantic States. The specimen captured was in fine condition and does not differ in any way from the typical specimens.

*Philopsia nivigerata* Walker. One specimen taken by me at Victoria on May 4th, 1913. It bears a close resemblance to *Philopsia (Talledega) montana* Pack., but is quite distinct. According to Mr. R. F. Pearsall, in *Canadian Entomologist*, December, 1906, the distinguishing characters of

these two genera, *Philopsia* and *Talledega*, are inconstant; therefore one of them must fall, and as *Philopsia* has priority of page it must stand, *Talledega* becoming a synonym of it.

*Nasusina* (*Gymnocelis*) *melissa* Grosbeck. Taken at Okanagan Falls on May 9th, 1913. This genus differs from *Eupithecia*, which follows it, in having one pair of spurs on hind tibiæ, whereas all the species of *Eupithecia* have two pairs; also in having a projecting cone tuft on front of head.

In the British Columbia Check-list Taylor has a *Eupithecia* listed as *lachrymosa* Hulst, which is wrong; it should be *E. limnata* Pearsall. Taylor was not very well acquainted with Hulst's species, which was from Oregon, and, although somewhat similar in markings, can be at once differentiated by the antennæ, which is simple ciliate in *lachrymosa* and bi-ciliate in *limnata*. Another one listed wrongly is *E. togata* Hub., which is strictly European. Pearsall described it later as *E. mutata*, and that name will take the place of *togata* in our lists. There are three more records to be added to this genus—*E. cestata* Hulst and *E. implorata* Hulst at Okanagan Falls in April, 1913, and *E. adornata* Taylor at Atlin. This latter species was also taken by Mr. J. W. Cockle at Kaslo on May 16th, 1914. These records are very interesting, as the two districts are widely separated, each having different fauna and flora from the other. It is evidently a high-altitude species, as its type locality is Calgary, Alberta. It was described by Taylor in *Canadian Entomologist*, December, 1906.

One of the most interesting Geometers taken by Mr. Anderson on his Atlin trip was *Eustroma destinata* var. *lugubrata* Moschler. This is a most beautiful insect of a rich chestnut colour and exceedingly rare. I would like to remark here that Mr. Anderson's captures of Geometridæ in the Atlin District were very gratifying, and besides gathering in many uncommon species, he has taken at least five new to the Province. It is also remarkable to find that a number of species recorded from Atlin have been taken by Mr. F. Wolley-Dod at Calgary, Alberta.

*Rheumaptera hastata* var. *gothica* Gue. Four specimens of this well-marked variety were taken by me at Victoria in June, 1913, but I did not see any during the past season. It is also taken at Vancouver.

*Rheumaptera hastata* var. *hastulata* Hub. This is much smaller and quite distinct from the preceding, somewhat resembling the variety *subhastata*, which, however, is darker. A series of this insect was taken at Atlin in the middle of June.

*Mesoleuca cæsiata* D. & Sch. should be changed to *M. aurata*, as *cæsiata* is strictly European.

The *Mesoleuca truncata-immanata* group I treated of in my paper read before you at the last annual meeting (Bulletin No. 4, page 44). It is unnecessary to add any more to that at present, only to remark that a few specimens of that group were taken at Atlin, and they all

show a change in colouring from warm brown to a greyish-brown, caused possibly either by a change of food-plant or to different climatic conditions.

I also remarked in the same paper that I had not seen the typical form of *Mesoleuca vasiliata* Gue., although the variety *niveifasciata* Hulst was taken regularly on Vancouver Island. On further investigation, however, I find that it does occur here, but very sparingly. Mr. G. O. Day, of Duncan, has taken a few, and so has Mr. A. W. Hanham. I found a couple of specimens when going over Mr. E. Skinner's collection which were taken by him at Duncan, B.C., some years ago; and also found one in the collection of Mr. A. H. Bush, of Vancouver, who has been collecting for many years.

There are also two more species of this genus to add to the list: *Mesoleuca formosa* Hulst, taken by the late Mr. Livingstone at Cowichan Bay, B.C., and now in the collection of Mr. L. W. Swett, of Boston, Mass. This is a very rare insect and I am glad to have the record. It was placed by Hulst in the genus *Philerme*, but it is a true *Mesoleuca*. The other one, *M. atrifasciata* Hulst, I found in the collection of Mr. E. Skinner, and was labelled "Possibly a var. of *E. nubilata*." It is listed by Dyar as a synonym of *M. immanata*, which it in no way resembles. It is a very striking insect, as may be seen from the type which is figured in Holland's Moth Book, Plate 44, Fig. 8, under the name of *Cleora atrifasciaria*.

The genus *Hydriomena* I have treated of in my previous paper, and I will now pass on to a variety of *Triphosa hæsitata* which occurs here, but which has evidently been overlooked. Mr. Swett first drew my attention to this variety; he having found it in the collection of Mr. C. Livingstone, which passed into his hands some time ago; since then I have taken two specimens in Victoria. It has a mottled appearance and is called var. *pustularia* Hy. Edwards.

*Marmopteryx marmorata* Pack. Two specimens of this handsome insect were taken at Okanagan Falls on May 7th, 1913. Its natural habitat is California. In an article by R. F. Pearsall, in the Bull. Brooklyn Ent. Society, Oct., 1914, on *Gypsochroa designata* Hufnagel, he says that on comparing the genitalia and markings with the European *designata* he finds them different, and proposes a new name for our species, viz., *emendata* Pearsall, *G. designata* being strictly European.

*Petrophora circumvallaria* Taylor. One specimen taken at Atlin on June 13th, 1914. This is a nice capture, and again illustrates the similarity of the fauna of northern British Columbia and southern Alberta. Both Messrs. Barnes and McDunnough and Mr. F. Wolley-Dod claim that this species is a synonym of the European *turbata* Hub., but until the genitalia of the two forms are compared I would hesitate to accept this, as I believe that we get very few of the European species in this country.

**Petrophora incurсата** Hub. is, according to Pearsall (Bull. Brooklyn Ent. Society, June, 1913), strictly European, he differentiating it from our species, which he has named **P. salvata**, by the structure of the antennæ.

In the *Canadian Entomologist*, 1900, page 104, Hulst described **Hydriomena amorata** (No. 3410 of Dyar's List). This Geometer is not a **Hydriomena**, however, but a **Petrophora**, and is a variety of **P. defensaria** Gue. I have found it to be double-brooded, as I have taken it at rest in September, and both at rest and at light in April, the spring forms being larger and a little brighter coloured.

**Deilinia variolaria** Gue. was included in the Provincial Museum catalogue compiled by E. M. Anderson in 1904, but was thrown out by Mr. Taylor in the 1906 check-list. This was wrong, as it is still taken in the Province, one specimen in good condition being taken at Okanagan Falls on July 3rd, 1913.

**Macaria teucaria** Strecker. There has been a certain amount of doubt connected with this insect. In the 1906 check-list Taylor put a question-mark before the specific name **teucaria**, and in Mr. Skinner's collection I found a specimen taken by him at Duncan some years ago and labelled "Undescribed" in Taylor's handwriting. When visiting Duncan in June, 1913, I was fortunate in taking a couple of specimens, and submitted them to Mr. Swett for his final opinion. Last July he took them to New York and compared them with specimens in the American Museum of Natural History. The result was that my specimens were found identical with those labelled "**Sciagraphia respersata** Hulst," one of which was also marked "Compared with type." As the late Mr. Grossbeck had the arrangement of the Geometridæ in the above Museum, and also was familiar with most of Hulst's types, there is no doubt that the above determination is correct.

**Sympherta tripunctaria** Pack. should be **Gladela lorquinaria** Gue. It appears that the genus **Sympherta** was preoccupied, so Grossbeck proposed the name of **Gladela** for it (*Entomological News*, October, 1909). The specific name of **lorquinaria** Gue. antedates by seventeen years that of **tripunctaria** Pack., so that name must stand, the latter becoming a synonym.

**Alcis dissonaria** Hulst. One specimen taken at Okanagan Falls on May 7th, 1913, and one at Penticton on June 30th. This is another rare insect and a very interesting record. Its type locality is Colorado, and it has been taken in Nevada.

**Cleora indicataria** Walker. I have taken an interesting series of this insect this past season. It is quite distinct from **umbrosaria** Hub., when fresh, but rubbed or worn specimens are hard to distinguish. Unfortunately they get worn very quickly, not lasting more than two or three days in a fresh condition.

**Erannis coloradata** Hulst. This is a record sent me by Mr. Swett, taken by Mr. Livingstone at Vancouver, but without date.

**Euchlaena johnsonaria** Fitch. One specimen taken on June 28th, 1913, at Okanagan Falls. This species was listed in the 1904 catalogue as taken at Victoria; that was an error, as the species taken at Victoria, Duncan, and other localities on the Island is the variety **mollisaria** Hulst, which occurs regularly, but not commonly.

**Pero giganteus** Grossbeck. This was given to me by Mr. A. W. Hanham amongst some pinned material last April. When setting it I noticed that it was different from the species that I had in my collection labelled "**honestarius (ancetaria)** Walker." I sent it to Mr. Swett, who pronounced it to be **giganteus**. It was described by Mr. Grossbeck in a paper given by him in the Proceedings of the United States National Museum, Vol. 38, pages 359-377. In this paper he shows that the genus **Azelina** Gue. must fall, as **Pero** H. & Sch. is the older one; also that our species **ancetaria** should be called **honestaria** for the same reason, so that the old name of **Azelina ancetaria** Hubner should read **Pero honestaria** Walker.

In addition to the foregoing, I have taken one species and three varieties new to science, the descriptions of which are now in the hands of the editor of the *Canadian Entomologist*, but as they have not yet been published I cannot make any remarks on them at this time.

I will now bring my paper to a close with the remark that in the near future all our closely allied species will be separated by comparisons of the genitalia of the various forms. There has just been issued in England a work of Mr. F. N. Pierce entitled "The Genitalia of the Geometridæ," dealing with all the recognized species in the British Isles and illustrated with over 1,500 figures. This work will be indispensable to any one working up the North American Geometridæ, as, having this for a basis, it will be comparatively easy to determine with certainty many of our doubtful species, and to settle the vexed question whether certain species are European or not.

Below is a tabulated list of the new records which I have been enabled to get together. As it is necessarily incomplete, I should be glad if the collectors of Geometridæ in this Province would send me the records of any new species, with the date, locality, and the name of the authority who made the determination.

## GEOMETERS NEW TO BRITISH COLUMBIA.

Name.	Locality.	Date.	Captor.
<i>Cladora atroliturata</i> Walker.....	Okanagan Falls	April 20, 1913.....	E. M. Anderson.
<i>Philopsia nivigerata</i> Walker.....	Victoria .....	May 4, 1913.....	E. H. Blackmore.
<i>Nasusina melissa</i> Grossbeck.....	Okanagan Falls	May 9, 1913.....	E. M. Anderson.
<i>Eupithecia implorata</i> Hulst.....	"	April 15, 1913.....	"
<i>Eupithecia cęstata</i> Hulst.....	"	April 15, 1913.....	"
<i>Eupithecia adornata</i> Taylor.....	{ Atlin .....	May 16, 1914.....	J. W. Cockle.
	{ Kaslo .....		
<i>Eustroma destinata</i> var. <i>lugu-</i> <i>brata</i> Mosch	Atlin .....	August 16, 1914	E. M. Anderson.
<i>Rheumaptera hastata</i> var. <i>goth-</i> <i>ica</i> Gue.	Victoria .....	June 20, 1913.....	E. H. Blackmore.
<i>Rheumaptera hastata</i> var. <i>has-</i> <i>tulata</i> Hub.	Atlin .....	January 16, 1914	E. M. Anderson.
<i>Mesoleuca formosa</i> Hulst.....	Cowichan Bay...	No date .....	C. Livingstone.
<i>Mesoleuca atrifasciata</i> Hulst.....	.....	.....	E. M. Skinner.
<i>Hydriomena furcata</i> var. <i>vir-</i> <i>idata</i> Pack.	Victoria .....	May 22, 1914.....	E. H. Blackmore.
<i>Triphosa hęsitata</i> var. <i>pustu-</i> <i>laria</i> Hy. Edw.	{ Victoria .....	March 20, 1914*	"
	{ Vancouver .....	August 23 .....	C. Livingstone.
<i>Marmopteryx marmorata</i> Pack.	Okanagan Falls	May 7, 1913.....	E. M. Anderson.
<i>Petrophora convallaria</i> Tay.....	Atlin .....	June 13, 1914.....	"
<i>Petrophora defensaria</i> var. <i>amorata</i> Hulst	Victoria .....	April 20, 1914.....	E. H. Blackmore.
<i>Alcis dissonaria</i> Hulst .....	Okanagan Falls	May 7, 1913.....	E. M. Anderson.
<i>Cleora indicataria</i> Walker.....	Victoria .....	June 26, 1913.....	E. H. Blackmore.
<i>Erannis coloradata</i> Hulst.....	Vancouver .....	No date .....	C. Livingstone.
<i>Euchlęna johnsonaria</i> Fitch.....	Okanagan Falls	June 23, 1913.....	E. M. Anderson.
<i>Pero giganteus</i> Grossbeck.....	Duncan .....	July 20, 1913.....	A. W. Hanham.

\* Hybernated.

Mr. Day: Since the death of Mr. Taylor we have had no authority on British Columbia insects, and Mr. Blackmore has very kindly jumped into the breach and is doing great work in this order, and we shall derive great benefit from the work Mr. Blackmore has done.

Mr. Treherne: It is true that the Calgary species and northern British Columbia are similar, and that they differ from the Vancouver Island species. Are they similar to the Asiatic species?

Mr. Blackmore: They are similar, but I do not know as to the Asiatic species.

Mr. Sherman: On the trail of the Cassiar Mountain we took many species that are found, not on the Coast, but on Vancouver Island.

Mr. Blackmore: I would like to thank the President for his kind remarks. I am trying in a small way to put things on a better basis. As far as possible, I try to be accurate and get things down fine, and can only do a little at a time, as our Province is so large and varied.

Mr. Treherne: Are these up-to-date endings of the species you name?

Mr. Blackmore: The endings, I think, are absolutely authentic. At one time, as you know, the various species of genera ended in a certain way. You could tell by the end of the word what class they belonged to.

Mr. Day: I shall now call on Mr. Anderson, of the Museum, Victoria, to give his paper on "Insect Records from Atlin and Northern British Columbia."

## INSECTS RECORDED IN THE ATLIN DISTRICT (NORTHERN BRITISH COLUMBIA) DURING THE SUMMER OF 1914.

BY E. M. ANDERSON.

(Reprinted from *Provincial Museum Report, 1914*, by permission of the Director.)

Since my report is of no economic value, I sincerely trust that it will be of interest to some members present; therefore, on a systematic order, I shall endeavour to furnish you with extracts from my field-notes, including a brief synopsis and annotated list of the insects collected in northern British Columbia.

In connection with the Provincial Museum of Victoria, I had the honour of making an extended zoological expedition into the Atlin District during the summer of 1914. Accompanied by an assistant, Mr. C. B. Garrett, we sailed from Victoria on May 29th, via Skagway, Alaska; thence by train and boat, arriving at Atlin on June 6th after a most enjoyable and pleasant trip. On our arrival we found the town of Atlin ("Atlin," a "Tahltan" Indian word meaning "Big Water") nothing but a mass of ruins, save the Government buildings and a few dwellings at the southern end of the town, these only being saved from devastation after a fierce fire. The following day, after provisioning the best we could under the circumstances, we departed from Atlin by wagon to Wilson Creek, and after a slow and rough ride we camped at the foot of a steep mountain, close to a small lake, at an altitude of 3,000 feet. On our arrival the weather was still cool, fresh snow lying on the foothills close to camp; the snow did not melt until about June 20th. This spot favoured the collecting of insects, Diurnals, Geometers in particular. Most of the material gathered at this camp is most desirable, and nearly all proved good species. Six out of seven species of *Brenthis* taken on this trip were found at Wilson Creek, including *Brenthis improba* Butler, which is still very rare in collections. This beautiful form was found on a grassy mountain-top, none being captured below 5,000 feet.

The three listed forms of *Cenis* and both *Erebias* appeared on the western slope of the mountains, while on the opposite side, only a short distance of about two miles, we found a marked difference in the fauna. *Lycæna sæpiolus*, *aquilo*, and *scudderi*, commonly called "blues"; *Colias scudderi* and *eryphile*, the sulphur butterflies; *Pontia occidentalis* var.

calyce and *Synchlœ, creusa* the "whites," and a number of day-flying moths were found hovering about the flora, which I vouch to say has no equal in any part of the Province I have visited. In addition, most of the day-flying moths were taken at Wilson Creek, where we collected for a short period of a little over three weeks. Having collected birds and mammals during the fall of the previous year, I acquired a fair knowledge of the district; consequently, with this in my favour, I was enabled to traverse with ease and avoid many hardships, etc., which a naturalist faces in the wilds of strange territory.

It is needless to mention the pleasure derived from a trip of this nature, and I sincerely hope that within the near future some of the members present, or otherwise, will have the same good fortune bestowed on them, and also the opportunity to go afield as I have in the past, thereby furthering what little entomological work I have accomplished, not only in the north, but in other sections of the Province. The north undoubtedly is still virgin territory, offering the student the richest field I know in British Columbia for general research-work. A casual glance at my list of captures, a number of which are new records, should convince our members that we are still at sea relative to what species occur in British Columbia, and also as to the respective range of some of the common forms of insects in the various orders. Insect-life in this country flourished almost everywhere in abundance. Perhaps the most noticeable phenomena was the scarcity of Heterocera (moths), attributed to the little or no darkness throughout the summer months; however, notwithstanding these conditions, it is indeed gratifying to learn that of what moths were taken nearly all were good species. It was not until early in August, when the nights began to show signs of darkness, that we availed ourselves of the use of the lamp. With this device we were greatly disappointed; our catch in four consecutive nights only yielded about a dozen Noctuidæ and several Geometridæ. Failing to attract the moths to light, a few nights were spent in visiting a few sugared tree-trunks, etc. Sugaring also proved futile, taking only four *Euxoa divergens* during the whole week. Incidentally, many interesting species of Diurnals (butterflies) fell to the net, several of which are entirely new records for the Province. Unfortunately, a number of the species known to occur in the district missed our observation, particularly those insects which are purely local to a limited area in the sections we were unable to search. Owing to our brief stay it was impossible to cover more than a small part of the vast unknown region, only scratching, as it were, at half a dozen points throughout the country where conditions were most favourable for general collecting purposes.

The Geometridæ collected are being reported upon by my esteemed friend and fellow-member, Mr. E. H. Blackmore. To this gentleman I am indebted in many ways, and also for his kind assistance in classifying and determining the insects belonging to this group. I may say that credit is due him for the energetic and painstaking manner in which he

has devoted all his spare time, both in collecting and studying this group, for the past two seasons. Not only has he discovered new species on Vancouver Island, but he has been instrumental in bringing to light many species and varieties which for a number of years have assumed erroneous names, many of which were taken for granted as authentic.

Odonata (dragon-flies) made their appearance early in June, and were abundant in suitable places during July and August. Six species were taken, all of which were submitted to Mr. Raymond C. Osburn for identification.

A very remarkable "Syrphidæ," *Erastalis rupium*, was taken. This is an entirely new record for America, being found common in Europe.

Attached will be found an annotated list of insects captured in the Atlin District, together with a supplementary list to the Okanagan insects collected in 1913.

## LEPIDOPTERA.

### DIURNALS (BUTTERFLIES).

1C. *Parnassius smintheus* var. *nanus* Neumoegen (Northern Parnassian). Common at Pike River on July 27th, 28th, and 29th. A large series of over a hundred were taken, including a number of well-marked females. (Barnes & McDunnough.)

36A. *Pontia occidentalis* var. *calyce* Edwards (Western White). Fairly common at Wilson Creek in June. This form is the commonest white in the north. (Barnes & McDunnough.)

38A. *Pontia napi* var. *bryoniæ* Ochseneimer (Alpine White). Not common. Two specimens taken at Wilson Creek on June 12th. Also a single worn female at Hot Springs on July 7th. We noted several on the wing at Skagway, Alaska, on June 4th. It is possible they may have been the form *alascensis*. (Barnes & McDunnough.)

*Synchlœ creusa* Doubleday & Hewitson. Common at Wilson Creek, where a number were taken on June 8th to 30th. Mr. McDunnough says specimens examined are typical.

63A. *Eurymus hecla* var. *glacialis* McLachlan. A single specimen collected at Anderson Bay on August 8th near the top of a mountain at 5,000 feet altitude. No others were observed. (Barnes & McDunnough.)

65B. *Eurymus eriphyle* Edwards. Abundant. Several taken at Wilson Creek on June 9th to 29th. Also occurred commonly at Hot Springs in July. Albinic females were also taken. (Mr. McDunnough states that this is the true form without a doubt.)

72. *Eurymus scudderi* Reak (Scudder's Sulphur). Appeared at Wilson Creek on June 20th to 30th. Fifteen taken at Hot Springs and Pike River during July. (Barnes & McDunnough.)

102. *Argynnis atlantis* Edwards. Fairly common at Hot Springs on July 12th to 25th. Specimens taken were a trifle smaller than type forms from the Catskills, New York. (Barnes & McDunnough.)

128B. *Argynnis eurynome* var. *bischoffi* Edwards. Two specimens collected at Pike River on August 8th. Mr. McDunnough states this is the silvered form of *bischoffi* Edwards, practically the same as var. *washingtonia*. (Barnes & McDunnough.)

128D. *Argynnis bischoffi* var. *opis* Edwards. A single specimen obtained at Pike River on August 8th. The type locality for *opis* is Cariboo District, but specimen is fairly typical. (Barnes & McDunnough.)

131. *Brenthis myrina* Cramer (Silver-bordered Fritillary). About fifty were taken at Hot Springs on July 5th to 9th, where it was common. Not observed in any other section.

134. *Brenthis tricularis* Hubner. Fairly common at Wilson Creek. A number were collected at Gopher Dam Mountain at about 4,500 feet altitude. Did not occur on the lower levels. All were taken from July 15th to 20th. Mr. McDunnough until further examination refers them at present to *Aphirape v. ossianus* Boisduval.

137C. *Brenthis chariclea* var. *boisduvalii* Dup. (Boisduval's Fritillary). Appeared commonly at Wilson Creek from June 15th to 30th. At Hot Springs a number were captured as late as July 20th. (Barnes & McDunnough.)

138. *Brenthis freija* Thunberg; syn. *freya* H. & S. We found this the commonest *Brenthis* in the district. It appeared in numbers at Wilson Creek from June 7th to 30th, where a number were taken. This species is the first fritillary to emerge, being the only form flying when we arrived at the Creek. (Barnes & McDunnough.)

139. *Brenthis polaris* Bdv. Not common. Three specimens collected at Wilson Creek on June 15th and 26th. (Barnes & McDunnough.)

140A. *Brenthis frigga* var. *saga* Kaden. A number were taken at Wilson Creek from June 11th to 28th. Fairly common.

140B. *Brenthis frigga* var. *improba* Butler. Eight specimens collected on the summit of Gopher Dam Mountain, 500 feet altitude. Mr. McDunnough states that it is paler above than the typical specimen, and is still rare in collections.

191. *Phycoides pratensis* Behr. Eight specimens taken at Hot Springs from July 10th to 26th. Not a common insect. (Barnes & McDunnough.)

218. *Aglais milberti* Goddard (Milbert's Tortoise-shell). Two seen at Pike River on August 8th. Probably common later in the fall.

270A. *Erebia disa* var. *mancinus* Dby. We found this beautiful form flying with *Erebia epipsodea* at Wilson Creek from June 11th to 30th. About thirty specimens were taken. By no means common. (Barnes & McDunnough.)

273. *Erebia epipsodea* Butler (Common Alpine). Common at Wilson Creek throughout the month of June. A good series of fresh specimens were taken. Mr. McDunnough reports the specimens submitted to him as a true typical form.

282. *Cœnomympha kodiak* Edwards. Only two specimens taken at Wilson Creek on June 26th. These are the only two records we have from British Columbia. Apparently not common, as no others were seen.

292. *Cenis jutta* Hubner; **syn. Balder** Bdv. Not common. Eleven specimens taken at Wilson Creek during the last week of June. Fairly common. (Barnes & McDunnough.)

293. *Cenis uhleri* Reakirt. Rather common. Eleven specimens collected at Wilson Creek from June 15th to 30th. (Barnes & McDunnough.)

295F. *Cenis norna* var. **taygete** Hubner. Very common at Wilson Creek throughout the month of June. A large series of over a hundred were taken. This species is the common Arctic butterfly, and can be seen in numbers along the mountain trails and roadsides from 3,000 to 5,000 feet altitude. (Barnes & McDunnough.)

396. *Epidemia helloides* Boisduval. Two specimens collected at Hot Springs on July 26th and five at Pike River on August 3rd. (Barnes & McDunnough.)

Some of the *Epidemia* taken represent a form between **dorcas** and **xanthoides**. (McDunnough.)

409. *Cupido sæpiolus* Bdv. Common at Wilson Creek from June 8th to 30th. Also common at Hot Springs early in July. Specimens are rather off type. (Barnes & McDunnough.)

425. *Agriades aquilo* Boisduval. Thirty specimens collected at Wilson Creek from June 15th to 30th. Barnes & McDunnough identified it as an intermediate Western form between **aquilo** Bdv. and **rustica** Edwards.

432. *Rusticus scudderi* Edwards. Common at Wilson Creek in June and at Hot Springs in July. Over fifty specimens taken. The specimens are probably closer to true **scudderi** described from Lake Winnipeg than the Eastern form going under the same name. (McDunnough.)

644. *Hesperia centaureæ* Rambur. Only two specimens taken at Wilson Creek, one on June 22nd and another on June 29th. (Barnes & McDunnough.)

## HETEROCERA (MOTHS).

### ARCTIIDÆ.

869. *Neoarctia yarrowi* Stretch. A perfect specimen taken at Wilson Creek on June 28th. Several others were seen on the wing in June. (Barnes & McDunnough.)

### AGARISTIDÆ.

943. *Androloma mac-cullochii* Kirby. Fairly common in the mountainous sections in June. Specimens obtained at Wilson Creek from June 12th to 28th. (Barnes & McDunnough.)

## NOCTUIDÆ.

1105. *Caradrina extimia* Walker. Three taken on August 20th at Atlin. (Barnes & McDunnough.)
1223. *Agroperina (Hadena) morna* Strecker. Single specimen taken at Pike River on July 29th, possibly a form of *morna*. (Barnes & McDunnough.)
1232. *Sidemia (Hadena) devastatrix* Brace. Atlin, August 15th; Cariboo Crossing, August 20th. (Barnes & McDunnough.)
1281. *Hyppa brunneicrista* Smith. One specimen taken at Hot Springs on July 6th, probably this species. (Barnes & McDunnough.)
1390. *Rhynchagrotis rufipectus* Morrison. Two specimens taken at Pike River on August 8th. (Barnes & McDunnough.)
1431. *Pachnobia littoralis* Packard. Single specimen on July 5th at Hot Springs is a form of *littoralis*. (Barnes & McDunnough.)
1489. *Agrotis (Noctua) fennica* Tauscher. Five specimens taken at Atlin from August 8th to 12th. (Barnes & McDunnough.)
1736. *Euxoa (Paragrotis) divergens* Walker. Three specimens taken at Atlin on August 8th, 11th, and 12th. Mr. McDunnough is not quite certain as to the identity of this species.
1737. *Euxoa redimicula* Morrison. Common at Atlin from August 9th to 19th. Eight specimens collected. (Barnes & McDunnough.)
1798. *Mamestra olivacea* var. *lucina* Smith. Single specimen collected at Atlin on August 8th. (Barnes & McDunnough.)
1840. *Mamestra sutrina* Grote. Single specimen collected at Wilson Creek on June 6th. (Barnes & McDunnough.)
1930. *Anarta cordigera* Thunberg. Common at Wilson Creek in June. Eleven specimens taken. (Barnes & McDunnough.)
1932. *Anarta melanopa* Thunberg. Not common. Three specimens collected at Wilson Creek from June 14th to 18th. (Barnes & McDunnough.)
1935. *Anarta richardsoni* Curtis. One specimen taken at Hot Springs on July 7th. (Barnes & McDunnough.)
1936. *Anarta?* sp. A single specimen, possibly a dark form of *impinigens* Walker was taken at Atlin on August 15th. (Barnes & McDunnough.)
1974. *Cirphis (Heliophila) heterodoxa* Smith. One specimen taken at Hot Springs on July 17th. (Barnes & McDunnough.)
2533. *Autographa (Syngrapha) ignea* Grote. Four taken at Pike River from July 27th to 29th. (Barnes & McDunnough.)
- Autographa orophila* Hampson. Two taken at Pike River on July 29th. (Barnes & McDunnough.)
3223. *Epicnaptera americana* Harris. A female collected at Wilson Creek on June 21st. (Barnes & McDunnough.)
- 4197A. *Albuna pyramidalis* var. *montana* Hy. Edwards. Three collected at Wilson Creek on June 28th. (Barnes & McDunnough.)

## GEOMETRIDÆ.

3255. *Philopsia* (*Talledega*) *montanata* Packard. Common at Wilson Creek in June; specimens taken on June 12th, 16th, 21st, and 27th. (L. W. S.)

*Eupithecia adornata* Taylor. Three taken at Wilson Creek on June 20th and 21st. (L. W. S.)

3350. *Eustroma propulsata* Walker. Taken at Atlin on August 11th. (L. W. S.)

3351A. *Eustroma destinata* var. *lugubrata* Moschler. A single specimen taken at rest on a fence at Atlin on August 13th. (L. W. S.)

3353. *Eustroma nubilata* Packard. Wilson Creek, on June 26th. (L. W. S.)

3359B. *Rheumaptera hastata* var. *hastulata* Hubner. Common at Wilson Creek from June 9th to 30th. (L. W. S.)

3360. *Rheumaptera tristata* Linnæus. Fairly common at Wilson Creek from June 16th to 28th. (L. W. S.)

3362. *Rheumaptera luctuata* Dennis & Schiffermuller. Wilson Creek, June 15th to 20th. (L. W. S.)

3362A. *Rheumaptera luctuata* var. *obducata* Moschler. Wilson Creek, June 26th to 28th. (L. W. S.)

3379B. *Mesoleuca citrata* var. *suspectata* Moschler. Wilson Creek, June 14th. (L. W. S.)

3381. *Mesoleuca silacea* Hubner. Common in the mountainous sections in June. A good series taken at Wilson Creek. (L. W. S.)

3387C. *Hydriomena furcata* var. *quinquefasciata* Packard. Very abundant throughout the month of June at Wilson Creek. (L. W. S.)

3419. *Hydriomena magnoliata* Guenee. Found it common at Wilson Creek from June 18th to 30th. (L. W. S.)

3434. *Stammœdes* (*Cænocalpe*) *topazata* Strecker. Fairly common at Wilson Creek in June. Previous record Mount Cheam. (L. W. S.)

3449. *Petrophora salvata* Pearsall; *incursata* Hubner. Taken at Wilson Creek on June 30th. (L. W. S.)

3450. *Petrophora abrasaria* Herrich-Schaeffer. Common at Wilson Creek in June. (L. W. S.)

3603. *Epelis truncataria* Walker. Fairly common at Wilson Creek from June 12th to 30th.

3777. *Enypia perangulata* Hulst. Single specimen taken at Carcross on August 20th. (L. W. S.)

3878. *Jubarella danbyi* Hulst. Two specimens taken at Wilson Creek on June 26th and 28th. (L. W. S.)

## PYRALIDÆ.

4404. *Phlyctænia itysalis* Walker. Common at Hot Springs on July 17th. (Barnes & McDunnough.)

*Phlyctænia* sp.? Pike River, August 8th; possibly *tellealis* Dyar. (Barnes & McDunnough.)

4504. *Scoparia lugubralis* Walker. Hot Springs, July 4th. (Specimens rubbed; the identification is not certain.) (Barnes & McDunnough.)

*Scoparia* sp.? Hot Springs, July 7th. (Barnes & McDunnough.)

4510. *Scoparia centuriella* Dennis & Schiffermuller. Very common at Wilson Creek in June. A large series of this species were collected. Very variable. (Barnes & McDunnough.)

4563. *Crambus pascellus* Linnæus. Common at Hot Springs. Several taken from July 5th to 10th. (Barnes & McDunnough.)

4583. *Crambus myellus* Hubner. Fairly common at Hot Springs. Specimens were taken on July 4th, 5th, and 6th. (Barnes & McDunnough.)

4776. *Laodamia fusca* Harworth. Nine specimens taken at Wilson Creek from June 15th to 30th. (Barnes & McDunnough.)

5071. *Olethreutes bipartitana* Clemens. Common. Six specimens taken at Hot Springs on July 8th and 12th. (Barnes & McDunnough.)

*Hysterosia homonana* Kearfoot. Single specimen taken at Hot Springs on July 8th. (Barnes & McDonnough.)

## TINEIDÆ.

*Nemotois belleta* Walker. One specimen taken at Hot Springs on July 4th. (Barnes & McDunnough.)

## DIPTERA. (ATLIN, 1914.)

(Idt. by Raymond C. Osburn.)

## TABANIDÆ.

*T. affinis* Kirby.

*Tabanus* sp.

*T. osburni* Hine.

## BOMBYLIDÆ.

*Anthrax fulviana* Say.

## SYRPHIDÆ.

*Syrphus contumax* O. Sacken.

*Syrphus intrudens* O. Sacken.

*Syrphus (Catabomba) pyrastris* Linnæus.

*Syrphus torvus* O. Sacken.

*Hanmerschmiatia ferruginia* Fallen.

*Ersitalis rupium* Fabricus. New to America; common in Europe.

*Melanostoma* sp. (Prob. new sp.)

## ODONATA (DRAGON-FLIES). (ATLIN, 1914.)

(Idt. by Raymond C. Osburn and E. B. Williamson.)

*Æshna sitchensis* Hagen. (Osburn.)

*Æshna eremista* Scudder. (Osburn.)

*Enallagma calverti* Morse. (Osburn.)

*Enallagma cyathigerum* Charpentier. (Osburn.)

*Leucorhina hudsonica* Selys. (Williamson.)

*Leucorhina proxima* Calvert. (Williamson.)

*Somatochlora hudsonica* Hagen. (Osburn.)

SUPPLEMENTARY LIST OF INSECTS COLLECTED IN THE  
OKANAGAN, 1913.

ARCTIIDÆ.

833. *Eubaphe immaculata* Reakirt. Penticton, June 27th, 1913.  
(Wolley-Dod.)

NOCTUIDÆ.

1226. *Hadena cogitata* Smith. Penticton, July 7th. (W.-D.)

1496. *Noctua unicolor* Walker; **syn. clandestina** Harris. Five specimens taken at Penticton on June 28th. (W.-D.)

1708. *Hadenella subjuncta* Smith. Three specimens taken at light, Penticton, July 3rd. (W.-D.)

1894. *Xylomiges dolosa* Grote. Fairly common on peach-blossoms at Okanagan Falls, May 5th. (W.-D.)

1895. *Xylomiges rubrica* Harvey. Okanagan Falls, May 5th. Very common on peach-blossoms. A large series of 220 taken. Very variable. (W.-D.)

*Strechia angula* Smith? Five taken at Okanagan Falls on May 6th, 8th, and 12th. (Mr. Wolley-Dod states specimens examined agree with the description of types from Arrow Head Lake, B.C., but he never saw the species before.)

2102. *Xylina georgii* Grote; **syn. holicineria** Smith. Seven taken at Okanagan Falls from May 5th to 30th. (W.-D.)

2120. *Colocampa cineritia* Grote; **syn. mertena** Smith. Five collected at Okanagan Falls on May 6th and 10th. (W.-D.)

2142. *Rancora strigata* Smith. Five fresh specimens taken at light at Okanagan Falls on May 5th, 7th, and 8th. (W.-D.)

2240. *Scopelosoma tristigmata* Grote. Okanagan Falls, May 7th. (W.-D.)

2405. *Melicleptria honesta* Grote. Vaseaux Lake, Okanagan Falls, May 26th. (W.-D.)

2601. *Eustrotia albidula* Guenee. Penticton, June 30th, three taken at light. (W.-D.)

2761. *Syneda (Euclidia) annexa* Hy. Edwards. Common at Okanagan Falls from April 26th to May 7th. (W.-D.)

HYPENINÆ.

3008. *Epizeuxis americalis* Guenee. Penticton, June 30th. Mr. Wolley-Dod states that it appears to be very rare in British Columbia, the only previous record being one from the late G. W. Taylor's collection.

- 3039A. *Chytolita petrealis* Grote. Penticton, June 21st. (W.-D.)  
 3168. *Gluphisa severa* Hy. Edwards. Two taken at Okanagan Falls on April 24th. (W.-D.)

## GEOMETRIDÆ.

3237. *Cladora atroliturata* Walker. Okanagan Falls, April 20th and 22nd. (L. W. Swett.)  
*Nausina (Gymnocelis) melissa* Grosbeck. Okanagan Falls, May 19th. (L. W. S.)  
 3316. *Eupithecia cestata* Hulst. Okanagan Falls, April 18th and 20th. (L. W. S.)  
 3318. *Eupithecia implorata* Hulst. Okanagan Falls, April 18th to 22nd, fairly common at light. (L. W. S.)  
 3321. *Eucymatoge tenuata* Hulst. Okanagan Falls, June 10th. (L. W. S.)  
 3436. *Marmopteryx marmorata* Packard. Two taken at Shuttleworth Creek, Okanagan Falls, on May 7th and 10th. (L. W. S.)  
*Leptomeris subfuscata* Taylor. Fairly common at Shuttleworth Creek, Okanagan Falls, from May 23rd to 30th. (L. W. S.)  
 3550. *Leptomeris (Eois) sideraria* Guenee. Okanagan Falls, June 10th and 12th, common. (L. W. S.)  
 3623. *Deilinia variolaria* Guenee. Penticton, July 3rd. (L. W. S.)  
 3648. *Sciagraphia denticulata* Grote. Okanagan Falls, May 6th to 8th. (L. W. S.)  
 3662. *Sciagraphia excurvata* Packard. Okanagan Falls, May 9th. (L. W. S.)  
 3850. *Cleora pampinaria* Guenee. Penticton, July 6th. (L. W. S.)  
 3867. *Lycia cognataria* Guenee. Penticton, June 30th and July 2nd. (L. W. S.)  
 3960. *Euchlæna johnsonaria* Fitch. Okanagan Falls, June 25th.

## THYRIDÆ.

4131. *Thyris maculata* Harris. Okanagan Falls, June 8th. (Wolley-Dod.)

## GEOMETRIDÆ (ATLIN, 1913).

3343. *Eutcphria (Philereme) multivagata* Hulst. Atlin, September 9th. (L. W. S.)  
 3380A. *Mesoleuca citrata* Linnæus. September 12th and 13th. (L. W. S.)

## LIST OF HYMENOPTERA COLLECTED AT OKANAGAN FALLS, 1913.

(Idt. by J. C. Crawford.)

- Bombus occidentalis.** Okanagan Falls, May 13th to 27th.  
**Bombus edwardsii.** Okanagan Falls, April 19th to 22nd, May 3rd.  
**Bombus separatus.** Okanagan Falls, May 27th.

- Bombus oppositus*. Okanagan Falls, June 13th to 27th.  
*Psithyrus insularis*. Okanagan Falls, June 6th.  
*Halictus lerouxii*. Okanagan Falls, April 19th.  
*Halictus trizonatus*. Okanagan Falls, June 12th.  
*Agapostemon femoratus?* Okanagan Falls, June 13th.  
*Bombomelerta fulvida*. Okanagan Falls, April 19th to 26th.  
*Anthophora solitaria* Ritz. Okanagan Falls, June 2nd.  
*Sphecodes hesperellus*. Okanagan Falls, June 2nd.  
*Andrena kincaidii* Ckll. Okanagan Falls, May 13th.  
*Andrena vicina* Smith. Okanagan Falls, May 7th.  
*Ceratina submaritima*. Okanagan Falls, June 12th.  
*Megachile* sp. Okanagan Falls, June 5th.  
*Osmia* sp. (two distinct var.). Okanagan Falls, June 2nd.  
*Anthophora* sp. Okanagan Falls, May 28th.

Mr. Day: That is a very interesting account of insects. I have had a little experience with the northern insects. My son was in Dawson several years ago, and he collected some insects and sent them down to me. I was much struck with the darkness of the insects, which demonstrated that the effect of the cold on moths was to generally produce dark specimens, and it is admitted that the cold has the effect of darkening moths. I think it is quite interesting to note that some go dark and some go light.

Mr. Blackmore: The specimens are similar in some of the various forms.

Mr. Day: Very similar. The next paper is on "Interesting Habits of Some Lepidoptera," by J. W. Cockle, Kaslo, B.C.

Mr. Treherne: Mr. Cockle's paper has been printed in Bulletin No. 5; however, as it is a paper which would be immensely interesting to all present, I beg leave to read it. (See Bulletin No. 5 for Mr. Cockle's paper.)

Mr. Wilson: I was reading the other night Darwin's Diary on the Butterfly, and I took a little note of the insects that he found in Brazil, if I might read it to you.

### DARWIN, BUTTERFLIES IN BRAZIL.

NOTICED BY DARWIN IN THE VOYAGE OF THE "BEAGLE."

I was much surprised at the habits of the *Papilio feronia*. This butterfly is uncommon and generally frequents the orange groves. Although generally a high flyer, it frequently lights on the trunks of trees. On these occasions the head is invariably placed downwards, and its wings are expanded in an horizontal plane instead of being folded vertically, as is commonly the case.

This is the only butterfly that I know of that uses its legs for running. Not being aware of this fact, the insect more than once, as I cautiously approached with my forceps, shuffled on one side just as the instrument was closing and thus escaped.

But a far more singular fact is the power which this species possesses of making a noise. Several times, when a pair, presumably male and female, were chasing each other in an irregular course, they passed within a few yards, and I distinctly heard a clicking noise similar to that produced by a toothed wheel passing under a spring catch. The noise was continued but at short intervals, and could be distinguished at about twenty yards distant. I am certain there is no error in the observation.

Mr. Doubleday described a peculiar structure in the wings of this butterfly, which seems to be the means of making this noise. He says it is remarkable for having a sort of drum at the base of the five wings between the costal nervure and the sub-costal. These two nervures, moreover, have a peculiar screw-like diaphragm or vessel in the interior.

Mr. Treherne: Before we adjourn there are two matters of interest. There is reported to be a general outbreak of caterpillars in the Fort George District.

Mr. Wilson: The caterpillar is working up the Fraser River.

Mr. Treherne: This is undoubtedly our friend the tent-caterpillar. Regarding the importing of bees into British Columbia, I have a letter from Mr. Robinson. At the present time the regulations of the Province demand that all bees and bee products be held in quarantine for thirty days, and if they are pronounced free from foul-brood they are allowed to enter into the country. Mr. Robinson was very strong on this question. He claimed that holding the bees at the border was not right, as, if they are infested with this foul-brood, they would fly inland into British Columbia, and if they had the disease they would breed it, and consequently we passed a resolution requesting action on the part of the Government to alter this regulation by either prohibiting the importation from districts known to be infested or by putting a quarantine on the whole business. We forwarded this resolution to the Department of Agriculture, and no action was taken, with the result that in Burnaby and Hastings they have had a very serious outbreak of foul-brood, resulting in the expense of several Inspectors being detailed off by this action of the Department.

The President: This is very interesting and upholds our action of last year. Before we adjourn I find it necessary to elect our officers for the year 1915. The meeting is now open for nominations.

## OFFICERS ELECTED FOR 1915.

President—G. O. Day, F.E.S., Duncan, B.C.

First Vice-President—L. E. Taylor, F.Z.S., M.B.O.U., Kelowna.

Second Vice-President—E. H. Blackmore, Victoria.

Secretary-Treasurer—R. C. Treherne, B.S.A., Agassiz.

Assistant Secretary—H. H. Creese, West Summerland.

Advisory Board—G. O. Day, L. E. Taylor, E. H. Blackmore, R. C. Treherne, H. H. Creese, Tom Wilson, W. H. Lyne, A. H. Bush, and E. M. Anderson.

## ERRATA.

## CORRECTIONS IN BULLETIN NO. 4, B.C. ENT. SOC. PROC.

Page 13. *Orthosia ferruginoides* should be *Orthosia verberata*. Mr. F. Wolley-Dod says that *ferruginoides* do not occur at the Coast; all that he has seen bearing that name are *verberata*. Though much alike, they are distinct. *Scepsis packardii* should be *Scepsis packardii*; *Leptarctia californicæ* should be *Leptarctia californicæ*; *Leptarctia* var. *dimidata* should be *L. cal.* var. *dimidiata*; *Eupethecia* should be *Eupithecia*; *Perstroma nubilata* should be *Eustroma nubilata*.

Page 14. *H. autumnalis* var. *crockeri* should be *H. autumnalis* var. *crokeri*.

Page 45, lines 9, 16, and 31. *Junctum notata* should read *punctum notata*.

Page 45, line 28. *Dysstroma* should read *Dysstroma citrata* Linn.

Page 45, lines 33 and 36. Variety *niveifascia* should read var. *niveifascia*.

Page 46, line 2. Sentence commencing with "Strange to say" should read as follows: "Strange to say that, although *californiata* has no described varieties occurring here, the Eastern form has two, one of which is *Hydriomena autumnalis* var. *crokerii* Swett."

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