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NOMENCLATURE AND CLASSIFICATION.

(PRESIDENTIAL ADDRESS.)

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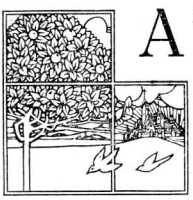

A SOCIETY such as ours labours under a serious disadvantage by reason of its members being comparatively few, and those scattered over a great extent of country. You, in Vancouver, are fortunate in having a small band of workers within easy reach of each other; in Victoria there are a few entomologists 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, Daphlidice, 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 "**galii,**" but by some means, probably a misprint, it was spelt "**gallii.**" Though several subsequent authorities have referred to the species as "**galii,**" 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, edwardiensis, 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 venation, 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 neuration 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 neuration 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 or oval, 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 neuration, 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 unfixed 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 tibiæ (*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 tibiæ, the tibial spurs and the hair-pencil on hind tibiæ 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.)