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FURTHER NOTES ON ALBERTA LEPIDOPTERA.

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(Continued from page 369.)

267. [*Euxoa nesilens* Smith.—This appears to be merely a variation of *tristicula* Morr. (No. 275 of this list, q. v.)]

268. *E. ochrogaster* Guen.—In my former notes I tabulated the variations of this species under four headings :

1. Ground colour red. (*Ochrogaster* Guen.)

1a. Ground colour red, with black basal streak, claviform and discoidal cell. (*Gularis* Grt.) Hampson's figure appears to be of the type of *gularis*, a male from "U. S. A.," though the figure is a little too dark.

2. Ground colour ochreous. This is the *Agrotis insignata* described by Walker in his Catalogue, Vol. X, p. 330, 1856. Assuming that the type labels on the specimens in the British Museum are correct, this must not be confused with *Agrotis insignata* described by Walker on page 353 of the same volume, which specimen he described again a year later as *illata*, the latter double type being a specimen of *tessellata*. The two *insignata* have not unnaturally been much confused in literature, and Grote claimed that Walker himself had identified *Hadena suffusca* Morr. with his *illata*, and that the description of *illata*, which I have not seen, might apply thereto. He often called the validity of Walker's types in question, as well he might, knowing that author's slipshod methods. Howsoever, the existing "type" of *Agrotis insignata* Walk., X, 330, 1856, is a badly rubbed, pale, washed out, reddish-ochreous female from Nova Scotia of the species at present under discussion, and is erroneously referred to by Hampson as a prior name to *pleuritica* Grote, the type of which he figures under Walker's name. Prof. Smith makes the correction in Journ. N. Y. Ent. Soc., XV, 143, 1907. He states elsewhere that Morrison's *cineromacula* is the same form.

2a. Ground colour ochreous, with black markings present. (*Turris* Grt.) The type of *turris* in the British Museum is a female from "U. S.

A," and my note on it is, "pale ochreous, black-marked, slightly rufous-banded."

I have not yet seen any real intergrades between the forms above tabulated, though the species is often extremely common in the latter part of the summer, and the larva very destructive as a cutworm in this district. I have, however, no reason for doubting their unity.

Grote twice published a translation of Guenée's description of *ochrogaster*, and in CAN. ENT., XXXIII, 178, points out that it does not seem quite to fit any form of the species we call by that name. Its author compares it with *Noctua plecta*. In addition to the discrepancies pointed out by Grote, I have never seen a red form which had a conspicuously paler collar, though I do not see why such a form might not occur. But if Guenée were really describing what we have been taught to believe, it seems strange that he should have omitted to mention one very striking difference between this form and *plecta*, viz.: the colour of the secondaries, which in *plecta* are usually most conspicuously pearly-white. Sir George Hampson, however, lists a variety of *plecta* from Sweden, *anderssoni* Lampa, with fuscous secondaries, though Staudinger does not mention this character. Neither does Tutt in "British Noctuæ and their Varieties," ii, 126-7, or iv, 118. Guenée's type is in Mr. Oberthür's collection, I think, at Rennes. The species figured by Holland as *ochrogaster* is, as already mentioned, *declarata* Walk.

269. *E. idahoensis* Grt.—I have a Calgary specimen of the grayish form compared with the male type from Idaho in the British Museum. *Furtivus* was described from three females from California. I saw types in the Brooklyn and Washington Museums. One at Brooklyn was labelled "Sierra Nevada." But another type there, and one at Washington were, according to my notes, labelled "Colorado." The locality is mentioned in Smith's Catalogue, though my notes on types may err. The variation was from gray to red, but I thought that all were one species, and the same as *idahoensis* Grote. I think this is probably correct, but do not feel sufficiently sure about it to risk the reference definitely at present. If two species are involved, then the types of *furtivus* may be a mixture. I should not think so were it not that there appear to be two species at Calgary, as I still have two series as I originally diagnosed them, and they do not appear to overlap. In Vol. XXXVII, p. 146, bottom line, after "species," insert "colour red-brown." I may after all be wrong in thinking them distinct, or it may be that my No. 270 is undescribed. Hampson

figures the type of *idahoensis*, but the ground colour is reproduced a little too red, and the costa not gray enough. His figure of *furtivus* is taken from a worn Colorado specimen, determined by Prof. Smith as such, and is almost certainly *idahoensis*. The intervening figure of *fæminalis* is much more like a small specimen of my No. 270. It is taken, however, from a specimen in Prof. Smith's collection, where I saw it, besides others there and at Washington, and it appeared to be a species previously unknown to me.

271. *E. nordica* Smith.—The male type from Calgary is more uniformly gray than the majority of specimens. The female type is less gray. Both are at Washington. Some dark and strongly-marked specimens bear a distinct resemblance to *divergens*, and have the pale median vein of that species, though less contrasting. *Divergens*, however, usually differs in having the costal space more concolorous, but the subcostal vein pale as well as the median, the latter forming a pale V at its junction with vein 3. The s. t. line also is more direct in *divergens*, with less tendency to form a W. *Nordica* at Calgary sometimes has a very decided reddish tint throughout, and the resemblance then may be to my No. 270, which formerly passed as *furtivus*.

Nordica occurs in Manitoba and Saskatchewan. It has been very common during some seasons near Calgary, and is, I think, to be met with every year. I have taken it in some numbers on the Red Deer River, in the district now known as Dorothy. As I before pointed out, the record from "B. C." under the description is erroneous, and the error is copied in Dr. Dyar's and the B. C. lists. I have, however, seen a single specimen, supposed to be of B. C. origin, a male, dated July 11th, 1904, in Mr. A. H. Bush's collection at Vancouver. The specimen was in perfect condition when I saw it, though Mr. Bush was not sure that he had not taken it in a C. P. R. car. It is therefore possible that it may have been a traveller. It was erroneously labelled '*furtivus*.' East of the Rockies, the form appears to intergrade with, and is not certainly distinct from *tessellata* and *focinus* (Nos. 263, 264, q. v.). Almost the only evidence I can secure in favour of its distinctness is the absence, with the one exception above mentioned, of *furtivus* from a very large number of *tessellata* and *focinus* which I have seen from Kaslo, Vancouver, and Vancouver Island. There can be no doubt, however, that a certain variation of a species does not always occur throughout its entire range. I may mention here that a considerable number of the *focinus* recorded by Dr. Dyar in

the Kootenai List seem to me unquestionably *tessellata*, as that species is known in the east.

Acutifrons is not certainly distinct from *nordica*. It was described from a male from California, now in the Washington collection, and a female from Oregon, now at Rutgers' College. The former is more like the ordinary form of *nordica* than the latter, from which Hampson's figure of *acutifrons* was probably taken. His figure of *nordica* is poor, that of *islandica* resembling some Calgary specimens very much more closely. The latter specimen is stated in the key to be of an Iceland specimen, but, comparing it with the British Museum series under that name, I found it to be much more like some labelled "*ab rossica*" from Uliassutai Mts., Mongolia.

272. *E. divergens* Walk.—The types of *divergens* and *versipellis* are in the British Museum, and are alike. The former is a male from Nova Scotia; the latter labelled merely "U.S.A.," appears to be a male with female abdomen attached. The ordinary Calgary form is similar. Hampson's figure is of type *divergens*. *Factoris* Smith, was described in 1900 from five females from Glenwood Springs, Colo. The type is in the Washington collection. *Abar* Strecker, was described the previous year from a single female from the same locality. I have seen the type of this in the Field Museum at Chicago, and consider the two names to refer to the same form, the latter of course having preference. It is by no means unlikely that the species is a somewhat obscure form of *divergens*. I have nothing compared with Smith's or Strecker's types, but at any rate *divergens* and *abar* must be closely associated. *Fusimacula* Smith, described in 1891 from a single male from California, in which the reniform merges with the orbicular on the median vein, seems to differ from *abar* in that character only, which is very likely merely varietal. I have specimens which I call *divergens* from Calgary, Kaslo, Glenwood Springs, and Yellowstone Park, in which the reniform runs back, and, as is often the case with such aberrations, not always evenly on both wings.

273. *E. redimacula* Morr.—The form occurring here is that figured by Sir George Hampson from Colorado. Much the same form occurs in the East, and I have a male from New York differing chiefly only in being browner and less grey. But a form occurring much more commonly in the East is more even in colour, has slightly larger and rounder discoidal spots, more even s. t. line without the inward streaks, and paler, dark margined secondaries. So unfamiliar did the form seem to my eye,

that I made sure it was a distinct species. Mr. Winn has taken both forms flying together at St. Hilaire, Quebec, and it was in his material that I first claimed to be able to recognize two species. The majority of the specimens which I saw subsequently in other Eastern collections were of the more even form, and the more I compared, the less able did I seem to draw any line between them. Still, I think the existence of two species quite possible. It would be best determined by breeding. If such is the case, which is Morrison's species will have to be determined by comparison with the type in the Tepper collection at Maddison, Wisconsin.

275. *E. tristicula* Morr.—This species is correctly identified. The type is a male in the Brooklyn Museum. It bears no locality label, but I believe it was described from Maine. Hampson's figure is from a coloured drawing of it. *Nesilens* Smith (No. 267) is evidently a variation of it without the black collar, basal streak, and in the cell. A good picked series of about fifty from Alberta, Manitoba, and a few from Windermere, B. C., show every intergrade between the two. I have examined a very much greater number. In some specimens, the black is replaced by pale ochreous shading. In either form, the costa, median vein, and discoidal spots may be rather distinctly paler than the ground, or quite concolorous. But *nesilens* must sink as an exact synonym of *remota* Smith, female, described from the Sierra Nevada. Prof. Smith agrees with me in this reference. There are two female types in the Henry Edwards collection in the New York Museum, from a figure of one of which Sir George Hampson's has been copied. The shades in the figure are rather too contrasting. The specimens are exactly like some from Calgary. A male type of *remota* is in the Washington collection, and differs from any that I had previously noticed in having the space beyond the terminal line the darkest part of the wing, and lacking all trace of dark shade or dashes before it. I had previously seen a figure of this specimen in the British Museum collection, and expressed a very strong opinion as to its distinctness from the published figure. Examination of the actual specimen showed it to be also a trifle violaceous, and proportionately shorter winged than *nesilens* as I knew it, but on the whole much more like a small specimen of that than I had expected. I subsequently found a Calgary male *nesilens* in Dr. Barnes' collection with the dark termen, and, accepting Prof. Smith's view of the matter, have changed my opinion as to its probable distinctness.

276. *Anytus obscurus* Sm.—In my former notes I expressed my inability to distinguish this from *profundus*, described by the same author from Brandon, Man., on the lower half of the same page. Sir George Hampson, on the strength of one male from Brandon, and two from Calgary, separates them in the table: . . . "Fore wing with the dominant colour fuscous brown—*profunda*," and "fore wing with the dominant colour black—*obscura*," altering the gender of the specific name to concord with that of the genus. Prof. Smith publishes a paper on the genus in *Psyche*, XVII, 206-209, Oct., 1910, expressing his views as to their distinctness from each other and from *privatus*, and publishing a plate showing figures of genitalia. He says: "*Obscurus* is really well named, and in the male differs obviously from *profundus* in a distinct brownish tinge, in the lack of contrasts, especially in the s. t. space, in the much more even, powdery suffusion over the whole wing, and in the lack of definition to the median lines." He states that all the *obscurus*, and no *profundus*, were from Calgary. The decision was based on an examination of 65 specimens of the two forms. The colour differences are at variance with the separation attempted by Hampson, and with the original description, in which a "seal brown tinge" is ascribed to *profundus*, but brown not mentioned at all under *obscurus*. I have 45 specimens from Alberta and Manitoba at present under examination, and have at times studied hundreds more. As a rule, Alberta specimens are darker than those from Manitoba, but by no means constantly so. A brown coloration is variable in either series, and I entirely fail to make a separation by this or any other character or combination of characters. The genitalic differences illustrated by Prof. Smith are, as he himself expresses it, "slight, and perhaps not important," and I do not now, nor did I ever before, see any reason for believing in the existence of two species. The form will probably eventually prove to be merely a dark, though inconstant variation of *privata* Walk., described from New York, though I should be too arbitrary in making the reference definitely at present. Dr. Dyar, in the Kootenai List, unites the names *obscurus* and *profundus* as a dark variation of *sculpta* (= *privata*), though as a matter of fact, of the three B. C. specimens there referred to, that from Sandon lacks tibial spines, and is not closely allied to these at all.

277. *Fishia* sp.—This species is not *yosemitæ* Grt., of which the type is a California female in the Henry Edwards collection, and which is a prior name to *exhilarata* Smith, described from Pullman, Washington,

and Glenwood Springs, Colorado. I have a specimen compared with the types of both names, and Prof. Smith agrees with me in the reference. *Yosemite* is grey, suffused with brown, and strigate with brown and black. No. 277 is usually blue grey, less strigate, and though occasionally tinged with brown throughout, lacks the brown strigations of the other species. It is the "*yosemite*" of Holland's figure and stood under that name in the British Museum when I was there, though omitted by mistake from Vol. IV of Hampson's Catalogue. It is also the "*yosemite*" of Smith, Trans. Am. Ent. Soc., XXIX, 201, 1903. The two are easily confused, though I believe distinct, and I have seen both from Manitoba and B. C., though as yet no *yosemite* from Alberta. I use a manuscript name for it in my own notes, but refrain from describing it until I learn more about some of the closely allied species. *Instruta* Smith, described from four males from De Claire, Man., (Trans. Am. Ent. Soc., XXXVI, 264, Nov. 1910), is evidently a very close relation at best. Another nearly which I feel very uncertain about is *enthea* Gt. *Relicina* Morr., under which name the above species formerly passed, was described from Waco, Texas. The type is stated to be at Cambridge, Mass. Prof. Smith states that it is an ally of *burgessi*. Sir George Hampson describes and figures a Texas female as *Parastichtis relicina*, thus referring it to a genus with unlashd eyes and unarmed tibiae. *Fishia* has lashd eye- and mid and hind tibiae spined, though the spines vary greatly in number and position, being seldom equal on the same pair of legs, and possibly occasionally absent.

(To be continued.)

SOME FURTHER OBSERVATIONS ON THE LIGHT-EMISSION
OF AMERICAN LAMPYRIDÆ: THE PHOTOGENIC
FUNCTION AS A MATING ADAPTATION
IN THE PHOTININI.

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In 1910, the writer (CAN. ENT., 1910, Vol. 42, pp. 357-363) called attention to the fact that the female of *Photinus pyralis* Linn.—the species of Lampyrid that is very common within the city limits of Washington, D.C., had been seen to flash following the emission of light by a male flying above her, and also after the sudden flash of an electric light in the room in which the insects had been kept in the dark. Since these observations were made it has been the writer's view that the photogenic function was primarily a secondary sexual character in this species, and that further study would reveal this fact. Accordingly, during the present

year, observations and experiments have been made which leave little doubt that in at least four species in two of the genera, *Lecontea* and *Photinus*, grouped under E. Olivier's sub-family *Photinini*, the photogenic function serves as a mating adaptation.

The first observations were made upon *Photinus pyralis*. It was soon found to be easy to recognize the flash of a female in answer to that of a male flying above her, but it was not so readily determined that her answering flash had any effect upon the actions of the male. The flash of the female, while of the same colour as that of the male, is easily recognized after a little practice, being slower—or rather of longer duration—and less intense. Persistent watch, however, was rewarded by seeing the male drop, following the answering flash of the female, flash again and drop still lower after her second answer, alight a few inches away from her, crawl toward her slowly, flashing at intervals—to each of which flashes she responded—and finally locate and copulate with her. The complete mating process was not followed until after several failures, where the male, after dropping, would rise again, or would simply fail to locate the female definitely, and fly away; but since being observed once, the same entire process has been witnessed a number of times, and under somewhat differing conditions. Apparently the males frequently locate the females by flashing before either has flown, since insects may be taken in copulation before the beginning of the period of flight in the evening. In fact, on one cool, damp evening, when but few insects flew, while the majority crawled to the tops of blades of grass and remained there, flashing at intervals, several instances were witnessed of this mating without flying. But the usual process appears to be as described first—the male flies over the tops of the grasses, weeds, etc., dropping down between them and flashing; any females that come within the range of his flash, answer by their slower flash; if the male sees this answering flash from one, he approaches her, flashes again, to which she answers, and he then finally locates her definitely by means of subsequent flashes. The answering flash of the female does not occur immediately after the flash of the male, but at a period—apparently approximately constant for all females of this species—of about three to four seconds after the flash of the male. This slight delay occurred in every normal case of mating observed with this species, *pyralis*.

To test this matter further, and to see if the females were sensitive to flashes of light in the field, as had been observed in the laboratory, a number of safety matches were ignited at irregular intervals, above an

area of field where there were known to be a number of females of *pyralis*, the match, during the flare of the chemical "head," being swung in an arc in imitation of the dipping flight and flash of the male *pyralis*, and being extinguished as soon as the head burned out. *In each instance the flash of light from the match was followed, within two to five seconds, by the flashes of females of pyralis in the surrounding grass and weeds.* Most of them flashed at the end of about four seconds. They did not flash in the intervals between the lighting of matches, except in response to the flash of a passing male, and in no case did any number answer a male, as they did to a match.

By the use of a small electric bulb, connected to a battery and push-button a few feet away, it was found quite as easy to deceive the male *pyralis*; the bulb is placed so that most of the light is thrown downward by the back of the lamp, and the circuit kept open until a male flashes within about two or three feet of the lamp. Then after a pause of three to five seconds, the circuit is closed through the push-button, so as to imitate as nearly as possible the answering flash of the female. If the male is in a position to see the light of the bulb, he will almost invariably drop, and repeating the process will bring him up to the bulb; usually he will crawl around and over it excitedly, for a few minutes, and then fly away. Sometimes males would crawl up grass-stems above the bulb, and apparently looking over the edge of the blade, hold perfectly still for a moment, and then flash; the instant the bulb was flashed in answer they would commence to wave their antennae rapidly, and crawl quickly down the blade and toward the bulb. Early in the flying period of an evening, as many as a dozen males have been thus attracted in a few moments. Flashing the electric light bulb immediately after the flash of the male, without the pause of a few seconds, was observed to be less effective in attracting them, though some would still come to the bulb when operated thus. The same apparatus may be used to excite the answering flash of the females, when the bulb is waved in an arc during the closing of the circuit.

One or two facts regarding this species—and to some extent they apply to many other Lampyrids—are of interest in this connection. The light of the males in flight is directed by the position during flight and by the reflecting layer of the photogenic organ, for the most part forward and downward; the eyes of the male are much larger than those of the female; the flash of the female is of such a character, and the organ so

placed, as to give the male a brief silhouette of the female as she rests on a blade of grass or a leaf.

During and immediately after copulation, the females of *pyralis* will not respond to the flash of a passing male, or to the flare of a match. A few females will be found that will not respond to a match; these are probably those that are completely impregnated; some, although apparently fresh, will respond only feebly, or irregularly; occasionally males will be found that will flash in response to the light of a match, though only rarely. No definite instance has been observed of a flying male mistaking the flash of a creeping male for that of a female, and dropping to it. Observations on a single female of *pyralis*, which it has regrettably been impossible as yet to confirm by further trial, showed that she would not respond to the flash of a female *Photuris pennsylvanica* Deg., made to flash above her, nor to a male of *Photinus consanguineus* Lec., although the same female readily responded to a match.

In copulation, the female raises the tip of her abdomen toward the male, the latter being mounted upon her back in such a position that the end of his abdomen is slightly farther back than hers. The insects remain coupled for anywhere from half a minute to several hours. One female has been noticed in captivity to couple with several males successively, but a similar observation in the field has not been made. The males certainly do not die within a week after copulation, though definite evidence that they mate a second time, or more often, has not been obtained.

For the most part the observations recorded above for *Photinus pyralis* have been exactly repeated for *Photinus consanguineus* and for *Photinus scintillans* Say. In each of these species the male has been seen to flash above a patch of grass, the female flash her answer from her resting place in the grass, the male drop, locate her through subsequent flashes, and finally couple. There are slight differences of application, due to the fact that the female of *scintillans* is apterous, while the female of *consanguineus* is, if anything, more active than that of *pyralis*, being noticed several times in the lower branches of small trees. Another difference is that the female of *consanguineus* will practically never answer the flare of a match by flashing, and the female of *scintillans* will do so but rarely. It will be remembered that the characteristic flash of the male *consanguineus* is two sharp fulminations, separated by a slight interval, while that of *scintillans* is very much shorter and sharper than that of *pyralis*, and also rather more orange; neither of these flashes can

be successfully imitated with a match. With an electric flash-light, however, it was found very easy to excite the answering flash from the female *scintillans*; equally good results were not obtained with the female *consanguineus*, however; the latter would answer the double flash of the electric light while some twenty or thirty feet away, but upon close approach they seemed to recognize the difference, and ceased to answer. The females of both these latter species answer the male's flash much sooner than does *pyralis*—usually within one second from the flash of the male. The flash of the female *consanguineus* is much like that of the female *pyralis*, being a single slow flash; the flash of the female *scintillans* is also a single slow flash, but is shorter than that of *pyralis* or *consanguineus*, though perceptibly of longer duration than that of male *scintillans*. *Scintillans* female responds to the flash of male *consanguineus*, flying above her, but the latter appears to pay no attention to her; she responds after the first flash of the *consanguineus* ♂, while *consanguineus* ♀ does not respond until after the second flash of her mate.

Although no definite experiments have been performed, it must be remarked here that neither *consanguineus* ♀ nor *scintillans* ♀ has been observed to respond to the flash of *Photuris*, although the latter insect has been observed a number of times to flash while over regions where the two former females were known to be.

Very similar observations were made upon *Lecointea lucifera* Melsh., the greenish, twinkling light of the male flying over the grass being answered by the slow single glow of the female clinging to the grass beneath. Only rarely were the males observed to drop, and actual mating was not witnessed, but from the fact of the female's answering flash, there remains but little doubt as to the nature of the process. Unfortunately the season of maximum prevalence of this species here was over before tests were made as to their sensitiveness to other lights than that of the male insect, so nothing can be said on this point.

Although a quite close watch has been kept on *Photuris pennsylvanica* Deg. for a considerable number of nights, nothing definite can be said as to the possible relation of its light emission to its reproductive life. A large number of these insects fly about in the trees and bushes, emitting their light in the various ways that have been described for it, and yet apparently paying no attention to each other. Dr. W. W. Coblentz informed the writer that the larger number of this species that he caught were females; this is certainly not the usual case with the other species mentioned, or with Lampyrids generally. In this species both sexes are

about equally active, and powerful flyers; the male has slightly the larger luminous apparatus of the two, and somewhat larger eyes. No connection between the different modes of light-emission of this species and the two sexes could be made out.

Two random observations: Those males of *Photinus pyralis* which seemed strongest and most active, were frequently noticed to have the ventral surface of the luminous segments of a pale salmon-pink colour, instead of the usual sulphur-yellow; the assumption is that these were newly-emerged insects, and that this salmon-pink is the initial colour of the photogenic organ, and that after use the usual sulphur-yellow colour appears. The colour of the light appears to be exactly like that of the insects with the yellow surfaces to these segments. Whether this change denotes a using-up of the photogenic material is an interesting problem, but one that would be difficult to solve. Second: One specimen of *Photinus scintillans* ♀ was observed in which the rudimentary elytra were at least one-half longer, proportionately, than is usual in this insect, perhaps representing a tendency to a dimorphic female in this species.

It may be objected that the proof submitted here is not sufficiently convincing as to the primarily sexual relation of the photogenic function. Perhaps it is not; there are various hypothetical questions that might be raised regarding it. But the writer believes that if anyone will take the trouble to observe some of these three species, or any of their near relatives, they will doubtless come to the same ultimate conclusion—that the light, as actually used by the insects, is primarily for the purpose of sexual attraction, and that the reproduction and continuance of the species depends upon it.

A brief review of what literature there is on this subject may be of some interest here.

There has been considerable difference of opinion in times past as to the precise purpose of the luminosity of the Lampyridæ, some holding it to be a secondary sexual character, others claiming that it is purely defensive in nature, and still others declaring that neither of these explanations satisfied the conditions, and that the luminosity plays some part in the life of the insects of which we had no knowledge. There seems to have been really surprisingly little actual observation one way or the other. A diligent search of the references given in the "Zoological Record" since its foundation yielded but few papers dealing with this question—itsself obviously one of fundamental biologic importance—and those found for the most

part were purely speculative. Jenner, in his note on *Phosphænus hemipterus* Fourcroy (Entomologist, 1883, Vol. 16, p. 216), regards the photogenic function in this insect as purely protective, and although there have been a number of papers published on this odd little Lampyrid, nothing very definite seems to have been adduced as to the usefulness of its luminosity. Incidentally, the observation cited by Planet (Le Naturaliste, 1908, Vol. 31, p. 200), of the finding of a *Phosphænus* ♀ in copula with a small specimen of *Lampyris noctiluca* ♂ is of considerable interest in this connection.

Emery's observations on *Luciola italica* Linn. (Bull. Soc. Entomol. Ital, 1887, 18, p. 406; Stett. Entomol. Ztg., 1887, Vol. 48, pp. 201-206), certainly seem to support the view taken by this author of the sexual character of the photogenic function in this species. The relation between the photogenicity and the sexual life in *Lampyris noctiluca* Linn. seems to have been recognized for over a century, since Spallanzani (Chimico esame . . . sopra la luce del fosforo, etc., Modena, 1796, p. 129), records it apparently as a matter of general knowledge that if a "luciolone" were exposed by night, a winged "luciole" would come to and couple with it. ("Luciolone" is a popular word signifying the glow-worm, or female of *Lampyris noctiluca*, while the word "luciole" is usually applied to either sex of *Luciola italica*, though in this connection it evidently refers to the male of the *Lampyris noctiluca*). The same observation was repeated by Phipson (Phosphorescence, London, 1868, p. 142). Quite recently Folsom (Entomology, with reference to its biologic and economic aspects; Philadelphia, 1906, p. 132), has stated that he regards the photogenic function in *Photinus* as a sexual character.

Gorham's paper on the "Structure of the Lampyridæ with reference to their phosphorescence" (Trans. Entomol. Soc. Lon., 1880, pp. 63-67), although mainly speculative, is of interest and importance in this connection. Under the head of "Biologische (ökologische) Bedeutung der Lichtproduktion," Mangold, in his monograph "Die Produktion von Licht" (Hans Winterstein's Handbuch der vergleichenden Physiologie, Vol. III, 2nd Half, pp. 326-332; Jena, 1910), has given a very extensive review of the present status of our knowledge of the usefulness of the photogenic function in luminous organisms in general.

There are but few references in the literature to the attraction of Lampyridæ to artificial lights. Lord Avesbury (The Origin and Metamorphoses of Insects, London, 1873, p. 17), notes that the male of *Lampyris noctiluca* will occasionally fly into rooms, attracted by light, which it apparently mistakes for that of its mate.

Dr. E. J. Lund (Johns Hopkins University Circular, 1911, NS, No. 2, pp. 10-14), has observed that of the Lampyrids of Jamaica, only *Photinus pallens* Browne showed any decided positive reaction to light stimuli, and in this case the reaction was very slight, whereas the Elaterid fire-fly of the same island, *Pyrophorus plagiophthalmus* Germar, was strongly attracted to light.

In the writer's experience, a single specimen of the male of *Lecontea lucifera* has been observed to exhibit attraction toward light, but the species of *Photinus* seem, for the most part, to be quite devoid of this property. Both the males and females of *Photuris pennsylvanica* have, however, been known to come to light, and several instances of this have come under the writer's observation.

Since the foregoing paper was written, Mr. Frederick Knab, of the U. S. National Museum, has called the writer's attention to a brief note by Osten-Sacken (Die Amerikanischen Leuchtkäfer, Stett. Entomol. Zeitg., 1861, Vol. 22, pp. 54-55), in which are recorded observations upon *Photinus pyralis*, made here in Washington, and which are practically identical with those given herein for the normal conduct of this insect. Hence the writer's observations on *pyralis* can be considered only as confirmation of the earlier observations of Osten-Sacken; in view of the fact, however, that Osten-Sacken's paper appears to be very little known, and has been overlooked by the majority of those who have contributed to this subject, it seems justifiable to leave the paper in its present form, making this acknowledgment of the previous work.

The assistance and criticism of Mr. H. S. Barber, of the National Museum, is also acknowledged with pleasure.

SECOND INTERNATIONAL CONGRESS OF ENTOMOLOGY.

The Second International Congress of Entomology will be held at Oxford, England, from August 12th to 17th, 1912. Further particulars will be announced shortly.

The Executive Committee proposes to find for members of the Congress lodgings in the town, or rooms in one or more of the colleges at a moderate charge; rooms in the college will be available only for men.

The Executive Committee invites an early provisional notice of intention to join the Congress, in order to be able to make the arrangements for the necessary accommodation.

The proceedings of the First Congress are in the press, and will be published shortly.

All communications should be addressed to the General Secretary of the Executive Committee, Malcolm Burr, care of the Entomological Society of London, 11 Chandos St., Cavendish Square, London, W., England.

HENRY SKINNER,

Member Permanent Exec. Committee representing America.

MISCELLANEOUS NOTES ON THE HYMENOPTERA CHALCIDOIDEA: THE GENUS *ARTHROLYTUS* THOMSON; *HORISMENUS MICROGASTER* ASHMEAD.

BY A. ARSENE GIRAULT, BRISBANE, AUSTRALIA.

(Continued from page 377.)

Family Eulophidæ.

Subfamily Entedoninæ.

Tribe Entedonini.

Genus *Horismenus* Walker.

1. *Horismenus microgaster* (Ashmead).

Holcopelte microgaster Ashmead, CANADIAN ENT., 1888, XX, p. 102, Idem.—De Dalla Torre, 1898, p. 28.

Horismenus microgaster (Ashmead).—Schmiedeknecht, 1909, p. 433.

Pediobioidea cynea Girault MS.—Webster, 1909, pp. 207, 209-210.

Unfortunately, I identified this species recently (Webster, l.c.) as a new genus and species, giving it the MS. name *Pediobioidea cynea*. However, the mistake was discovered before publication of the description, so that the name is a *nomen nudum*. The species is poorly described, so that I redescribe it herewith and designate a type from the original specimen.

Normal position. *Male*.—Head triangular (cephalic aspect), slightly wider than long and wider than the thorax, the face reticulated, impressed along each side of the meson (the scrobes), the malar space large, smooth. Eyes oval, on the lateral aspect; ocelli in a triangle on the vertex, the lateral ones about their width from the eye-margin and near to the rounded or obtuse occipital margin; head (dorsal aspect) about $2\frac{1}{4}$ times wider than long; antennæ inserted below the middle of the face, but above (dorsad) of an imaginary line drawn between the ventral ends of the eyes, rather short, in both sexes 8 jointed, with a ring-joint, the club single and acuminate at extremity, the funicle 4-jointed, the apical three joints moniliform, and the flagellum (excluding pedicel) clothed with rather long, soft, dense, whitish hairs. Head, pronotum and dorsum of the mesothorax delicately, squamosely reticulated, the metathorax glabrous and prolonged caudad into a short truncate neck (dorsal, lateral aspects); metathoracic spiracle minute, margined and oval. Abdomen distinctly petiolate, smooth, oval, the second segment occupying most of the dorsal surface, the others

retracted into it; abdomen about as long as the length of the thorax. Parapsidal furrows incomplete, but distinct caudad, leading from a point just cephalad of the cephalo-mesal angle of the axillæ and distinct for a third the length of the mesoscutum, narrow, like the median furrow of the scutellum. Scutellum with a distinct median and a lateral longitudinal furrow, the latter complete and punctate for its entire length (see female); caudal margin of the mesoscutum, between the axillæ, slightly emarginate, just on each side of the meson; otherwise that portion of it is straight. Postscutellum rugose basally, triangularly peltate; median line of the metanotum smooth and broad, differentiated, oval. Ring-joint present, very shallow, in effect a broad median carina bordered by a sulcus on each side. Legs normal, coxæ enlarged, somewhat globular, the tarsi 4-jointed. Wings hyaline, densely, shortly ciliate distally, the marginal cilia moderate, short, the stigmal vein distinct, but very short, subsessile, as is also the postmarginal vein, both subequal and about a sixth or seventh of the length of the marginal vein, which in turn is about one-third longer than the submarginal vein. Mandibles acutely bidentate, the inner or mesal tooth slightly shorter, and with its apical margin serrate at its middle. Body small and delicate, metallic.

From 6 specimens, $\frac{2}{3}$ -inch objective, 2-inch optic. Bausch and Lomb.

Female.—As the male. Head densely, minutely reticulated on the face, laterad of the scrobes and also on the vertex and occiput, finely, minutely, longitudinally rugulose just beneath the eyes, the malar space or genæ smooth, the eyes shorter, more rounded and more convex; antennæ inserted slightly below (ventrad of) an imaginary line drawn between the ventral ends of the eyes, without a ring-joint, but the club 2-jointed, the apical joint small and conical, the funicle 3-jointed, its joints subpedunculate; the flagellum somewhat less hairy than in the male. Petiole of abdomen stouter and less conspicuous, but distinct. Axillæ widely separated. The lateral longitudinal furrow of the scutellum complete and uniform, not evanescent caudad, and continued caudo-mesad in a curved line to the base or origin of the median furrow (caudal end), and consisting of shallow oval punctures; the median grooved line narrow. Abdomen long, pointed, conic-ovate, but very slightly produced convexly ventrad, and inclined dorsad from its insertion (dead specimen), hiding the petiole somewhat, the second (first body) segment very long, somewhat over a half the length of the abdomen (excluding the petiole), and hence longer

than the combined lengths of the following segments; segments 3 and 4 subequal; segments 5 and 6 subequal and about one-half longer than 3 or 4; segment 7 apparently twice, or nearly, the length of 5 or 6, narrowing caudad, and the 8th segment much narrower, conic, but nearly as long as segment 7; abdomen longer than head and thorax combined, but not much longer; sheaths of the ovipositor not exerted or prominent. Body moderately stout, the thorax long, abdomen stout and pointed; metallic. Metanotum smooth, the median line as in the male, on each side of it a longitudinal roughened impression, and a deep reticulated impression running cephalo-laterad from the side of the neck, along the margin to about a point near the insertion of the caudal coxæ. Meso-pleura smooth, excepting those of the mesoscutum and prothorax. Base of the meso-postscutellum impressed and rugose, the sclerite peltate, its cephalic margin straight, the lateral margins obliqued caudo-mesad, margined, shining, acute at the meson. Caudal coxæ twice the size of the intermediate ones. Tarsi 4-jointed, the apical joints long. Ovipositor not exerted.

Female.—Length, 1.56 mm.

General colour metallic dark cyaneous (dark indigo, or French, blue), the abdomen darker, with a brassy sheen and purplish reflections; eyes purple-lake, clothed with short stiff hairs, the ocelli ruby-red; knees, tibiæ and tarsi white, with the exception of some brownish on the outer (dorsal) aspect of the tibiæ near the base and the brownish-black apical tarsal joints; trochanters pallid; tegulæ concolorous. Wings hyaline, the venation pallid-yellow; antennæ shining black, metallic bluish-black in bright lights.

Sculpture of the mesoscutellum less dense than that of the mesoscutum and different in appearance, but of the same general character; coxæ glabrous, brilliantly polished. Petiole, or first abdominal segment, concolorous with the abdomen, rugose, as long as the caudal coxæ, cylindrical and moderately stout; discal cilia of fore wings, proximad, moderately long, longer than those apicad, the apex of the wing broadly, oblato-convexly rounded; lateral ocelli farther apart than each is from the cephalic ocellus; mesoscutum and the caudal margin of the pronotum with several long, slender, stiff, white hairs, one of which arises from a setigerous puncture near the base of the incomplete parapsidal furrows; head with similar, but much shorter and more numerous, hairs, and the scutellum with several of the long ones, one arising from the lateral

grooved line, caudad; stigmal vein with a nipple-like projection just before the apex (=uncus).

Scape of the antennæ about as long as the combined length of the pedicel and the two following joints, slightly dilated ventrad at its middle, cylindrical; pedicel obconical, about three-fourths the length of the first funicle joint and not as wide; joint 1 of funicle rectangular, narrower, but one-fourth longer than funicle joint 2, which is about equal in length to the pedicel and subquadrate, but longer than wide and somewhat larger than funicle joint 3; the latter shorter and quadrate, distinctly smaller than the basal club joint, its peduncle subobsolete; funicle joints 1 and 2 with a short stout peduncle on one side of the apex, the opposite apical margin inclining obliquely to it; club about as long as the pedicel and second funicle joint united, about, or less than, half the length of the funicle, the proximal joint subequal to funicle joint 1, more than twice the size of the apical joint, which is smaller than the pedicel and regularly conical and acute at apex. Antennæ hispid-pubescent with white hairs, which arise from tuberculate spots, making the funicular and club joints rough. Antennæ cylindrical.

From one specimen, $\frac{2}{3}$ -inch objective, 2-inch optic. Bausch and Lomb.

Male.—Length, 1.20 mm. The same.

Body less robust, smaller, the abdomen regularly ovate, the second abdominal segment large, as in the female, and widest, the others somewhat retracted into it; genitalia exerted in death, the body of the abdomen not as long as the thorax, about as long when including the petiole; the latter slenderer and more distinct, its sculpture slightly more delicate. Eyes slightly larger, the cheeks, therefore, not as long as in the female.

Pubescence of funicle and club more pilose in appearance, softer. The antennæ differ as described in foregoing; scape slightly shorter, not quite equal to the combined lengths of the three following joints; pedicel about the same; first funicle joint and the club longest of the flagellum, subequal, the club larger, a third longer than joints 2, 3 and 4 of the funicle, all of which are subequal and quadrate; the second funicle joint a little irregular; peduncles of the funicle joints about as in the female, but that of the 4th joint longer in the male than that of the 3rd funicle joint in the female and more mesad; club joint ending in an acute spine-like projection; club equal to less than a half of the length of the funicle. Antennæ filiform as a whole.

From six specimens, $\frac{2}{3}$ -inch objective, 2-inch optic. Bausch and Lomb.

Redescribed from six male and one female specimens, tag-mounted, received for identification from Mr. R. L. Webster, Iowa State Agricultural Experiment Station, Ames, Iowa, the specimens bearing the following labels: "Exp. 205, 2 August, 1908," 2 males; "Exp. 217, 2 and 3 August, 1908," 2 males; "Exp. 322, 11 Nov., 1908," 1 female; and "Exp. 322, 17 and 19 Nov., 1908," 2 males. Reared from the larvæ of the Yellow-head Cranberry worm (*Alceris*) *Peronea minuta* (Robinson), but the degree of the parasitism is most probably secondary, the host of the parasite being *Clinocentrus americanus* Weed.

Habitat.—Missouri (St. Louis); Iowa (Des Moines and Shenandoah); Illinois (Normal, Champaign).

Type.—Type No. 12.205, United States National Museum, Washington, D. C., one male, tag-mounted (Missouri, the original specimen).

This species is evidently a secondary parasite; in the collections of the Illinois State Laboratory of Natural History are specimens reared from the larva of *Canarsia hammondi* Riley at Champaign, Ill., July 10 and 14, 1895, W. G. Johnson (accession Nos. 21,376 and 21,377); also specimens recorded as a secondary parasite of the same host, the same locality, September 6, 1894 (Nos. 21,031; 21,032).

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1893. Ashmead, William Harris.—Bull. Nos. 3, 1, technical series, Ohio Agric. Exp. Station, Norwalk, Ohio, p. 162.

Original description of *Arthrolytus apatele* Ashmead.

1894. Webster, Francis Marion.—Notes on some species of Ohio Hymenoptera and Diptera heretofore undescribed. Bull. Nos. 3, 1, technical series, Ohio Agric. Exp. Station, Norwalk, Ohio, p. 158.

Arthrolytus apatele.

I found, on September 10th, a specimen of this species under the body host, which had in this case evidently been killed by *Rhogas intermedius* Cress. It does not appear to be abundant.

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1897. Howard, Leland Ossian.—A study in insect parasitism, etc. Bull. No. 5, technical series, Division of Entomology, U. S. Dep. Agric., Washington, D. C., p. 36.

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1906. Nason, William A.—Parasitic hymenoptera of Algonquin, Illinois, IV. Entomological News, Philadelphia, XVII, p. 153.

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NOTES ON TWO CONOCEPHALIDS.

BY WM. T. DAVIS, NEW BRIGHTON, STATEN ISLAND, NEW YORK.

The grasshopper, *Conocephalus caudellianus*, was described in the CANADIAN ENTOMOLOGIST for August, 1905, from several males found at Lakehurst, N. J., in Sept., 1903. Since that time additional specimens have been collected in New Jersey at Lakehurst, Tuckerton and Jamesburg. We, however, failed to find any females on these occasions, and it was not until August, 1910, while at Cold Springs, Cape May Co., N. J., that two female *caudellianus* were found in the meadow along Bradley's Run. The ovipositor is 33 mm. in length, and comes even with the end of the elytra. The hind femora are 28 mm. long. The fastigium in shape and markings is like that of the males described as above cited.

The *caudellianus* found at Tuckerton in September, 1907, were in a rather dry field, and some of them, when disturbed, flew away to long distances. Two flew several hundred feet and lit in cedar trees that bordered the field. This is an unusual proceeding, for they generally seek safety by dropping to the ground and hiding among the thick vegetation.

In the Proceedings of the Entomological Society of Washington, Vol. XII, p. 121, 1910, Mr. H. A. Allard compares the stridulations of *Conocephalus exiliscanoris* Davis and *C. bruneri* Blatchley. Since describing *exiliscanoris* in 1886, I have collected a great many specimens, and find that the song varies considerably in loudness, according to the age of the singer. Its volume is also dependent on temperature to some extent. Furthermore, the insect gradually decreases in size as one travels north, those from Cape May Co., N. J., being much larger than Long Island specimens. From these facts I am inclined to think that *bruneri* is a synonym of *exiliscanoris*, as has been suggested.

A NEW SPECIES OF DEROSTENUS (CHALCIDOIDEA).

BY C. R. CROSBY, ITHACA, N. Y.

Derostenus salutaris, new species.—Male. Length, 1.5 mm. Head, thorax and abdomen bright metallic green, the last darker and bluish in certain lights. Head viewed from above strongly convergent behind the eyes and strongly concave posteriorly; the occiput bounded by a distinct ridge bearing a row of blackish hairs. Viewed from in front the inner margin of the eyes sinuate. Antennæ inserted near the mouth and separated by a distinct median carina. Head finely shingled and clothed with sparse, short, dark-coloured hairs. Eyes finely pubescent.

Thorax more distinctly shingled and clothed with a few rather long brownish hairs. Propodeum with a median carina and a transverse carina before the apex; no lateral carinæ present.

Antennæ dark, nearly black; scape white; ring-joint distinct; funicle of three nearly equal segments; club ovate, of three closely united segments, the last small and style-like; flagellum filiform. Legs white; coxæ metallic green. Wings hyaline; postmarginal vein about as long as the stigmal.

Petiole of abdomen a little longer than hind coxæ, finely and densely punctate. Abdomen viewed from above nearly circular, smooth and flattened. The first segment behind petiole about one-third the length of abdomen, the others subequal.

Described from two ♂ specimens reared 2nd June, 1911, from cocoons of the plum leaf-miner (*Nepticula slingerlandella* Kearfott), from Rochester, N. Y.

The larva is 1.4 mm. long, smooth, whitish in colour, and rounded at both ends. The mandibles are very small and inconspicuous.

Mr. Heath's note on *Pieris protodice*, in the September number (p. 327), records just such an experience as I myself had this summer. On July 25, while hunting in my own grounds, I perceived a white butterfly which seemed to be different from the cabbage butterflies that were flying about. I netted it, and found it to be *P. protodice*—the first I had ever seen in this neighbourhood, where I have been collecting since 1907. On Aug. 21, in some pasture-fields near this town, I found numbers of *protodice* mingling with the crowds of *rapæ*. I at once captured two, male and female, and could have taken a dozen with ease.—FRANK M. GIBSON, PH.D., Westminster, Maryland, 12th September, 1911.

FURTHER NOTES ON DIABROTICA.

No. II.

BY FRED. C. BOWDITCH, BROOKLINE, MASS.

D. alternata, nov. sp. (Jac. in litt).

Head and middle joints of antennæ black, thorax flavous, transverse, constricted behind, and bifoveate, scutel black, elytra bright bluish green, transversely, rugosely, coarsely punctate with about five elevated costæ, lateral margin and apex flavous, beneath and legs flavous, tibiæ and tarsi fuscous. ♂ with a hollow and protuberance near the sutural apex. Length, 6 mm.

Callanga, Peru, 2 ♂, 1 ♀, 1 ♀?

Very near *viridipennis* Jac. (type in my collection). The main difference aside from a little brighter colour, is the wholly black head in the ♂. The species has been distributed with the manuscript name *alternata* Jac. of the pair sent to me as co-types by Messrs. Staudinger & Bang-Haas, the ♀ seems to be probably a different species, the lower part of the face being yellow, the antennæ wholly fuscous testaceous and parts of the body beneath black.

Head smooth, with a fovea, palpi flavous, antennæ more than half the length of the body, black, first joint testaceous, 2nd testaceous below, 8-9 and part of 10 flavous, thorax transverse very narrow, moderately coarsely punctate (like *viridipennis*, though Mr. Jacoby's description says the reverse), elytra moderately widened behind with about 5 distinctly elevated costæ which vanish at or before reaching the testaceous tip, which is broad with a deep sutural excavation similar to that of other species of this group (C. Baly's paper). The legs are fuscous on the upper outsides.

D. nigrotibialis, nov. sp. (Jac. in litt).

Head black, mouth parts yellow, antennæ black with last three joints pallid, thorax transverse, flavous, deeply depressed, trifoveate, the depression more or less piceous, scutel smooth black, elytra black, elongate, nearly parallel, thickly, coarsely, corrugately punctate, black, the lateral margin narrowly flavous, the ♂ with cariniform process on the convexity near the suture, below and legs flavous, tibiæ and tarsi black. Length, 7-8 mm.

Eight examples, Marcapata, Peru.

December, 1911

The antennæ are about $\frac{3}{4}$ the length of the body, the second joint short, the third more than twice as long, the fourth barely longer than the two preceding. The thorax is nearly twice as wide as long, the surface shiny and finely punctate, the depression very deep and extending nearly from side to side, sinuation of the sides short and well marked, the punctuation of the elytra coarse, confluent and granulate between the punctures, becoming obsolete at extreme tip. The cariniform tubercle places this species in Baly-Gahan, section 2, division C, near *ambitiosa* Er.

This species has been distributed with the manuscript name *nigrotibialis* Jac. A pair of co-types has been sent me by Messrs. Staudinger & Bang-Haas. Other examples are in my collection. The ♀ co-type has the elytra cyaneous blue instead of black; my other two ♀'s are black.

D. pallens, nov. sp.

Head black, antennæ $\frac{2}{3}$ length of body, black, base of the first joint and last three joints (apex of the eleventh excepted) pale. Thorax pale yellow, transverse, depressed, punctured, trifoveate, scutel black, elytra pale yellow, smooth, shining, sparsely and finely punctulate, with two transverse depressions at and behind the middle respectively, suture just back of the scutel, very narrowly piceous, beneath yellow, inclined to piceous, legs yellow, tibiæ and tarsi black. Length, $7\frac{1}{2}$ mm.

One (♂?) Carrillo (type), 2 (♀?) San Carlos, Costa Rica; coll. Schild-Burgdorf.

The two San Carlos examples differ from the type in that the 7th and 8th joints of the antennæ are more or less flavous. The type has the 8th joint lighter at the apex than the base, joint 2 short, 3 twice as long, 4 a trifle longer than the two preceding. In the ♀ the third joint is obviously longer than twice the second.

The thorax is twice as broad as long, strongly sinuate and broadly margined at the sides behind; there is an obsolete median third fovea visible between the two side ones; the nearly parallel elytra have a well-marked humeral groove, making the shoulder prominent, and a broad, smooth elevation near the suture making a well-marked sutural depression; the median depression is deeper than the rear one, but both are easily visible with the naked eye; the rear one gives the appearance of a broad, smooth elevation on the convexity. Near *subimpressa* Jac., from Costa Rica.

D. centrastigma, nov. sp.

Head black, mouth parts flavous, antennæ a trifle over half the length of the body, black with the under side of the first few joints flavous, thorax flavous, transverse, depressed, bifoveate, scutel black, elytra nearly parallel, not plicate, flavous, transversely depressed at the middle, a common sutural wedge-shaped piceous spot reaching to this depression, and the suture very narrowly lined with black nearly to apex. There is also a supplemental depression running from the shoulder obliquely towards the median depression body. Beneath piceous, thorax flavous, legs flavous, tibiæ and tarsi piceous. Length, 6 mm.

One example, San Carlos, Costa Rica; coll. Schild-Burgdorf.

Joint 2 of the antennæ is short, 3 more than twice as long, 4 shorter than the preceding two; the thorax is nearly twice as wide as long, strongly sinuate at the sides behind; the elytra are smooth, sparsely and finely punctuate; the humeral umbone is prolonged into a sort of obsolete ridge, which vanishes behind and gives the elytra a flat back in front, with strongly declivous sides.

Has the general appearance of a small, ill-developed *suturalis* Baly, with the usual large rear black spot absent.

D. castanea, nov. sp.

Head rufous, piceous about the eyes and mouth parts; antennæ about the length of the body, black, rufous at the base; thorax rufous, transverse, depressed, strongly bifoveate, scutel rufous piceous, elytra nearly parallel, flavous, with a post median sutural, elongate rufous spot, on each side, and a strong transverse median depression; surface finely and sparsely punctulate; body below piceous, thorax rufous, legs yellow, with black tibiæ and tarsi. Length, 6½ mm.

One example, San Carlos, Costa Rica; coll. Schild-Burgdorf.

Antennæ with joint 2 short, 3 more than twice its length, 4 shorter than the preceding two, thorax much broader than long, very markedly sinuate at the sides behind, elytra strongly depressed around the scutel and with a well-marked humeral depression running from just inside the shoulder knob, obliquely towards the median depression.

I place the species near *subimpressa* Jac., from Costa Rica.

(To be continued.)

PERILLUS CLAUDUS A BENEFICIAL INSECT.

In the September number of this magazine appeared a note by Dr. Bethune relative to the predaceous work of *Perillus claudus* Say on the Colorado potato beetle. I also am glad to report the good work of this insect in Michigan during the years 1908 and 1909. In 1908 it was sent in to the Michigan Agricultural College several times, and each time mentioned as killing the potato beetle. In 1909 it was sent in quite frequently, and from many localities. Several of the correspondents claimed that it was becoming so beneficial that spraying was hardly necessary. It was known to attack the larvæ and nymphs. The method of its attack was to pierce with its mouth-parts the soft skin of the larvæ or nymph and suck out all the liquid contents of the host's body, thus insuring a sure and sudden death.

There seems to have been a northward spread of this insect, as it was not formerly known to occur as far north as Illinois, and here we have it in 1908 and 1909 in Michigan, and in Ontario in 1911.

M. A. YOTHERS, Pullman, Wash.

**NOTES ON THE NORTH AMERICAN SPECIES OF GRAPTA
IN THE BRITISH MUSEUM.**

BY HENRY H. LYMAN, MONTREAL.

In the 36th Annual Report of the Entomological Society of Ontario for 1905 appeared a very interesting paper by Mrs. Nicholl on "Butterfly Collecting in Canada, 1904," followed by some critical notes by the late Dr. James Fletcher.

Mrs. Nicholl appears to have consulted Mr. Henry Elwes in regard to at least some of the determinations, but I do not know whether all her specimens were examined by him or not.

On page 76 *Polygonia (Grapta) gracilis* is recorded as having been taken at Ottawa and Montreal; the latter locality, however, I believe to be erroneous. I do not know that there is any inherent reason why it should not occur here, but the fact remains that we have had a flourishing branch of the Entomological Society of Ontario in active operation here for 38 years, and no specimen of that species has ever been taken here by any of our members.

December, 1911

Last year I paid several visits to the British Museum, and made a special study of the North American Graptas, having taken over with me authentic specimens of nearly all the known species from my own collection for comparison. Mr. Heron was absent on account of a breakdown of his health, but when I had examined the same drawers in 1906 he told me that they had been arranged by Mr. Elwes, and there was a memorandum in Mr. Elwes's writing stating that he had arranged them in accordance with the views of the leading North American entomologists, though he did not concur in their views.

Last year I found in the first drawer the following note: "The arrangement of this drawer is only provisional. I have not studied the very diffuse literature now.—H. J. E.

"I have left the names on the labels to show what the Americans call them."

My notes on the contents are as follows:

Progne, 4 specimens.

No. 1 is *faunus* from Nepigon.

Nos. 2, 3 and 4 are correct (Nos. 2 and 4 bred by J. Fletcher, Ottawa, No. 3 also from Ottawa), from the Crowley bequest.

Over a label

Comma
Harris
syn. *Dryas* Edw.
syn. *Harrisii* Edw.

stand five specimens.

No. 1 is *progne* from Nova Scotia, below N. S. is "Redmayne?"; and the specimen has a pin label with the correct name.

No. 2 is var. *dryas* ♂, and is labeled:
I believe this and following labels with name
"*Grapta c-album* Linn." to be in Mr.
Heron's writing.

Nova Scotia.
Hewitson Coll.
Grapta c-album Linn.

No. 3 is *satyrus* ♂, and is labeled:

N. America.
Hewitson Coll.
Grapta c-album Linn.

No. 4 is *dryas* ♂, apparently, but the secondaries are less clouded than usual. It is from W. Va., and bears a label in the writing of the late W. H. Edwards.

Comma ♂
Dimorphic from *dryas*.

No. 5 is *comma*, var. *harrisii*, from N. Y., but is marked *dryas* on the pin label.

The next row of specimens has a label *dryas* at the foot.

One specimen at top of row is *faunus*, from the Elwes collection, and was taken at Nepigon, 29, vii, 93. Then a vacant space of four inches, then one *progne* bred from currant by Fletcher and labeled:

Progne
fide Fletcher

Then another space of about four inches, then two specimens of *progne*, one from Maine and the other labeled:

Nova Scotia.
Redmayne?

Then three *comma*, var. *harrisii*, ♀. The first from Zeller collection, and labeled "West Virginia" in W. H. E's writing. The next labeled:

N. America.
Hewitson Coll.
Grapta c-album Linn.

The last is from New York, and is labeled on the pin in error "var. *dryas*."

Next follow two rows with label at foot, *harrisii*.

First row:

No. 1 is *faunus*, from the White Mts., N. H.

No. 2 is a very interesting form from Albany River, Hudson's Bay Territory, taken by Geo. Barnston, which seems to stand about midway between *progne* and *gracilis*, the silver mark being L-shaped as nearly as possible, forming a right angle, but the border is not nearly as silvery as in typical *gracilis*. It bears a pin label "*G. gracilis*," by Heron.

No. 3 is *faunus*, from Albany River, H. B. Barnston, and has a correct pin label by Heron.

No. 4 is *faunus*, from New York.

No. 5 is the same, but also marked from "Elwes collection."

No. 6 is *faunus*, from Nova Scotia.

No. 7 is *comma*, var. *harrisii* ♂, from N. J., from Dr. Strecker, Elwes collection.

No. 8 is *comma*, var. *harrisii*, West Va., the written pin label by W. H. E.

Second row :

No. 1 is *faunus*, from White Mts., N. H.

No. 2 is similar to the corresponding specimen in the first row, and same locality and collector.

No. 3 is *faunus*, from N. Y., Elwes collection.

Then there is a space of three inches.

No. 4 is *faunus*, and is labeled :

Nova Scotia.
Hewitson Coll.
Grapta c-album Linn.

No. 5 is *comma*, var. *harrisii* ♀, N. J., Strecker, Elwes collection.

No. 6 is *comma*, var. *harrisii* ♂.

Then a 2-inch space.

No. 7 is *comma*, var. *dryas* ♀, from Ottawa, Crowley bequest.

No. 8 is *comma*, var. *dryas* ♀, W. Va., labeled W. H. E.

The remainder of the drawer is filled with *Grapta interrogationis*, var. *fabricii* and var. *umbrosa*, which are correctly arranged.

In the next drawer there is a label as follows :

"After careful study of the western and Rocky Mts. forms and comparison with analogous varieties, sexual and climatic, in Europe and Asia, I cannot follow the distinctions adopted by Edwards and other American authors.—H. J. ELWES, Jan. 3, 1905."

In this drawer there are very interesting specimens, but so badly mixed that I gave up in despair, as the same species sometimes stood under two or even three names, and there were labels on long pins stuck promiscuously about the drawer like Dervish standards.

There is no typical specimen of *gracilis* as found in eastern Canada and the North-eastern States of the American Union in the collection, which may account for Mrs. Nicholl's erroneous record of that pre-eminently beautiful species from Montreal.

I have rarely examined a collection without finding at least some of the *Graptas* misnamed.

GNORIMOSCHEMA SEPTENTRIONELLA, N. SP.

BY REV. THOMAS W. FYLES, HULL, P. Q.

Locality: North Wakefield, Province of Quebec.*Gall-plant*: *Aster junceus* Ait.*The Gall*: Situated on the stem of the plant, 6 inches from the ground and 8 inches from the summit of the panicle of blossoms; fusiform, one inch long, half an inch in diameter at the widest part; contained no trace of a web.*Imago*: Appeared in the middle of September; 20 millimetres in expanse of wings: 10 millimetres in length of body. *Head* brown, mottled with gray. *Palpi* recurved (drooped in drying), 2 millimetres long, dentate on the inner edge of the second segment. *Antennae* six millimetres long, filiform, brown. *Thorax* and *abdomen* dark brown, the latter somewhat hoary towards the end. *Fore wing* brown; taken lengthwise the costal half of the wing is of a warmer hue than the inner half. The outward third of this costal part is striped with brown and rosy gray. The fringe of the fore wing is 3 millimetres long; it has a rosy glow towards the outer angle, and is beautifully marked with minute brown spots. *Hind wing* dark gray, 3½ millimetres at the longest part, light brown. *Legs*: tibiae of hindmost pair set all round, and all their length, with long hairs. The joints of the tarsi are edged with gray.

ENTOMOLOGICAL SOCIETY OF AMERICA.

The sixth annual meeting of the Entomological Society of America will be held in Washington, D. C., Tuesday and Wednesday, Dec. 26 and 27, in affiliation with meetings of the American Association for the Advancement of Science, and other affiliated societies. Meetings will be held Tuesday forenoon and afternoon, beginning at 10.00 a.m., and on Wednesday forenoon. The meetings of the American Association of Economic Entomologists will begin Wednesday afternoon with the President's address, and other meetings on Thursday, and Friday forenoon, followed by the meetings of the Horticultural Inspectors.

The annual address will be given by Prof. John Henry Comstock, of Cornell University, on Wednesday evening, December 27, at 8.00 p.m. His subject will be "On some Biological Features of Spiders." It will be illustrated by lantern slides.—Extract from announcement.

Mailed December, 12th, 1911

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