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NOTES ON "A REVISION OF THE GENUS ARGYNNIS," BY HENRY J. ELWES, F. L. S., F. Z. S., ETC.

BY W. H. EDWARDS, COALBURGH, WEST VA.

So much of the text of Mr. Elwes' paper as relates to North American species has recently been printed in *Psyche* (March), but the synonymic list, which is most important for a full comprehension of the state of mind of the author, was omitted. I applied to the editor of the *CAN. ENT.* to print this list, but it was found that it would occupy nearly one-half the space of a number, and it was not thought expedient to give it. In course of the present paper, however, enough of said list will be given to show the features of the whole. Mr. Elwes, in "revising," as he terms it, has cut the forty-two species enumerated in Group I., in my Catalogue of 1884, adding *Cipris* and *Semiramis*, described later, to fifteen; and in Group II., makes one of *Bellona* and *Epithore*. He says, page 560, (*Psyche*, 308): "The Argynnides of North America are, without exception, the most difficult butterflies to classify that I have studied. I have a collection which includes authentically named specimens of almost all the species and varieties, many of them direct from such well known collectors as Messrs. H. Edwards and Morrison, many from Messrs. Strecker and Geddes. I have also seen some of the best collections in the United States." * * * "It seems presumptive for a man to set aside much of what has been written by those who have seen, both living and dead, so many more specimens than I have seen, etc."

Undoubtedly it is a difficult group, and Messrs. H. Edwards and Scudder, with myself, have studied it long, but do not pretend to know completely some of the forms; and it seems odd that a stranger can skip from ocean to ocean and back again, stop here a day and there a week to ply his net, visiting a few collections, and those mostly second or third rate, getting his specimens "authentically named," in nearly all cases by

persons who never saw several of the described species, or have their knowledge at second hand, and on the strength of this pronounce judicially on the American Argynnides! One of my correspondents, a lepidopterist, not a mere collector, on reading the paper in *Psyche*, wrote me thus: "It is an amazing piece of presumption for a visitor to America to collect and buy a lot of specimens, and on the strength of that to denounce and try to overthrow the work of yourself and Scudder, who have been studying the butterflies for more than a quarter of a century, and must know a thousand times more about them than he possibly can." And another correspondent, of same character, says: "I think it a pity for a man to write on such a subject, unless he can throw some light on it."

Mr. Elwes gives the impression that he had studied the important collections of the country, but he never saw mine, nor that of Mr. Bruce (rich in the Colorado species), nor that of the American Entomological Society in Philadelphia, nor any collection on the Atlantic slope except Dr. Holland's, Mr. Neumoegen's, Mr. H. Edwards's and Mr. Strecker's. On the Pacific, those that he could have seen were local and small. It is known that I have sold my collection to Dr. Holland, but at the time Mr. Elwes visited Pittsburgh, the greater part of the rarer and less known Argynnides, and particularly those that have so perplexed this gentleman, had not been delivered. At Mr. Neumoegen's he scarcely glanced at the group, but gave all his time to the East Indian butterflies. He says himself that he "went through" Mr. Edwards' collection, but, as Mr. Edwards has not returned from Australia, I cannot learn at what pace, though I can imagine it. But he spent considerable time at Reading, and Mr. Strecker tells his friends that "he took copious notes," and that he "gave him many points." The paper shows as much.

I had cordially invited Mr. Elwes to visit me and inspect the Argynnides, but not finding himself able to come, he failed to see the most complete collection in the group treated of ever brought together, containing not only the types of all the species I had described, but every one of Dr. Boisduval's types of Californian species: in other words, of nearly every species described since 1852. Of the two species described by Mr. H. Edwards, and the four by Dr. Behr, I have examples named by them, and in most cases long suites, with all the varieties which during thirty years I had been able to bring together.

I could have shown Mr. Elwes the points of difference in difficult sub-groups, and could have named all his specimens "authentically." But he preferred to take counsel of this and that "collector," with the plain result that his specimens are not named "authentically," and that his collection must be a hopeless jumble. It is clear as can be from his list that in half the cases he does not know what he is talking of. For example: "*A. Aphrodite*, *A. Cybele*, *A. Alcestis*, *A. Cipris*, *A. Halcyone*. This is a group of species or forms which are extremely hard to define; and though Edwards and Scudder, and most other North American Entomologists, agree in keeping them separate, I think it is very difficult, if not impossible, to identify them, unless you know their habitat." (One would think that such cases were unheard of elsewhere. Habitat is an important aid in determining between closely allied species, and zoologists in every branch, and botanists, take it into consideration.) I have a pretty good series of all, except *Cipris*, which must be very close to, if not identical with *Alcestis*, etc." Plainly, he does not know *Cipris* then, a species closer to *Aphrodite* than to *Alcestis*. "Either such experienced collectors as Morrison or Geddes did not know *Aphrodite* when they saw it out of its usual range, or Scudder and Edwards are mistaken." Truly, it does look so. However, it is not remarkable that the collectors named did not distinguish *Cipris*, inasmuch as, in their day of collecting, it had not been separated. "Mr. Edwards perhaps would say that my *Halcyone*, which were sent by Mr. Strecker, and taken near Denver, are not true to name; but what can they be from that locality?" Here it seems that locality helps him to decide on a species. "What can they be?" I can answer this pathetic appeal: *Halcyone* is not "taken near Denver," but *Cipris* is, and Mr. Elwes was viewing a *Cipris* undoubtedly. Now *Halcyone* does not belong to the *Aphrodite* sub-group, as anyone can see by the figure of the female in Butt. N. A., vol. 3, part IX. It has the peculiar cut of wings of *Edwardsii*, and great egg-shaped silver spots. So, here are two species our author is at fault about.

And he is bothered with *Chitone*, "sent by H. Edwards from Nevada," which "does not agree with W. H. Edwards' description on the under side" (which is the important side), "and is nearer *Nevadensis*." He never saw *Chitone*, a species not taken in Nevada, but in Southern Utah and in Weber Mountains, and totally different on both sides from *Nevadensis*.

A *Lais* "seems to me very near *Atlantis*"; and in the list, p. 546, he says "*Lais* (*Atlantis* var.?)," not being able to determine whether it is a species or a var. He never, in text or list, refers to the plate of *Lais*, in Butt. N. A., vol. 3, which, as well as the description, testifies to a species that cannot be confounded with *Atlantis*.

"There occur, however, in Nevada, forms which are described as *Laura* and *Macaria*, of which I have authentic specimens from Mr. H. Edwards, and which, by their under sides, seem to be *Coronis*." Then, in same connection, speaking of *Chitone*, as before quoted, he goes on: "None of these names can, in my opinion, be retained, except as synonymns, though they are *all kept up* in Mr. Edwards' Catalogue as distinct species." On this I remark that Mr. Henry Edwards is one of the few experienced lepidopterists who are well acquainted with the American Argynnides. He collected for several seasons in California and Nevada, and knows more of the living butterflies than any other one man. In doubtful cases I rely on his judgment above all persons. His collection does not embrace, by a good deal, all the described species; but, so far as it goes, it is complete, and each species is represented in long suites. This collection was undoubtedly the most important one Mr. Elwes visited. "In going through Mr. Edwards' collection, I noted *Columbia* as similar to *Hesperis*;" and on the strength of that casual glance one May morning, down goes *Hesperis* as *Atlantis* pure and simple, and *Columbia* as well but with a query, the usual confession of ignorance of its position. It takes something more than "going through" a collection in this fashion to make one's self acquainted with forty species, and giving the right to pronounce on them. In the present case, also, some deference might be thought due to Mr. Edwards' standing and experience. But, I doubt very much whether Mr. Elwes saw *Macaria*. So far as I know, it is not Nevadan, but is confined to the Greenhorn Mountains and Kern River region in South California.

"Whether *Montivaga* and its var. *Egleis* are really distinct from *Eurynome* and its varieties, is hard to say," p. 574. Who said *Egleis* was a var. of *Montivaga*? I am confident the author of this paper never saw *Montivaga*, unless under another name. It is neither *Egleis* nor *Eurynome*, but the same as *Arge* Strecker, which last is not *Erinna* at all, as anyone can see by reading the two descriptions. Mr. Mead, who has a keen eye for resemblances or differences, (alas, that he has gone over to the

botanists !) on his return from the summer's collecting in California and Nevada, 1878, went to Reading, and at once identified *Arge* as *Montivaga*, many examples of which he had taken at Tallac, Nevada. The description supports Mr. Mead's testimony. *Erinna* was unknown till five years after *Arge* was described, when the first examples were brought in from Washington Territory. Neither it nor *Eurynome* are Californian. In Butt. N. A., Vol. II., *Eurynome* is figured and its egg: in Vol. III., *Egleis* and its egg. Apart from the sufficient distinctness of the imago, the different form of the eggs is decisive, though doubtless Mr. Elwes does not know it. There is no appreciable variation in the shape of the eggs of any species of Argynnis. Mr. Scudder relies implicitly upon this fact, even in the characterization of genera. If one is higher than broad, with a given number of ribs, all are; if one is broader than high, all are. The egg of *Eurynome* is squat, as broad as high, with twenty ribs; *Egleis* is tall, considerably higher than broad, with eighteen ribs. I may say here that nowhere in the paper do I find the least reference to the plates in Butt. N. A., except on page 574. When talking of *Bischoffii* and *Opis*, I read: "In Edwards' figures I can see no specific characters." In the list most of the plates are referred to, but in the text no one would suppose that any of these species had been figured, or that such figures as are given were of the least use in determining species. The author prefers to trust to his "authentically named" specimens.

On p. 536, he says he has not *Inornata* in his collection, and indirectly that he never saw it, but he "cannot recognize it as a species." Nothing further is said of it, but in the list it is put under *Callippe*, "? var. vel trans. ad *Edwardsii*, vel ad *Zerene*, *Inornata*." *Edwardsii* in no one character resembles *Zerene*, and is Coloradan, while *Inornata* is found only in California. The plate shows it to be one of the most distinct species of the fauna. The male is as red as *Adiante*. *Callippe* has no red about it, but is dark and melanic. So that here *Inornata* is put down as related to three wholly unrelated species, under one of them, and *on its way*, "trans." to the other two!

A. Hippolyta, which is kept up" (a favorite and charming phrase!) "by its author as a species, and seems to be something intermediate between *Hesperis* and some form of *Zerene*" (all roads lead to *Zerene*!) "Its locality would indicate that it may be nearer to them than to *Atlantis*." (Observe the admission that habitat is worthy of considera-

tion!) But, in the list, p. 547, *Bremnerii* is put as a true species and *Hippolyta* as a synonym of it—not even credited as a var.! It strikes me there is discrepancy between text and list. And *Rhodope*, also one of the most distinct species in the fauna, is put under *Bremnerii*, to which it has no relation, as “? var. *Rhodope*.” The “authentically named” specimens have misled the author, and, as usual, the plate would have set him right.

“The species allied to *Monticola*, namely, *Zerene* and *Bremnerii*, have puzzled me quite as much as Edwards, Strecker and others. In the damper climate of Oregon * * * a darker form, *Bremnerii*, occurs, * * * and might be considered as the Pacific coast form of *Atlantis*, but in the specimens taken at Mt. Hood, the silver is absent, and these might well be considered a northern and darker form of *Zerene*.” A characteristic sample of this author’s hazy views of species! In the first place, I will say, that Edwards is not and has not been puzzled by the species in question. In the next place, that *Bremnerii* is not at all like *Atlantis*. In the third place, I had long suites of the Mt. Hood specimens from Morrison, receiving by pre-contract every variety and every species taken, and no *Bremnerii* was without silver. Nor in the many examples I have seen from Oregon and Vancouver, have I seen one that was not as fully silvered as *Cybele*. In the fourth place, Mr. Elwes has never seen a *Bremnerii* without silver. Doubtless, he is talking of *Zerene*. And in the last place, notwithstanding all his bewilderment and error of determination, he actually puts in the list *Monticola*, *Bremnerii* and *Zerene*, as three of his fifteen true species!

A. Behrensii is put under *Monticola* as “? var.,” with this funny comment: “? trans. ad *Monticola*, vel. ad *Bremnerii*, nomen vix conservandum.” Now, *Behrensii* resembles neither; it is one of the rarest of our species so far, and in all these years I have seen but four examples of it. I do not believe the author ever saw one. Here again the plates could have enlightened him.

So much for ignorance. There is another class of species, differing radically in colour, size, form, and in the shape and number of the silver spots, which, to our author’s eye, look all alike. “*A. Lcto* is a species which, though undoubtedly nearly allied to *Cybele*, is fully as distinct from it as *Nokomis*, and may be regarded as its Pacific Coast form in the

same way as *Nokomis* is the form (i. e. of *Cybele*) of the dry central plateau of the continent." He had already said that *Cybele* and *Aphrodite*, and several others, were all one species, and now gets into the same corral *Leto*, *Nokomis* and *Nitocris*, which last, he says, is nothing but a form of *Nokomis*. And he quotes the wise remarks of his friend and counsellor, Strecker, with approval: "I have always contended that *Nokomis* was a pale abnormal form of *Cybele*, of which we have so many other instances in other species, (I should like to see a statement of these other instances!) from the *dry salt regions* of Utah and Arizona," p. 568. Pity that Mr. Darwin had not lighted on that explanation of the origin of species! The dry salt air changes the form of a species, changes its coloration throughout, changes the form of the silver spots, enlarges or decreases their number, lines the spots with heavy bars of black on both anterior and posterior sides. Thus a *Nokomis* is manufactured out of a *Cybele*! *Leto* is as unlike *Cybele* in shape, in the silver spots, their size and number, and in the colour of both sexes, as it is unlike *Zerene*. *Nokomis* female, on the upper side, is of the same pattern as female *Diana*, the spots being yellow, which in *Diana* are blue. *Leto* female, in place of the extra-discal oblong spots on hind wings, seen in the other two species, has a solid yellow band. To me it seems absurd to the last degree to be talking about the identity or even the nearness of the three species to each other. I happen to have bred *Leto* from egg to imago, and the larvæ has striking differences from that of *Cybele*. And how any one can look at the plates of *Nokomis* and *Nitocris*, and call them forms of one species, is past my understanding.

A. Semiramis "to my eye is nothing more than a form of *Coronis*, in which the black markings of the upper side have become paler and more reduced, as might be expected from the arid character of the country where it is found. It has been taken by Mr. Wright in the mountains separating the San Bernardino Valley from the Mohave Desert, and was not out when I visited these mountains in May, 1838." Why might it have been expected? That strikes me as on a par with the reason given for transformation of species in Utah, the dry salt air; and in Oregon, the damp climate. As it happens, the region where *Semiramis* is found is not on the desert side of the mountains, and Mr. Wright, in answer to my inquiry, denies the arid character, and says that no mountains are dry

there. "The winds all the year are from the Pacific; the desert is 20 miles away, across 5,500 feet of a mountain range."

"*A. Adiante* is a form which both Strecker and Edwards consider distinct. On the coast of Calif., according to Strecker's information, it is now extinct, and all the male specimens (*I have seen no females*) in Mr. Godman's and my collection were evidently taken many years ago. I should certainly be inclined to set it down as a variety of one of these species," *i. e.* *Zerene* or *Monticola*. "The opinions held twenty-five years ago, when Dr. Behr was an active collector, are not conclusive." In the list, under the true species *Zerene*, is set: "? *Hydaspe* Bdl.; ? *Irene* Bdl.; ? *Rupestris* Behr.; ? *Adiante* Bdl." Now *Hydaspe* is really a var. of *Zerene*. I have Boisduval's types of both. *Rupestris* is in no way related to *Zerene*, and in both these cases the author is unable to pronounce definitely. He does not know, confessedly, what they are; nor whether *Adiante* is a var.¹ or not. In the text, he says he thinks it is a var. of either *Zerene* or *Monticola*. Well, which? Knowing nothing at all, he puts it as a ? var. of *Zerene*. Perhaps if one could cut down the wings of *Zerene* or *Monticola*, trim the edges a little, change the hue of the upper side, reduce to streaks all the heavy black markings or obliterate half of them, wipe out all the marks and spots of the under side, one could manufacture an *Adiante* that would seem the real article to the reviser of the Argynnidæ. For myself I am content with the species as nature made it. But this is the process by which 42 species are cut down to 15.

I could have shown Mr. Elwes recent specimens of *Adiante* of both sexes, and told him where to seek it. In 1889, a correspondent obtained eggs of it for me.

In the list, p. 545, we have under the head of true species *Aphrodite* Fabr.; "? var. *Alcestis: Cipris*" (put as a mere synonym of *Alcestis*), "? *Aphrodite* Mead" (which is neither more nor less than what, thirteen years after Mead's mention, was separated as *Cipris*.) But the gem of the group is put thus: "var. vel bona sp. *Nausicaa* Edw." It is either a var. or a good species, the author does not know which, but all the same it stands under *Aphrodite*, and another species is disposed of. If the author knows nothing, why not say nothing!

List, p. 541, "*Bellona* Fabr.; var. *Epithore* Bdl.; the fore-wings less

produced apically, the hind margin convex (in *Bellona* it is concave or sinuous), the base less obscured, beneath paler." If these characters are not enough on which to found a species, or separate two species, how much further must we look? But in addition there are other separating characters.

What are we to think of a transient visitor on the strength of his desultory experience "going through" such collections as he had access to, pencil in hand and carpet bag in the hall, and of his "authentically named" specimens from "experienced collectors," making a list after this fashion? Confessing at every step that he is lost, groping his way by query marks, uncertain whether to call a thing a var. or a good species; but, all the same, putting each incomprehensible form under something else. He laments his trouble, but can't approve of Edwards' way of getting over the difficulty (Elwes' difficulty) by creating other species, p. 566. Everywhere trans. ad *Zerene*, vel *Edwardsii*, vel *Monticola*, vel *Behrensi*, vel *Callippe*, vel *Meadii*, one species half the time trans. to at least two others. The result of this floundering is a paper and list on the lines of, and level with, Strecker's Catalogue! With a difference, however, in favor of Mr. Strecker: that no matter how ignorant he is, he never allows it, but is cock sure that *Cybele* and *Leto* and *Nokomis* are but the same thing; and *Colias Eriphyle*, *Philodice* and *Eurytheme*; and *Satyrus Nephela*, *Ariane*, *Boopis*, *Gabbii*, *Alope*, *Pegala*, *Wheeleri*, all one (vide Cat.). We do not find him dealing in query marks or alternatives. Such assurance is at least refreshing in contrast with the painful uncertainty and confusion of this paper.

Indefinite knowledge is definite ignorance, but when one is in the latter state, why take the world into his confidence?

I suppose, before Darwin, all naturalists were perforce lumpers of species. Each species was a little world with its group of satellites. But, since 1861, the view is changed, and in this country lumpers are nearly as scarce as dodcs.

I myself am the reverse of a lumper in my method of work, and as I have always avowed the fact, my position is well understood. "I apprehend," says Prof. Owen, "that few naturalists nowadays, in describing and proposing a name for what they call 'a new species,' use that term to signify what was meant by it twenty or thirty years ago. * * * * The proposer

of the new species now intends to state no more than he actually knows ; as, for example, that the differences on which he founds the specific character are constant in individuals of both sexes, so far as observation has reached," etc. That is what I act on, and I believe the lepidopterists of this country do the same, as a body. In CAN. ENT., 21, 235, 1889, Mr. Lyman says : " I hold very strongly that whenever a form is distinctly and easily separable from previously named species, it is entitled to be treated as a good species, and to be given a specific name, until it is proved to be only a variety by breeding," etc.

Dr. Holland writes, after reading Mr. Elwes' paper : " Your course in applying specific names to constant, or apparently constant, varieties, is proper, no doubt. The species so called may be relegated at a later time to the rank of a mere variety ; but science has been the gainer by the process." Professor Rivers, in his recent paper in *Psyche*, holds the same view. So does Mr. Gröbe in his new Check List.

In illustration of the two ways of working : In 1876, I described a certain yellow *Colias* from British Columbia as *C. Eriphyle*, being satisfied that it could not be *Philodice*, the then only described yellow species of the sub-group. In 1883, I named another yellow *Colias* from Colorado, that seemed to have distinct features, as *C. Hagenii*. Year after year I endeavored to get eggs of the Colorado form, and when at last I succeeded, the butterflies resulting showed that that *Hagenii* and *Eriphyle* were essentially the same thing, and both were a yellow form of the orange species *Eurytheme*.

Per contra, as an example of lumping without knowledge, quite after Mr. Elwes' own heart : Mr. Strecker, in his Catalogue, puts *Philodice* as a species, and *Eriphyle* as a variety of it—not only that, but *Occidentalis* and *Chrysomelas* as well, though these belong to a different sub-group from *Philodice*. Which was the more reasonable proceeding, to lump as varieties or synonyms several forms of which the lumper knew nothing, or to spot them as separate, and go to work to ascertain the facts ?

In the same way I had separated the two orange *Colias*, *Ariadne* and *Keevaydin*, as species, and when the opportunity came for breeding them, they were proved to be polymorphic forms of *Eurytheme*. So two of the polymorphic forms of *Papilio Ajax* were reckoned, not only by me, but by Dr. Felder, as distinct species, till breeding showed them forms merely, but deserving a name-of course. By naming and separating a probable

species, attention is directed to it, it can never more be lost sight of, and sooner or later its true position will become established. But if several forms, of which nothing definite is known, are rolled into a lump, who can say that they will ever again be separated or even noticed!

In Mr. Elwes' revision of the genus *Erebria* he enumerated *Epipsodea*, and hesitatingly under it (with a query) a var. he thought worthy of a name, *Brucei*. He says he did not know whether to call this a var. or a species. He and Mr. Godman had each one specimen, and "it is so different from *Epipsodea* that, had I more specimens, I should be inclined to consider it a different species." So he puts it down as a var. with a query. If he had had more specimens—say one or two more—he would have done exactly what he is holding Mr. Edwards up to public reprobation for, put it as a species! Well, Mr. Bruce sent me eggs laid by the *Brucei*, and in due time one of them gave a typical *Epipsodea* imago. The indefinite knowledge has become definite.

On p. 569, larval characters are deprecated as a means of determining doubtful species, because the larvæ "are liable to vary" as much as the perfect insect. I will put my experience against the author's, and I say that the variation in the larvæ of each species of *Argynnis* is practically nothing.* They are as like each other as so many peas. When, therefore, I have reason to think, from the imago, that a certain form is a distinct species, as, for example, the one now known as *A. Cipris*, and which was called by Mr. Mead and myself the Rocky Mountain form of *Aphrodite*, but on my part always with doubts, if I can get eggs, I may find out the truth one way or the other. In case of *Cipris*, the larva and pupa showed a distinct species, and thereafter I had no difficulty in defining the geographical limits of *Cipris*. *Aphrodite* has a chocolate-brown larva and brown pupa, with no other markings; *Cipris* has both stages variegated and striped with yellow, and is as remarkable in its ornamentation

*There are many cases among the Heterocera, where the larvæ alone are relied on for distinguishing species, vide Weismann's Theory, p. 543, Eng. Ed. "In the Sphingidæ, cases are not wanting in which the moths are far more closely allied than the larvæ. This is especially striking in the genus *Deilephila*, eight species of which are allied in the imaginal state, in a remarkable degree, whilst the larvæ differ greatly from one another in color, and to as great an extent in marking." In the case of *D. Euphorbiæ* and *Niæca*, whilst the larvæ show great differences. * * * the moths cannot be distinguished with certainty. The imago of the rare *Niæca* is, for this reason, wanting in most collections; it cannot be detected whether a specimen is genuine, i. e., whether it may not perhaps be a somewhat large example of *Euphorbiæ*."

as *Idalia*. Suppose I had followed the example of the lumpers and *Cipris* had been overlooked altogether! What gain would have accrued?

I will lay down another rule that is infallible in Argynnis. Each species has its own style of silver spots, and there is practically no variation throughout the species, or in the range of it. *Coronis* Behr. abounds in South California, flies in all the intervening States to Montana, and in Oregon and Washington, and varies as much in coloration of both surfaces as any American species. But take it where we may, the great egg-shaped spots are always the same. It does not follow, though, that every specimen with egg-shaped spots is therefore a *Coronis*. *Cybele* always has silver spots of its own type; so has *Lepto*, so *Nokomis*. In no case does one of these species approach the other. In *Macaria* the spots are at their maximum, in *Chitone* at their minimum; yet, in the list, both are put down as vars. of one other species. I would commend a careful course of study in these points to the author of the paper.

Mr. Elwes is sure that Mr. Edwards "will one day regret" having "in his earlier years created a great number of synonymns." I am sorry that he should be pained on my account. I am as much of a sinner in my later years as in my earlier, and have within a week described two species of Argynnis, which Mr. Elwes will regard as either "vars. or bona sp., or trans. ad *Zerene*." "His later views, as expressed in such papers as he has written on *P. Napi* and its vars., and in *Lyc. Pseudargiolus*, give evidence of a correct appreciation of the variation of species," for which condescending and patronizing approval I am duly grateful. But the illustration of *L. Pseudargiolus* is not so pat as was intended. I named both *L. Violacca* and *Neglecta* as species, and figured them as such in Vol I., Butt. But, when eggs were got, the whole curious and complicated relationship was made out, and these forms and several others were proven to be polymorphic forms of the one species *Pseudargiolus*. And I will venture to say I proceeded scientifically from first to last.

With regard to *P. Napi*, all I attempted to do was to show how a parent species could originate distinct derivative forms, and though I called all *Napi*, yet the derivatives, every one of them, are good and true species, or dimorphic forms of species, breeding true, not intermixing, and in the next edition of my Catalogue I shall put them down as such. I think I can see how the derivation from a single form occurred, but the derivatives are now species, and at present entirely separated from the parent *Napi*.

Anyone who has collected, and studied, and bred butterflies for years will have ideas as to the limits of variation in each species, and he will judge forms newly presented to him by those which he already knows. The eastern Argynnids—seven species—show little variation except in size, and it is only *Cybele* and *Aphrodite* that show that, according as they are northern or southern. The others are remarkably constant. Neither of these species, whatever its variation, runs into another, or approaches another. No one but a novice can possibly mistake one for another. Judging by what I see of them, I do not expect to find much variation in the genus elsewhere, and in fact if there are any variable species in our fauna, they form the exception, not the rule. The greater part are certainly as well defined as *Aphrodite* and *Atlantis*. I believe all the 42 described species, unless perhaps *Clio*, to be good species, constant to type, breeding true. *Clio* may turn out by breeding to be a dimorphic form of *Eurynome*. I should be delighted to be the means of proving it, but till it is proven, I hold it as separate. As to *Artonis*, that it is distinct from *Eurynome* and *Clio* I have no doubt whatever. I know it is found abundantly where *Eurynome* does not fly, and of course it breeds to its own type.

On page 535, in this remarkable statement, when speaking of the Argynnides of all the world: "The difficulties in this genus are not so great as in *Colias* and *Erebia*, except in the species inhabiting the Rocky Mountains and Pacific States of North America, which run into each other in a most extraordinary manner. Most of the European species, though closely allied, are fairly distinct, and I have only marked one species out of America as doubtful." So far as relates to all the world, then, except these western districts of America, the rule I laid down holds good by Mr. Elwes' own admission, that the several species of *Argynnis* vary only within certain limits, and nowhere run into each other.

Mr. Elwes had only to make sure of his American species, which he could easily have done by seeing the original types, and he would have found his rule held good universally. But ignorant of the types, he started wrong, and trusting to what he calls authentically named specimens, received from experienced collectors, together with his lack of knowledge of the preparatory stages, or of what are the most important features of the imagos, he has landed where we find him.

THE BUTTERFLIES OF LAGGAN, N. W. T.; ACCOUNT OF
CERTAIN SPECIES INHABITING THE ROCKY
MOUNTAINS IN LATITUDE $51^{\circ} 25'$.

BY THOMAS E. BEAN, LAGGAN, ALBERTA.

THE LOCALITY.—Laggan is a telegraph station of the Canadian Pacific Railway, 956 miles west of Winnipeg as the railway runs, and six miles east of the British Columbia eastern boundary. A mile west of Laggan the railway leaves the Bow River Valley, and turns more directly west into the valley of Noore's Creek to cross the central range of the Rocky Mountains, the summit of the pass being six miles from Laggan. Directly east of Laggan, Pipestone Creek, flowing from the north, joins the Bow; its sources are about twenty miles to the north, among the crags of the Sawback Range, only a few miles distant from the headwaters of the Red Deer River. A short distance west of Laggan, Noore's Creek enters the Bow: this stream, although scarcely ten miles long, carries, on warm days, a great volume of water, derived from an extensive snow field on the eastern face of the Waputtek Range. The Bow River itself, rising about latitude $51^{\circ} 45'$, flows southeast for a long distance in an elevated shallow valley parallel to the axis line of the Rocky Mountains, and close to the basal slope of the central range of peaks. At Laggan, the surface of the river, at its ordinary summer level, is but three hundred feet below the elevation of the summit of Kicking Horse Pass.

The entomological ground, whose butterflies I propose to speak of, is chiefly a limited district immediately around Laggan, comprising, on the east, the valley of the Bow to a distance of four miles, and on the west the same valley for two miles; embracing on the southwest the valley of Noore's Creek, and the summit valley of Kicking Horse Pass to a point about three miles west of the British Columbia boundary; and extending on the north from the level of the Bow to the peaks of the nearest of the "Slate Mountains." A less complete examination has been made for nineteen miles east along the railway, and above timber line upon mountains at Stephen and Hector; also between the Bow River and Emerald Lake, three miles south.

As regards continental position, Laggan is about one hundred and sixty-five miles north of the international boundary, on a line with the western boundary of Montana, in the same longitude as the Great Slave

Lake and the peninsula of Lower California. It is approximately in latitude $51^{\circ} 26'$ north, and its elevation above the sea is recorded as 5,005 feet, only 290 feet less than that of the railway summit at the head of Kicking Horse Pass, while it is nearly a thousand feet higher than Morley, at the edge of the mountain district, and over three thousand feet more exalted than Regina, in the region of the central prairies.

To aid an estimate of the climatal and zoological conditions of the Laggan district, certain facts may be mentioned, partly of a general nature and partly local. The latitude of Laggan brings it about in line with the Aleutian Islands, Moose Fort on James Bay, and York Point, Labrador, while it is almost two degrees more northerly than Anticosti Island, and about four and a-half degrees further north than the city of Quebec. The district is thus seen to be considerably more northern in position than any other equally accessible North American entomological field which has been as fully examined. This district is on the warmer side of the continent. Although so much further north than Mount Marcy in the Adirondacks, on which timber line occurs at 4,850 feet, and the White Mountains of New Hampshire with timber line at 4,250 feet, yet the mountains about Laggan lift their forests to a far greater altitude, the uppermost fringe of larches illuminating timber line in September with a soft yellow glow at a height of 7,000 feet. The difference in the climate of western British America from that of the eastern side is illustrated by the occurrence of rattlesnakes at the "Forks of the Red Deer River," in the warm plains east of the mountains; the locality is nearly due east from Laggan, and is in the latitude of Southern Labrador.

The *local* conditions of the Laggan district, however, are distinctly of a boreal tendency. So great is the altitude of the Bow Valley that the railway grade is but 2,000 feet below timber line; in the vicinity of Pike's Peak, Colorado, an equal relative position would be met with at an altitude of 9,700 feet. The valley of the Bow, indeed, is but a comparatively narrow pass, parting two great systems of chaotic upland, where peak is frozen to peak by an almost unbroken line of glaciers—every sunless height a field of snow, each shaded alpine abyss a gulf of ice. As may well be supposed, these frigid environments powerfully affect the summer climate of the region, and exert a controlling influence upon the night atmosphere even when the days are warmest.

Among the noteworthy features of the scenery may be mentioned:

Mount Hector, in the northwest ; Mount Temple, about eight miles southwest, with a great field of snow and ice on its summit a mile above the valley ; Mount Lefroy, seven miles to the south, and the glacier of Noore's Creek, nine or ten miles west ; also Emerald Lake, three miles south of the Bow, and the various rapids and canons of the Bow and Pipestone.

For names and figures made use of, I am indebted chiefly to the "Geological Survey of Canada" and "Gannett's Dictionary of Altitudes."

Preliminary to a consecutive list of the Laggan butterflies, to be written when all the material is sufficiently understood, I propose now to present such details as are likely to be of interest in regard to some of the least familiar of these Western Alberta autochthones.

COLIAS ELIS Strecker ; its seasons and variations, with information in regard to the male :—

This fine butterfly was first collected by Capt. Geddes, who records the capture of the female at Laggan, on Aug. 1st, 1884—the only definite date I find in print. The reason the Captain did not find the male was because it was not lost, but gone before. Capt. Geddes also catalogues *Colias Meadii* Edw., as collected at Laggan in the season of 1884.

Mr. Strecker's description of *Elis* may be found in "Proc. of the Acad. of Nat. Sciences of Philadelphia" for 1885, pp. 24-25. Mr. Strecker says :—

"Capt. Geddes took about fifteen examples, all females, nine of the orange form, and about six of the white ; but nothing that could possibly be considered as the male. The other examples of *Colias* captured in the same locality were lemon-coloured males and females probably of one species, and allied to *Pelidne*, but bearing no kinship to the above. The most remarkable and distinctive feature of this *C. elis* is the white female ; as the species, I am positive, will be found, whenever the male is discovered, to belong to a group in which albinous females are unknown, its congeners being *Hecla*, *Hecla*, *Staudingeri* and *Eogene*, species in which no instance of the pale female has yet been known to occur ; all of which are found only at great altitudes, or at the North Polar Regions, and are in the male distinguished from the other red or orange species by the absence of the mealy kidney or oval-shaped spot on the upper surface of the costa of secondaries near the body.

"It is, curious, in regard to these albinous females of the *Coliades*,

that in one group they should occur in one species only, whilst in another there should be but one species, *C. Meadii*, found also at great elevation, in which they do not occur ; and in yet another species, *C. Vautierii*, of the same group with the last mentioned *Meadii*, found in Chili, the female is always white, such a thing as a red one being entirely unknown."

I find nothing in print from Capt. Geddes as to the elevation at which he found his specimens of *Elis*. Mr. Strecker states it as ten thousand feet, but that is evidently incorrect : timber line in the region occurs at about seven thousand feet, and the habitable belt extends but little more than a thousand feet above that elevation, while comparatively few of the ultimate barren peaks reach a height of ten thousand feet. *Elis* is by far most frequent at a little over five thousand feet, and is often met with in appropriate localities up to about six thousand feet ; it is rarely seen much higher than about six thousand feet, and never in my experience found above the tree line.

In regard to the distribution of *Elis*, I have little information. It is known to me only as inhabiting a very limited district. Eastward it becomes less frequent quite abruptly, and I have not seen it further east of Laggan than four or five miles ; it probably drops out of the fauna entirely on the east within ten miles of Laggan. To the southwest, across the summit, I have found it only as far as Hector siding, three miles west of the height of land ; beyond Hector its territory cannot extend far, as the decrease of altitude on the west slope at the head of the pass is very rapid, amounting to one thousand feet in the first six miles. The entire extent of the range of *Elis* from east to west, as known to me, is not more than thirteen miles. As to the distribution north and south, along the central line of the mountains, nothing is known, but in that direction its empire may be extensive. An interesting problem it is : How far the domain of *Elis* extends north and south from its thinly settled reserve on the Bow?—how far northward along the narrowing angle of the upper Rockies toward the wide-spread country of *Hecla*?—and southward, how far across a thousand miles of intervening mountainous wilderness toward the ancient villages of *Meadii* on Colorado's cloudy summits? Within the narrow limits of its known district, *Elis* is of general occurrence in localities where its food plant grows, though at few points is it ever anything but rare. A part of the best locality known to me was devastated by the fires just east of Laggan in June, 1889. *Elis* has partially established itself upon the high flats and hills between Laggan and the nearest,

mountains north, a district burned a few years ago, and will, no doubt become more frequent there in future years, as its food plant is abundant. At the summit, this butterfly and most others were well nigh exterminated in the summer of 1886 by the storm of fire which raged through the pass, sparing nothing but the little marshes and their inhabitants. Collecting there several times in 1888 and 1889, I saw scarcely a butterfly other than the two species of *Chrysophanus*, which live at the edges of the little swamps. These were as frequent at the summit as I found them in their resorts elsewhere. The larger butterflies, however, were lacking or were excessively rare, excepting only *Pieris occidentalis*, which seemed to have in some degree regained a footing.

The ♂ of *Elis* flies chiefly from about the 28th of June to the end of July. My initial date in 1886—an early season—was June 23. After July few ♂s are seen, and those few not newly out of chrysalis. The ♀s are abroad during a period about equal to that of the ♂s, but beginning and ending a few days later; my collection dates indicate a term of about five weeks, say from July 6th to August 10th or 12th. The ♂ is most frequent near the middle of July, and the ♀ a week or ten days later. The total period of the imago, including both sexes, varies in different seasons from a term of thirty-five to one of forty-five days: during the last five to ten days there are seen none in good condition—the females appear in faded finery, and rarely a tattered male lingers among the asters. There is but one flight in a summer. No indication of hibernation in imago or pupa has come to my notice. All the evidence so far obtained tends to show that the larva invariably hibernates at a very early stage, almost certainly at first stage, and that the species, in its habit of development, is a strict biennial.

Admitting *Elis* to be a distinct species, it is without doubt extremely near to *Meadii*, far closer than to any other well known form; this the ♂ especially proves. Probably its description as a distinct species was immediately due to the incident of failure to collect ♂s in the first instance.

DEFINITE CHARACTERS OF THE ♂.—Material examined, twenty-nine caught specimens. The smallest measures 48 mm., or 1.9 inch; the largest is 57 mm., equal to 2.24 inches. These measures are obtained by adding the length of the two primaries (measuring from apex to centre of base of wing) and the breadth of the body. Average expanse of the twenty-nine individuals 51.2 mm., or 2.01 inches. This is a larger butterfly than *Meadii* or *Hecla*. It is smaller than *Christina*, or even *Alex-*

andra, being nearer the expanse of *Edusa*, *Myrmidone* and *Thisoa*, and to the last one it has a more than superficial resemblance. The border of primary varies greatly in breadth in different individuals, ranging from 2.5 to 4.5 mm. in my specimens, measured at middle of outer margin: this is an important point of contrast from *Meadii* ♂, in which the breadth of the border of primary, in different individuals, is peculiarly uniform. At apex the border is not usually so broadly produced proportionally as in *Meadii*, but more nearly as in *Hecla*. At inner angle, the border is generally much produced, in which it follows the method of *Meadii* and differs from *Hecla*. As a general statement, the border of both wings is relatively much less produced in *Elis* than in *Meadii*. In the shape of the border of primary, *Elis* differs from *Meadii* definitely, though slightly, but its difference from *Hecla* is emphatic and essential. A more detailed comparison between *Elis*, *Meadii* and *Hecla* may be attempted later, with a more ample material of *Meadii* for inspection. At present it may safely be said that *Elis* is on upper surface partly near *Meadii*, and in part more like *Hecla*; that its resemblance to *Hecla* is comparatively superficial, while in essentials it is nearer *Meadii*, yet is not quite identical in the method of its pattern. On under side the differences between *Elis* and *Meadii* are not definite, nor very considerable. The cell-spot above primary is uniformly small, often sub-linear, and in six of the twenty-nine it is almost obsolete. Under hind wing the cell-spot is also small, but in five of the twenty-nine specimens it is faintly double. The presence of submarginal dark spots on under surface is scarcely to be called a feature of *Elis*, though slight traces of this submarginal row occur in twelve of the specimens. The same is true as to the "patch," or cluster of dark scales, found on costa beneath secondaries in many species of *Colias*; in *Elis* it is but feebly exhibited, traces of it being found in only seven of the twenty-nine males. Details of this kind do not constitute very interesting reading, but they are important. Such features as the cell-spots of both surfaces, the submarginal row of spots, and the costal "patch" on under side, and the nature of the marginal border on upper surface of wings,—when their averages in the several *Colias* forms have been fully collated from ample representative material of both flown and bred specimens—will prove to be efficient criteria in determining the standing of these forms.

(To be continued.)

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 75, Volume xxii.)

Genus NEMEOPHILA Steph.

1830—Steph., Ill., Brit. Ent., Haust., II., 72.

1855—Wlk., C. B. Mus., Lep. Het., III., 623.

Head small, not retracted, with rough vestiture. Eyes small, yet somewhat bulging or prominent. Tongue moderate in length, but weak. Palpi short, straight, scarcely projecting beyond the clypeus, clothed with short, thin vestiture. Ocelli present. Antennæ moderate in length, the ♂ rather lengthily bi-pectinated. Legs unarmed, subequal, the posterior longest, rather closely scaled, the spurs distinct.

Primaries with accessory cell distinct, giving off 7-10 from its apex, 4 and 5 close together, well separated from 3.

Secondaries with 3, 4 and 5 almost equidistant from the end of the submedian; 6 and 7 together from the end of the subcostal, which latter gives off 8 from about the middle of its course.

The species in this genus are variable and the relation of the described forms is by no means fixed. As usual I follow Mr. Grote's List, without, however, intending to subscribe to the correctness of the synonymy.

N. geddesi Neum.

1883—Neum., Papilio III., 137, *Nemeophila*.

Habitat—N. W. Brit. Col.

N. modesta Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 113, *Platarctia*.

1882—Grt., New List, 16, *Nemeophila*.

Habitat—California.

N. petrosa Wlk.

1855—Wlk., C. B. Mus., Lep. Het., III., 626, *Nemeophila*.

1872—Pack., 4th Rept. Peab. Ac. Sci., 85, *Nemeophila*.

1874—Streck., Lep. Rhop., et Het., I., 79, = *plantaginis*.

1878—Streck., Pr. Dav. Ac. Sci., II., 272, pl. IX., ff. 2-4, = *plantaginis* Linn.

1879—Strk., Rept. Chief Eng., 1878-79, V., p. 1859, = *plantaginis*.

1882—Stretch, Papilio, II., 92 (variations), *Nemeophila*.

var. *cæspitis* Grt. & Rob.

- 1868—Grt. & Rob., Trans. Am. Ent. Soc., I., 337, pl. VI., f. 43,
Nemeophila.
- 1869—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 75, *Nemeophila*.
- 1873—Grt. & Rob., Trans. Am. Ent. Soc., IV., 248, *Nemeophila*.
- 1879—Strk., Rept. Chief Eng., 1878-79, V., 1859, =var. *plantaginis*.
var. *cichorii* Grt. & Rob.
- 1868—Grt. & Rob., Trans. Am. Ent. Soc., I., 338, pl. VI., f. 44,
Nemeophila.
- 1869—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 75, *Nemeophila*.
- 1873—Grt. & Rob., Trans. Am. Ent. Soc., IV., 428, *Nemeophila*.
- 1879—Strk., Rept. Eng., 1878-79, V., 1859, =var. *plantaginis*.
var. *geometrica* Grt.
- 1865—Grt., Proc. Ent. Soc., Phil., IV., 318, pl. II., f. 1, *Eupsychoma*.
- 1872—Pack., 4th Peab. Rep., 86, =*petrosa*.
- 1875—Pack., Rept. Geol. Surv. for 1874, 559, *Nemeophila*.
- 1878—Strk., Proc. Dav. Ac. Sci., II., 272, pl. IX., f. 3, *plantaginis*.
- 1879—Strk., Rept. Chief Eng., 1878-79, V., 1859, *plantaginis*.
- 1879—Grt., CAN. ENT., XI, 209, *Nemeophila*.
geometroides G. & R.
- 1868—Grt. & Rob., List N. A. Lep., p. VIII., *Eupsychoma*.
ab. *hospita* Schiff.
- 1878—Strk., Proc. Dav. Ac. Sci., II., 272, *Nemeophila*.
Habitat—Calif., Rocky Mts., Colo.

A very variable species. Mr. Strecker mentions the early stages in his paper in the Rept. Engin. for 1878-79, and refers everything to *plantaginis*. How far he is correct I will not venture to say at present; but this much I can say, I have never in all the series seen by me found anything which was like the series of European specimens. That all these names refer to one variable species is not, I think, disputed.

N. scudderi Pack.

- 1864—Pack., Proc. Ent. Soc., Phil., III, 113, *Platarctia*.
1872—Pack., 4th Rept. Peab. Ac. Sci., 86, *Nemeophila*.
Habitat—Brit. Amer., Calif.

N. selwynii Hy. Edw.

- 1885—Edw., CAN. ENT., XVII., 65, *Nemeophila*.
Habitat—Ontario.

Genus SEIRARCTIA Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 119.

1873—Stretch, Zgy. & Bomb., 81.

Antennæ of ♀ short, with joints marked but scarcely serrate, the sides ciliated. Head moderate in size, closely applied to the thorax, but not sunken. Tongue obsolete. Palpi short, third joint equal to the second in length, not much exceeding the first; straight. The eyes are rather large, but not prominent. Ocelli present. Vestiture long and hairy. Legs short, fore-tibiæ shorter armed with a long claw at tip, middle and posterior tibiæ nearly equal in length, each armed with a pair of short terminal spurs only.

No male has been under examination, and I cannot therefore speak of the characters of that sex.

Primaries without accessory cell, seven to ten on a stalk out of the end of the subcostal at the same point with six; ten from nearest to base of stalk to costa; seven next to outer margin; eight and nine forking close to tip, the former to apex, the latter to costa; four and five together from the end of median; three from median some little distance before the end. Secondaries six and seven together from end of subcostal; four and five together from end of median; three some little distance before the end; eight, as usual, from about the middle of subcostal.

These studies were all made on a ♀, *S. echo*.

S. clio Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 120, *Seirarctia*.

1872—Stretch, Zyg. & Bomb., 82, pl. 3, f. 1, *Seirarctia*.

1882—Behr,* Papilio II., 187, biol. notes.

Habitat—California.

Food plant—*Apocynum androsæniifolium*.

S. echo Sm. & Abb.

1797—Sm. & Abb.*, Ins., Ga., II., 135, pl. 63, *Phalaena*.

1816—Hübner, Verzeichniss, 184, *Estigmene*.

1856—Wlk., C. B. Mus., Lep. Het., III., 668, *Spilosoma*.

1860—Clem., Proc. Ac. N. Sci., Phil., XII., 531, *Hyphantria*.

1862—Morris, Synopsis, Suppl., 342, *Spilosoma*.

1864—Pack., Proc. Ent. Soc., Phil., III., 120, *Seirarctia*.

1865—Wlk., C. B. Mus., Lep., Het., XXXII., 352, *Hyphantria*.

1889—Slosson*, Ent. Amer., V., 153, larval habits.

1890—Slosson*, Ent. Amer., VI., 8, larval habits.

Habitat—Georgia, Florida, Dist. Col.

Food plants—Oak, Persimmon, Palmetto : omnivorous.

Seirarctia bolteri does not belong to this genus, and has been referred by its describer to *Halisidota ambigua*.

Genus *Ectypia* Clem.

1860—Clem., Proc. Ac. N. Sci., Phil., XII., 529.

E. bivittata Clem.

1860—Clem., Proc. Ac. N. Sci., Phil., XII., 530, *Ectypia*.

nigroflava Graef.

1887—Graef., Ent. Amer., III., 43, *Spilosoma*.

Habitat—Texas.

A poor specimen of this species is in the collection U. S. National Museum, also from Texas. I did not recognize it as Clemens' species until I had identified it with Mr. Graef's description. Mr. Hy. Edwards subsequently called Mr. Graef's attention to the probable synonymy, and there remains no doubt that Clemens' species is again known in collections. I have no notes on the genus, and believe it will either not prove a good one or some other must fall in with it.

Genus PYRRHARCTIA Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 120.

Head small, somewhat retracted. Tongue short and weak. Palpi very short, scarcely reaching the front. Antennæ very short, simple in both sexes. Legs stout, moderately long; spurs short, middle tibiae with one, posterior with two pairs. Fore tibiae without armature. Claws with tips toothed.

In venation this species does not differ from *Leucarctia*, which will be fully described in this respect. The remarkable male characters of this genus have been described and figured by me.

P. isabella Sm., Abb.

1797—Sm., Abb.*, Lep., Ga., II., 131, pl. 66, *Phalæna*.

1816—Hübner, Verzeichniss, 184, *Estigmene*.

1833—Harris, Cat., Ins., Mass., 591, *Arctia*.

1841—Harris*, Rept. Ins., Mass., 59, *Arctia*.

1855—Wlk., C. B. Mus., Lep. Het., III., 611, *Spilosoma*.

1860—Clem., Proc. Ac. Nat. Sci., Phil., XII., 531, *Spilosoma*.

- 1862—Harris*, Inj. Ins., Flint ed., 335, f. 170, *Arctia*.
 1862—Morris, Synopsis Lep. Suppl., 340, *Arctia*.
 1862—Clem., App. to Morris Syn., 352, *Spilosoma*.
 1863—Saund., Syn. Can. Arct., 16, *Spilosoma*.
 1864—Pack., Proc. Ent. Soc., Phil., III., 121, *Pyrrharctia*.
 1869—Saund.*, CAN. ENT., I., 26, *Spilosoma*.
 1870—Riley*, Am. Ent., I., 48, *Arctia*.
 1871—Riley*, Am. Ent., II., 182, f. 112, *Arctia*.
 1872—Riley*, 4th Rept. Ins., Mo., 113, f. 65, *Arctia*.
 1873—Edw.*, Proc. Cal. Ac. Sci., V., 187, 370, *Pyrrharctia*.
 1876—Moeschl., Stett. Ent. Zeit., 37, 297, *Pyrrharctia*.
 1878—Mann*, Psyche, II., 270, *Spilosoma*.
 1880—Riley*, Am. Ent., III., 133, f. 51, *Arctia* (life hist.).
 1881—Riley*, Gen. Index to Mo. Rep., 55, *Pyrrharctia*.
 1882—Coleman*, Papilio, II., 18, *Pyrrharctia*.
 1883—Weed, Papilio, III., 84, *Pyrrharctia*.
 1884—Bean*, CAN. ENT., XVI., 67, *Spilosoma*.
 1886—Smith, Ent. Amer., II., 79, *Pyrrharctia*.
 1888—Dimmock (A. K.)*, Psyche, IV., 281, *Spilosoma*.
 Coleman, Journ. Bost. Zool. Soc., I., 28, *Spilosoma*.
californica Pack.
 1864—Pack., Proc. Ent. Soc., Phil., III., 121, *Pyrrharctia*.
 1872—Pack., 4th Rept. Peab. Ac., 86, pr. syn.
 1873—Butler, Cistula Ent., II., 39, pr. syn.
 Habitat—United States and Canada.
 Food plants—Omnivorous.

(To be continued.)

CORRESPONDENCE.

ERRATA TO THE REVISED CHECK LIST OF N. AM. NOCTUIDÆ.

Dear Sir: Although the list was nearly three months in press, from end of December to beginning of March, and I had a large number of proofs, I find that three mistakes escaped correction which I desire to note in this place:—No. 211, for *Harv.* read *Harr.*; No. 359, for *Harv.* read *Harr.*; No. 802, for *Gr.* read *Morr.* Students using the list will please note these necessary changes.

April, 1890.

A. R. GROTE, Bremen, Germany.

Mailed May 2nd.