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FURTHER NOTES ON ALBERTA LEPIDOPTERA.

BY F. H. WOLLEY DOD, MILLARVILLE, ALTA.

(Continued from page 339.)

248. *Euxoa vallis* Smith.—The type from Laggan is a female, and not a male as I stated in my previous notes. Besides that, I have seen a female taken here on Oct. 5th, 1907, now in my collection, and a male taken by Mr. Sanson at Banff on Sept. 8th, 1909. This appears to be a valid species, so far as I can judge. After seeing my own female and the type, I had supposed them to be large suffused specimens of *vulpina*, but Mr. Sanson's male made me change my opinion.

249. *E. pestula* Smith is, I have been very much surprised to find, the correct name for what I had listed as *pleuritica*. Prof. Smith has a pair of types in his collection from Calgary, and the rest of his series under the name when I saw his collection were the same species. But most unfortunately all five co-types which Prof. Smith sent me when he described it, along with several others bearing his own *pestula* label, are *focinus*, or at any rate of that group, which accounts for my confusion of *pestula* with *focinus* (XXXVII, p. 60, 1905). There is a resemblance between certain specimens, but their distinctness is unquestionable. My comparison of this species with *messoria* holds good.

Sir George Hampson figures Grote's male type of *pleuritica* under the erroneous name of *insignata* Walker. This *insignata* of Walker's is a rubbed female from Nova Scotia, but is easily recognizable as *ochrogaster* Guen., as pointed out by Prof. Smith in Journ. N. Y. Ent. Soc., XV, 143, 1907. My likeness of *pestula* to Hampson's figure is quite justified (XXXVII, 56), but I fear I must retract the statement that it is "without doubt" the same, as, though closely allied, I believe them to be distinct. As it happens, the figure is a bit more variegated than the specimens, and too ochreous, and the pale gray shades on costa and inner margin are exaggerated. I should probably suspect *pestula* of being *pleuritica*, were it not that I believe I recognize the latter in another very closely allied species occurring here, to be treated of under additions.

250. *E. incallida* Smith.—I shall have to let the species stand under this name at present. By comparison of types I decided that *incallida* and *lutulenta* were probably the same species as suggested by Dr. Dyar in the Kootenai List. But Dr. Barnes, who has a series under both names from the type locality, Sierra Nevada, California, thinks them distinct, and makes *quinquelinea* a third species. The Calgary species is exceedingly variable, and seems to be the same as the one recorded from Kaslo, and is probably identical with the Nevada female figured by Hampson as *lutulenta*. I have examined the specimen figured by him as *incallida*, and it is undoubtedly the Manitoba form I referred to, which still looks to me distinct, nor can I give it any known name which satisfies me. These specimens, however, come in an extremely difficult and variable group, including a number of names, as to the status of which I have formed no definite opinion, and with which I do not care to tamper just now.

251. *E. lagganæ* Smith.—I have examined the type from a drawing from which Sir George Hampson's very bad figure is copied. I did not recognize it as anything known to me, but am inclined to associate it closely with *fuscigera* Grt., of which I make *terrenus* Smith a synonym, by comparison with both types. The type of *fuscigera* in the British Museum is a male from Sausalito, Calif., but is not the specimen figured by Hampson, which is from the same locality, but may not be the same species. The type of *terrenus* is a male in the Washington Museum, from Pullman, Wash. Terr. One of my series of *fuscigera* from Stockton, Utah, is extremely like Smith's figure of *lagganæ*.

252. *E. testula* Smith, = *acornis* Smith.—My notes say the type is "a grayish-brown, even *acornis*." In the type of the latter the spots happen to be outlined with pale annuli, a rather unusual feature in the species, but present in several of my picked series. In *testula* they are outlined in dark. The species has occasionally been rather common in September.

253. The specimen referred to under this number still remains unique so far as my collection is concerned. I doubt its being *difformis*.

254. *E. recticincta* Smith.—I re-examined the type of this when at Washington, fifteen years after seeing it first, and I had certainly seen none meanwhile. My suggestion that it might be *acornis* proves wide of the mark. I do not feel sure that it may not prove to be *pedalis* Smith, of which the only type, a male from Colorado, stands by itself in the same collection. The latter is larger, and reddish rather than yellow-luteous.

Both may be the same as *teleboa* Smith, described from a female from New Mexico, which I have seen in the Brooklyn Museum. Hampson's figure of the latter, taken from a coloured drawing of the type, is rather too faintly marked. *Teleboa* was described one page before *pedalis*, and resembles *recticincta* more closely than does the other. Hampson places the three next one another, on the strength of figures sent him of the types, but had no specimens.

255. *E. holoberba* Smith.—I have not come across this species here for some years, and have only a single Calgary specimen in my collection. I have, however, a beauty from Nelson, B. C., almost exactly like it. It is a close ally of *sponsa* Smith, and may possibly prove to be the same, but my specimens of *holoberba* denote a larger, more robust insect, though of course that character may be variable. The type of *sponsa* is from the State of Washington, and that of *numa* Strecker from Seattle in that State. I believe them to be the same species, and identical with the type of *micronyx* Grote from California. All three types are females. That of *sponsa* is at Washington, *numa* in the Strecker collection at Chicago, and *micronyx* in the British Museum.

256. *E. neotelis* Smith (Pr. U. S. N. M., XXII, p. 446, 1900, *Carneades*).

E. objurgata Smith (Id., p. 448).

E. cariosus Smith (Id., p. 449).—A pair of types of each of these three names, all from Pullman, Washington State, are in the Washington Museum, and co-types are there and in Prof. Smith's collection. Colorado is given under the description as another locality for *neotelis*, and Dakota for *objurgata*.

E. focinus Smith (Journ. N. Y. Ent. Soc., XI, p. 7, 1903).—No. 264 of my list. This was described from a long series from Calgary; Pullman, Washington; Glenwood Springs, Colo., and Truckee and Sierra Nevada, Calif. I have notes on a female type and a co-type from Pullman, in Prof. Smith's collection, but omitted to write notes on the male type. I must apologise to Prof. Smith, as I know he has been unable to see with me in this matter, but I feel bound to express my opinion that the above four names refer to the same species, and moreover, that they do not even denote anything approaching the wide range of variation which I believe the species to possess. Compare my previous notes under *objurgata* and *focinus* in CAN. ENT., XXXVII, pp. 57, 59, and on p. 60, under *pestula* in error, as all specimens I then had under that name are really this species. The female types *objurgata* and

neotelis look to my eye very nearly exactly alike, and co-types of some of the names seem equally like types of the others.

It is necessary that I should here refer to that much maligned type, *Mamestra insulsa* Walker. It is of course, as all are agreed who have seen it, not a *Mamestra* at all, but of the Agrotid genus called *Euxoa* by Hampson and Smith. It was first referred by Smith in his Catalogue to a species apparently very widely distributed and common throughout the temperate portion of this continent, which has long stood under that name in probably all carefully named collections, but which should henceforth be known as *declarata* Walk., of which *decolor* Morr., probably, and *campestris* Grt., certainly, are synonyms (No. 261 of this list). But Sir George Hampson in his Catalogue, Vol. IV, puzzled some of us much by quoting *insulsa* as a synonym of *messoria* Harr. Prof. Smith, in Journ. N. Y. Ent. Soc., XV, 142, reviewing Hampson's work, states that, after re-examination of the type he concludes that his own reference to the *campestris-decolor* series was correct, and that "*insulsa* has nothing to do with *messoria*." The reference of the name by two different men to such distinct and dissimilar species led me to conjecture that either the type must be a badly rubbed specimen, or the available daylight in the British Museum bad. During my visits there in February and March, 1909, I was much surprised to find that neither was the case. The light at the table where I studied was, on a clear day, distinctly good, as is also the specimen, a female, labelled "W. Canada, Orilla, Bushe," from which the description was presumably taken in 1856. Bearing Prof. Smith's notes in mind, I studied it long, in different lights, at different angles, on different days, and even re-examined it after an interval of several weeks. I never for one moment could associate it with either *messoria* or *declarata*. But what I did associate it with, both at very first sight and always subsequently, was the species at present under discussion, my numbers 256, 264 and 265, which I have long been in the habit of calling the "*focinus* group." Yet I felt sure I had never seen anything to quite match it, but believed, and still believe, that it will ultimately be declared to belong here, in which case of course it will have preference. I have been on the lookout ever since for something to match the type, according to the impression it made on my mental vision, and have hunted specially amongst Ontario material of the *tessellata* series, but without success. My notes taken on the spot say: "It looks to me much more like *focinus* Smith (? = *tessellata* Harr.), of the uniform type, with no black at all, and pale s. t. line. It is a good specimen, and perhaps best matched with

some of the bluer forms of *focinus*, which Smith named *objurgata* for me." But the nearest approach I have yet seen to it is a male co-type of *neotelis* from Pullman, Washington, in Prof. Smith's collection, though that is a good deal paler. The comparison was from memory alone. The type locality of *insulsa* is presumably intended for Orillia, Ontario, whence material may reasonably be looked for to decide the point. It is of course not impossible that the locality is entirely wrong, and it may have been taken west of the Rockies.

Names which I associate closely with this group are *tessellata* Harr. (No. 263) and *nordica* Smith (271) q. v.

257. This species is certainly not *intrita* Morr., for note on which vide under *reuda* infra. I have not yet found a name for it, and use a manuscript one for myself. It is an ally of *intrita* and *basiflava*, and occurs on Vancouver Island. It is rare in collections.

258. *E. mollis* Walk.—Several specimens were taken at light here on July 5th, 1910. Sir George Hampson's figure is fair of the female type from St. Martin's Falls, Albany River, on the northern boundary of Ontario. *Fernaldi* Morr. has been correctly referred to the same species. There is a female type from Oldtown (? Maine) in the British Museum, and another, without locality label, in the Neumoegen collection at Brooklyn.

259. *E. reuda* Streck.—The specimen I recorded by this name, which is still a unique so far as my local material is concerned, is probably correctly named. I have a female taken last year by Mr. Thomas Baird at High River, about thirty miles from here and farther from the foothills. This is smaller and more like some specimens received of the same season's catch at Husavick and Winnipeg Beach, Man., from Mr. Wallis, matching some of my long Vancouver Island series closely, except in the slightly smaller size. In my hurry during my short day at the Field Museum, I unfortunately overlooked the types of *reuda* in the Strecker collection, but my own specimens so referred, and all I have seen in other collections, have been, I think, conspecific with *intrita* Morr., of which the type, a male from Vancouver Island, is very well figured by Hampson, and is a dark ferruginous brown form with indistinct maculation. *Reuda* was described from Seattle, Washington, and the description reads like the same species with more distinct maculation and black in the cell, the females being stated to be much paler. *Strigilis* Grt., type a female in the British Museum from Vancouver Island, is a rather dark though well

maculate specimen of the same species, and is well figured by Hampson. *Titubatis* Smith, described from two males from Oregon, with mention of Colorado specimens having been seen, is about intermediate between *strigilis* and *intrita*, and is the same species. I have seen both types, one at Washington, the other in Brooklyn Museum. I have a fine series from Vancouver Island, and the variation covers all the above and more. My series includes specimens well matched with all types except *reuda*. The synonymy of this species, in order of publication, appears to be

intrita Morr.

strigilis Grt.

titubatis Smith.

reuda Streck.

Alticola Smith, described from the Sierra Nevada, Calif., is a very near ally of the above, and may be the same species. I have seen seven specimens marked "type" in the Rutgers College, Washington, and Henry Edwards' collections, as well as a number of others from the same locality. The colour is "a mixture of red and clay yellow, varying to a definite bright red-brown or deep brick-red," as described in Smith's Monograph. The variation seems to run suspiciously near some Vancouver Island specimens of *intrita*, and individuals are in the Henry Edwards' collection from both localities, very much alike. In fact, as my notes say, "*alticola* suggests to me the reddish end of the *titubatis* series." Hampson's figure is excellent of a Sierra Nevada male in the British Museum, but the open, v-shaped orbicular is the artist's copy of an illusion caused by an abrasion of the scales in that region on the left wing, the right orbicular seeming to me round.

260. The species I had listed as *Euxoa rena* Smith seems to be the one which that author has described as *cervinea* in Trans. Am. Ent. Soc., XXXVI, 262, Nov., 1910. The description was made from five males and one female from Bozeman, Mont.; Vancouver, B. C.; Banff and Calgary, Alta. Of *rena*, described from the Sierra Nevada, Calif., I have examined six or seven types in the Washington, Rutgers College and New York collections. I did not feel confident that these were all the same species. At any rate, a female type in the Henry Edwards' collection struck me as being probably distinct from two male types there, and more like some of the gray forms of the *neotelis* and *tessellata* group. In Prof. Smith's collection, he had a Calgary female (probably the one mentioned under the description of *cervinea* as possibly distinct) standing under *rena* and specimens from Olds, Alta., under *dissona*, under which name my No.

260 has often been recorded. A Calgary specimen of my own I compared with his male type of *rena* there, but did not feel quite sure that they were the same. Whether *cervinea* = *rena* in part or not, is, to my mind, a doubtful point, and I think the types of *rena* may prove a mixture. *Cervinea* is certainly allied to *munis*, as Prof. Smith states, the latter being a larger species, with black or blackish in the cell. The type of *munis* is from Colorado, a female, in the British Museum.

Just what *dissona* is I cannot quite discover. It was described from Labrador, and the type is presumably in Möschler's collection. A Labrador specimen in the British Museum from the Grote collection is well figured by Hampson, and might pass for a poorly-marked *rena* or *cervinea*. The *dissona* of Prof. Smith's collection did not help me, and a Labrador female standing under the name in the Strecker collection seemed to me some species not closely allied to *rena* at all. Staudinger gives it priority over *opipara* Morr., which he makes a variety, but in this Sir George Hampson does not concur.

261. *E. declarata* Walk., syn. *decolor* Morr. and *campestris* Grt. (= *insulsa* Smith, nec. Grt.).—This is the species which has long stood in nearly all North American collections, and has been treated of in literature as *insulsa* Walk. But I have endeavoured to demonstrate above (under 256) that *insulsa* is distinct, and not very closely allied. *Declarata*, of which the type is a female in the British Museum from Vancouver Island, is wrongly treated by Hampson as a synonym of *tessellata*. It is the species figured by Holland on Plate XXIII, fig. 3, as *insulsa*—erroneously, as per other authors—and also fig. 10, as *ochrogaster*, though how it came to pass muster as the latter species is a mystery. *Campestris* Grt., type a female in the same collection from New York, is the same species. The type of Morrison's *decolor* I have not seen, nor the description, and merely follow Prof. Smith and others in referring it as a form of *declarata* with contrasting shades, not uncommon in the species. Such a form is figured by Hampson, though the figure seemed to me too contrasting for any specimen in the Museum collection. If the same, *declarata* has preference by nine years.

Expulsa Walk., type a female in the British Museum, from Vancouver Island, has been referred by Prof. Smith to *insulsa*, and by Sir George Hampson to *messoria*. I wholly agree with the latter. I had already in my collection a good series of *messoria* from Vancouver Island, where a dark variation is rather common, and recognized it at once. It is a rather uniform and dark specimen with even smoky secondaries, and dark shading

between the spots. Both authors claim a close resemblance between this type and that of *insulsa* (CAN. ENT., XXXVII, 59, line 11, 1905, and Journ. N.Y. Ent. Soc., XV, 143, 1907). Closely analysed, I must admit a general similarity in both maculation and colour, though I did not notice it at first. Such similarity, however, is often to be noticed in this genus, between occasional specimens of species not really closely related. In this instance I should not have thought of associating them.

263. *E. tessellata* Harr.—When I published my former notes on this species, I was evidently under the impression that I could separate it from *focinus*. Without going so far as to claim that they are identical, I must regret my inability to draw any line between them, and shall not be surprised if they ultimately prove the same. I have seen neither the type nor original description of *tessellata*, but believe it to have been described from the Eastern States. I have a series from Ontario, and can match some of the specimens very well with local material. Typical *focinus* is slightly larger, and more blue-gray, but the variation here seems to be enormous, and to include forms, many of which appear to be locally constant elsewhere. Many of these have been described, and their validity seems to be taken for granted.

In Prof. Smith's Catalogue, three names are given as synonyms under this heading, though one of them, *nigricans*, appears to be a citation in error of Riley's. Including these, Sir George Hampson gives eight, of which, however, I have placed *declarata* Walk. as a distinct species, probably prior to *decolor* Morr. This leaves seven supposed synonyms. As a frank admission of my lack of understanding of this group, or, at any rate, of my inability to make the necessary association of characters by which the various forms may be distinguished from each other so as to suggest distinctness of species, I may state that, in addition to those seven, I have nine other names, as to the validity of which I do not feel at all assured, and which I have indexed as possible synonyms. Of some of this total of sixteen I know absolutely nothing, and merely follow Smith and Hampson. Of most of the others I have seen the types, have often compared one with another, and taken extensive notes. Of a few I feel more or less convinced of the identity, with others I must look forward to a better acquaintance. This certainly comprises the largest group in all the Noctuidæ that I have studied in which I have failed to arrive at definite conclusions. As to *insignata* Walk., referred to in my former notes, it appears that Walker gave the name to two species referable to

this genus, on two different pages of the same volume. Both these have already been correctly referred by Prof. Smith, one to *ochrogaster*, the other to *tessellata*. The type of the latter *insignata* Walker described again in the following year as *illata*, thus combining two synonyms in a double type. I have this type very closely matched with a specimen from Cartwright, Man. *Perlentans* is another type which I have fairly closely matched with a Calgary specimen in my No. 243. As to Riley's citation of *nigricans* Linn., I have two fine males from Redvers, Sask., from Mr. Crocker, one of which has travelled with me to the British Museum and all over the eastern collections without finding anything to match it more closely than some of a European series under that name in the British Museum. Yet I do not feel at all assured that the specimens are not dark variations of *tessellata*, Dr. Dyar's *focinus* of the Kootenai List includes specimens which I should most certainly call *tessellata*. My notes under Nos. 243, 256, 264 and 271 should be here referred to. The group is rarely common here, but I have examined probably some hundreds of local captures, and many from Saskatchewan and Manitoba, from British Columbia, and sundry places in the Western States.

264. *E. focinus* Smith.—Vide *tessellata* supra and *neotelis* (No. 256).

265. *E. pestula* Smith.—This is a good species, and is the 249 of this list. But all the specimens referred to by me under this heading in XXXVII, p. 56, 1905, were, I believe, *focinus* Smith.

(To be continued.)

CANADIAN TIPULIDÆ.

I have been appointed by Dr. Hewitt to compile the list of crane-flies for the new Canadian catalogue. Our knowledge of the *Tipulida* of any country is exceedingly limited, and Canada is no exception to the rule. I should be glad to determine material for collectors from either alcoholic or dried specimens, and will return named duplicates if so requested. The smaller, inconspicuous species (sub-family *Amphinominae-Simnobiae* of authors) are especially desired. Authenticated data will be gratefully received.—CHARLES P. ALEXANDER, Dept. of Entomology, Cornell University, Ithaca, N. Y.

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

BY A. ARSENE GIRAULT, BRISBANE, AUSTRALIA.

(Continued from page 354.)

3. *Arthrolytus rugifrons* Thomson.

Thomson, 1878, p. 160.

De Dalla Torre, 1898, p. 155.

Schmiedeknecht, 1909, p. 359.

"3. *A. rugifrons* m: Viridis, annis scapo pedibusque pro parte pallidis, abdomine rotundo-ovato, ventre et basi sæpe pallidis. ♀ Lon., 2-3 mill.

"Species statura, omino *Merapori*, sed antennis postannello haud parvo, ab affinibus capite fortiter subrugoso-punctato, ocellis fere in triangulum dispositis, mandibulis haud validis; antennis infra medium faciei convexæ insertis, articulo 10 toto vel subtus pallido, ocellum haud attingente, 20 haud parvo, 30 vix conspicuo, 40 discreto, 5-10 sensim crassioribus, 50 vix, 100 fortius transverso, clava haud parva; thorace collari angusto, medio subacuto, scutello convexo, metathorace brevi sed haud declivi, punctatæ, plica et carina media distinctis; alis hyalinis, apice ciliato, speculo parvo, cellula basali postice pilosula; abdomine thorace fere latiore, subtus parum convexo, ventre et postpetiolo pro parte pallidis; pedibus minus validis, coxis æneis, femoribus tibiisque fuscotestaceis optime distinguenda.

"Temligen sällsynt i norra och medlersta Sverige."

(Thomson, 1878, p. 160.)

With the exception of the citations, I have been unable to find further notice of the species in the literature.

4. *Arthrolytus puncticollis* Möller.

Möller, 1882, p. 180.

Sandahl, 1883, pp. 124, 223.

De Dalla Torre, 1898, p. 155.

Schmiedeknecht, 1909, p. 359.

"2. *Arthrolytus puncticollis*. Nigro æneus, scutello obscure purpurascens, scapo antennarum pedibusque partim rufescentibus, abdominis basi viridi, nitido; thorax subtilissime alutaceus punctis majoribus parce impressis; alæ hyalinæ; antennæ flagello tenui. ♂ ♀. Long., 1.5-3 mm.

c. Tolerably rare, in northern and middle Sweden.

November, 1911

"*Mas.*: corpore sæpissime minore, antennis longioribus et tenuioribus, flagelli articulis pube albida adpressa vestitis.

"*Arth. albiscapo* (Thoms.) affinis, sed antennis tenuioribus, alis immaculatis præcipueque punctura thoracis insignia bene distinctus.

"Lefver som parasit på *Anobium paniceum*.

"Ett kasseradt af Anobii-larver genomborradt parti af *Radix Iridis* florentinæ tillvaratogs sistlidne April för undersökning af larvernes utveckling. Den 13 i samma manad framkröp ur ett af boorhalen en liten Pteromalinhona af underslägtet *Arthrolytus* (Thoms.), hvilken i flera hänseenden var olik förut kända arter. Den 23 April visade sig den första lille hanen och under aterstoden af manaden kläcktes sparsamt sma hanar och honor. Under Maj-Juli framkommo begge könen talrikare och i mera utbildade former. I Augusti utkläcktes de största honorna; derefter aftog frequensen allt mera till den 10 September, da de sista parasisteklarne observerades" (p. 180). (Notes on the dates of issuance of the parasite.)

5. *Arthrolytus apatelæ* Ashmead.

Ashmead, 1893, p. 162.

Webster, 1893, p. 158.

De Dalla Torre, 1898, p. 155.

Schmiedeknecht, 1909, p. 359.

"Genus *Arthrolytus* Thompson.

"(6) *A. apatelæ*, sp. n.—♀. Length, 1.5 mm. Black, shining, although exhibiting a fine scaly punctation; scape and legs honey-yellow, or pale ferruginous; all femora, and the posterior tibiæ broadly at the middle, brown; flagellum subclavate, brown. The head is broad, much wider than the thorax, the vertex being broad and rounded. The antennæ are inserted a little below the middle of the face, the funicular joints being short, not or scarcely longer than wide, the club somewhat large, fusiform. Thorax short, the mesonotum being about twice as wide as long, with the parapsides indicated only anteriorly; collar distinct but narrowed medially; scutellum convex; metathorax short. Wings hyaline, the marginal vein twice as long as the stigmal, the postmarginal not longer than the stigmal. Abdomen conic-ovate, a little longer than the head and thorax united.

"Hab.—Wooster, Ohio.

"Bred by Prof. Webster, from the larva of *Apatela populi* Riley."

(Ashmead, 1893, p. 162.)

Although, in the original description just given, the specimen is recorded from a lepidopterous larva, it appears from Webster (1893) that its relationship is not so clear, he having found the original specimens under the body of the host larva, the latter "Killed by *Rhogas intermedium* Cresson." The species must be considered, therefore, doubtfully primary on lepidoptera, the alternative being an ichneumonoid. Webster writes: "It does not appear to be abundant."

6. *Arthrolytus aeneoviridis*, species nova.

Normal position. *Female*:—Length, variable, 2.00 mm. average; normal in length for the genus.

General colour dull dark green, nearly black, with brassy reflections, and in certain lights metallic. Trochanters with some yellowish; knees, tibiae and tarsi pallid yellow, the lateral aspect of the tibiae and the last two tarsal joints dusky; flagellum of antennae dull fulvous, the pedicel darker and the scape concolorous with the body, fulvous at base and apex; eyes dull chestnut red, the ocelli ruby red; wings hyaline, the venation pallid yellow. The abdomen with more greenish and in certain lights with metallic bluish reflections and with some yellowish at dorsal meson near base; venter concolorous with the general body colour. Tegulae dark.

Head (cephalic aspect) rounded, slightly convex, the antennae inserted nearly in the middle of the face, slightly above (dorsad of) an imaginary line drawn between the ventral ends of the eyes, the scape reaching nearly to the cephalic ocellus; margins of head rounded or obtuse; eyes ovate, in the lateral aspect, but their long axes pointing ventro-mesad and not parallel with the dorso-ventral axis of the genae and less than half the length of the genae, their surface fine, more delicate than that of the head and practically naked, clypeus slightly emarginate at meson of the apical margin. Dorsal aspect, head twice as wide as long, the occipital margin not acute, the vertex wide between the eyes, the head one-third wider than the thorax; ocelli in a small triangle in the centre of the vertex, the caudal ones not especially near the occipital margin and slightly farther from the eye margin than from the cephalic ocellus; the distance between them is one-third more than the distance between either and the respective eye margin; all ocelli round and equal. The whole of the head, occiput, pronotum, mesonotum including the axillae and the scutellum, and the metanotum, closely, moderately coarsely, polygonally sculptured, most regularly on the mesonotum and more delicately on the head, pronotum and metanotum, the sculpture being on the latter nearly transversely

rugulose, while on the mesonotum it is nearly coarse enough to appear as dense punctures; caudal margin of the mesoscutum nearly straight, the pronotum distinct, about a fourth the length of the mesoscutum, not narrowed mesad; axillæ widely separated. Parapsidal furrows indicated cephalad by an impression, but incomplete, yet extending about two-thirds the length of the mesoscutum. Metathoracic spiracle not conspicuous, oval. Metathorax not as long as the scutellum, with a rather short and broad median carina (Coddington lens, $\frac{1}{2}$ -inch), the disk peltate with its wings slightly impressed and margined laterad, extending to within a short distance of the spiracle along the cephalic margin, and with its carinated or margined sides extending caudo-mesad to the meson at the insertion of the abdomen where the disk has a very short neck; a longitudinal spiracular sulcus on the dorso-lateral aspect of the metathorax leads from a point just caudo-mesad of the spiracle to the caudal margin of the segment. Metathoracic pleura dorsad with a few long, whitish hairs.

Abdomen conic-ovate, widest at the 4th segment and thence caudad, conic; segment 2 longest; segments 3, 4 and 5 subequal, each one-third shorter than the second segment, but wider; petiole, or the first segment, sessile; abdomen not quite as long as the head and thorax combined; hypopygium not exerted; venter not produced ventrad, not convex. Legs normal, the proximal tarsal joint of caudal legs longest, one-fourth longer than the second joint, the 3rd, 4th and 5th joints much shorter, the 4th shortest; tibial spurs of caudal legs single. Thoracic pleura sculptured like the pronotum, including also the coxæ and femora of all of the legs.

Fore and hind wings normal, usually densely ciliate in the disk and with moderately short marginal cilia, the marginal vein in the fore wing less than a half the length of the submarginal vein, moderately short and stout and about a fourth longer than the postmarginal vein; the latter equal in length to the stigmal vein, the latter bifurcate at its extremity, or rather with a slender nipple-like projection from its cephalo-lateral margin at a distance from the apex of the stigmal vein equal to the length of the projection (= *uncus* of Thomson).

Scape long and slender, cylindrical, as long as the combined length of the pedicel, the two ring-joints and the first two funicle joints; pedicel small, obconic, about a third longer than the combined length of the two ring-joints and a third shorter than the first funicle joint; the latter the longest joint of the flagellum, about as long as the combined lengths of

the pedicel and ring-joints; the first ring-joint narrow, longer distally, about a half the length of the second which is quadrate; joints 2, 3 and 4 of the funicle subequal, about a fourth shorter than joint 1 and each slightly shorter than the one in the series of three just preceding; funicle joint 5 intermediate in length between joints 4 and 6, the latter the shortest funicle joint, quadrate and about a fifth shorter than joint 5 and a third shorter than joint 1; funicle joints gradually decreasing in length and gradually increasing in width, the funicle cylindric-clavate, the joints wider at the apex; club short, distinctly wider than the funicle and about a third its length, conic-ovate, 3 jointed, widest at the apex of the first or proximal joint, which is subquadrate and equal in length to the 6th funicle joint, but about a fourth or fifth wider; the second club joint nearly twice wider than long, narrowing cephalad, narrower than the proximal joint, but a third shorter; the apical club joint small and conic, its longitudinal axis equal to the length of the preceding joint (Fig. A); flagellum hispid-pubescent, clavate, the hairs directed cephalad and closely applied to the joints, giving the appearance of longitudinal carination to them, and arranged in two rows. Mandibles 4-dentate on each side and symmetrical, the lateral tooth longest and most acute forcipiform, the two inner paired but unequal and smallest and the mesal tooth conic; teeth of mandibles fuscous. (Fig. C).

(From 9 specimens, $\frac{2}{3}$ -inch objective, 2-inch optic, Bausch and Lomb).

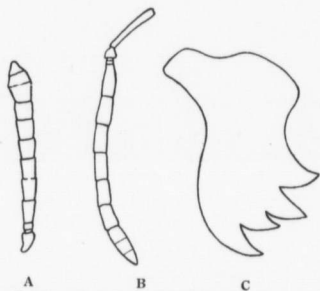


FIG 28.—*Arthrolytus anecoviridis* Girault. A.—Flagellum of female. B.—Antenna of male. C.—Right mandible of female. (The second tooth is drawn too long.

Male:—Length, 1.6 mm. The same.

Body smaller, more slender, the abdomen ovate, concolorous, about

the length of the thorax, the antennæ not the same, but longer and filiform; genitalia exerted in death; eyes oval, *not* ovate.

Scape slightly longer in proportion to the pedicel, ring-joints and first two funicle joints, the pedicel and ring-joints relatively shorter, the first two funicle joints relatively longer, than in the female; flagellum filiform; pedicel obtuse, small, twice the size of the combined ring-joints, but only about a third the length of the first funicle joint; both ring-joints narrow longitudinally, subequal; first funicle joint longest, twice the length of the ring-joints and the pedicel combined and a fifth longer than the second joint; funicle joints 2 and 3 and 4 and 5 subequal, each a little shorter than the one immediately preceding, but all longer than wide, the 6th only a third shorter than the first and more than a third longer than the proximal club joint; club slightly narrower, its proximal and intermediate joints subequal, the latter slightly shorter and each about half the length of the first funicle joint or less; the apical club joint distinctly smaller, subequal to the pedicel, obtusely conic. (Fig. B). Hairs of antennæ about as in the female; in balsam mounted antennæ, or under the microscope, appearing as though they were in circular rows of white ridges around the joints, in two or three series, or single as the case might be; in three series or rows on joint 1 of funicle, in two rows on joints 2-6 of funicle, and in a single row on the club joints; in the latter cases the hairs reaching to or beyond the apices of the respective joints; on the first funicle joint, the hairs originating at the base of each third and a third the length of the joint; on the remaining funicle joints at the base of each half and as long as the respective halves. Scape and pedicel practically impubis. Mandibles as in the female.

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

Described from three males and nine females received for determination from Mr. R. L. Webster, of the Iowa Agricultural Experiment Station, Ames, Iowa, and bearing the following labels: "Exp. 204, 29, 30 July, 1908" (1 ♂, 3 ♀s); "Exp. 205, 31 July, 1908" (1 ♀); and "Exp. 332, 5-14 Oct., 1908" (2 ♂s, 4 ♀s); and "Exp. 177, July 27, 1908" (1 ♀). Appeared in breeding-cages containing the larvæ of (*Alceris*) *Perovea minuta* (Robinson), after the ichneumonoid *Clinocentrus americanus* Weed and before the entedoninine *Horismenus microgaster* (Ashmead). Reared at Ames, Iowa, from host material collected at Shenandoah and Des Moines, Iowa. (Webster, 1909).

Types.—*Accession No.* 40,289, Illinois State Laboratory of Natural History, Urbana, Illinois; 6 ♀s on tags and 1 ♂, 2 ♀s antennæ in

xylo-balsam (1 slide), 1 ♀ head in xylo-balsam (1 slide). *Co-type* No. 12,199, United States National Museum, Washington, D. C.; 1 ♂, 1 ♀ tag-mounted.

SPECIES FORMERLY REFERRED TO *Arthrolytus*.

1. *Arthrolytus clisiocampæ* (Fitch).

This species was described as *Cleonymus clisiocampæ* by Fitch (1856). Riley (1871) thought the species to be more properly a *Semeotellus*: about twenty years later, Ashmead (1894) referred it to *Arthrolytus*, and subsequently in Howard, in 1897; Fiske (1903) decided it to be synonymic with *Dibrachys boucheanus* (Ratzburg). Still later, however, he again refers to it as *Arthrolytus clisiocampæ* (Fitch) (Mason, 1906). I have examined specimens of this insect in the Mason collection, determined by Ashmead and labelled variously *Dibrachys clisiocampæ* (Fitch), *Arthrolytus clisiocampæ* (Fitch), and there can be no doubt but that they are identical and belong to *Dibrachys*. The species is *Dibrachys boucheanus* (Ratzburg) of authors.

2. *Arthrolytus pimplæ* (Ashmead).

Ashmead, 1894, p. 339.

De Dalla Torre, 1898, p. 155.

An examination of the description of this species, together with notes furnished me by Mr. J. C. Crawford, of the National Museum, Washington, D. C., taken from the types, shows that it belongs properly to *Dibrachys* Foerster. The antennæ are inserted distinctly below (ventrad of) the middle of the face, from the direct cephalic aspect, the face not being produced ventrad. This character is easily seen upon comparison of the two genera. The species *pimplæ*, however, has the antennal pedicel longer than the proximal funicle joint, not true with *Dibrachys*, but the sum of its characters, so far as I know them, shows its affinities to the latter genus.

3. *Arthrolytus incongruens* Masi., 1907.

This species has 3- and 4-dentate mandibles; it is therefore not *Arthrolytus*, as at present understood.

Table of the Species.

The following diagnosis is based mostly on the literature. I have been unable to select structural characters as a basis for separation of the species, and have not much reliance on colorational differences in these metallic *Pteromalinae*. For the present, therefore, the species, as they now stand, are indexed in the following table, which should be used with caution.

Females.

- A. Wings with a dusky area.
- a. Brassy-green, the scape yellow-brown. Flagellum incrassate..... *punctatus* Thomson.
 - b. Verdigris-green, the scape white; flagellum not incrassate; apical tooth of mandible larger..... *albiscapis* Thomson.
- B. Wings hyaline.
1. Blackish-green, with some metallic lustre.
 - a. Scape reddish, or partly so, flagellum slender, not clavate; base of abdomen green, shining.... *puncticollis* Möller.
 - b. Scape blackish-green, concolorous, flagellum clavate; base of abdomen with some yellow; marginal vein a fourth longer than the stigmal; pedicel a third shorter than joint 1 of the funicle; pronotum not narrowed at the meson..... *aneoviridis* Girault.
 2. Black, with little or no metallic greenish.
 - a. Scape honey-yellow; flagellum subclavate, brown; base of abdomen concolorous; marginal vein twice as long as the stigmal; pronotum narrowed at the meson..... *apatele* Ashmead.
 3. Verdigris or bronze-green, metallic.
 - a. Scape pallid ventrad; flagellum incrassate or clavate; base of abdomen often pallid; pedicel not small; pronotum narrow, subacute at meson..... *rugifrons* Thomson.

Males.

The males of but three of the species are known; they may be recognized by the following index:

- A. Wings hyaline.
1. Brassy-green, metallic.
 - a. Scape reddish; abdomen with a pallid spot at base; legs reddish, the coxæ and femora brassy-green..... *punctatus* Thomson.
 2. Blackish, with some metallic greenish.
 - a. Scape black-greenish; abdomen concolorous; flagellum filiform; legs pallid-yellow, coxæ metallic..... *aneoviridis* Girault.
 - b. Scape reddish; base of abdomen green shining; flagellum filiform; tibiæ white..... *puncticollis* Möller.

(To be continued.)

SOME LITHOBIOMORPHA FROM THE REGION OF SAN FRANCISCO BAY.

BY RALPH V. CHAMBERLIN, PHILADELPHIA, PA.

Of the six species of the Lithobiomorpha described by Stuxburg from California, the types of four were secured at Sausalito, or near by, on San Francisco Bay. Among these the identification of *Lithobius kochii* and *Lithobius obesus* has been simple; but considerable uncertainty has attached to the forms designated by Stuxburg as *Lithobius megaloporus*, later placed in his subgenus *Pseudolithobius*, and *Lithobius pusio*, placed by its author in his subgenus *Archilithobius*, this difficulty being due to the fact that the types were immature individuals, as I previously showed to be indicated by various points in one description. In order, if possible, to clear up this uncertainty, especially with reference to the species *megaloporus*, which seemed to merit generic rank, I took advantage of an opportunity presented in April of this year to make collections at Sausalito and several other points on the San Francisco Bay (Mill Valley, Oakland and Berkeley). Ample material of the species described by Stuxburg, as well as of other species, including several interesting new ones, was secured.

The anticipations with reference to the species *megaloporus* and *pusio* were fulfilled. Stuxburg gives the length of *megaloporus* as 12 mm., whereas that of adults is from 35 to 39 mm. The species must be given separate generic rank, and will stand as *Pseudolithobius megaloporus*. The species *pusio*, as anticipated, proves to belong to the genus *Bothropols* and to have been based upon a young specimen of a distinct species, and not of *B. monticola*, as was thought possible. *B. monticola* seems not to occur in the Coast Mts. or region, but to be confined to the Sierras and the country northward, being common in Oregon and Washington. Brief descriptions of these two species are given below.

Of the new forms discovered quite unexpectedly, the most interesting is *Buethobius coniugans*, the second species of the genus to become known. Unlike *B. oobitus*, the type species, the new species shows conspicuous sexual dimorphism. The males are uniformly larger than the females, and are remarkable for the very long and distinctly three-jointed gonopods, differing from those of the female in lacking terminal claws and basal spines. In this regard the species suggests a transition from forms presenting no dimorphism to those such as *Lithobius*, in which it is more marked and the male gonopods mostly small and wart-like and

but two- or more often, one jointed. *Zygethobius sokarienus* is the third species of its genus to be made known.

1. *Bothropolys xanti* Wood.

One specimen was taken at Mill Valley. This species is abundant southward, the author having numerous specimens from Stanford, Pacific Grove and Monterey, Santa Barbara, San Bernadino, Los Angeles, Santa Monica, Claremont, etc.

2. *Bothropolys pusio* (Stuxberg).

1875. *Lithobius pusio* Stuxberg, Ofvers. af Kgd. Vet.-Akad. Forhandl., No. 2, p. 67, No. 3, p. 31.

1909. nec. *Lithobius pusio* Chamberlin, Ann. Ent. Soc. America, p. 187.

Brown, often of reddish caste, the head not darker, concolorous with dorsum; some of the major dorsal scuta in some, with the caudal border very dark, and some with a median dark stripe. Antennæ reddish brown, pale distad. Prosternum and prehensorial feet brown, the posterior ventral plates of same colour; the legs and most of venter lighter brown, the caudal pairs of legs commonly pale distad.

Antennæ short, composed of 20 articles of moderate length, which gradually decrease in size from the second to the ultimate.

Ocelli distinct, usually thirteen in number, and arranged in three series, thus, 1 + 5, 4, 3.

Prosternal teeth 6 + 6-6 + 7, stout, darkened, uniform in size and spacing, all apically, bluntly rounded.

Angles of none of the dorsal plates produced.

Coxal pores of various sizes, small and very small, mostly arranged in two or three series. The caudal series on each coxa consists of the larger pores, usually 4 or 5 in number; the next series is composed of smaller pores, and the third or most anterior of the smallest; the second and third series often confused or forming a single irregular row. Pores in number usually from 7 or 8 (12th coxa) to 12 (13th-15th coxæ) in number on each coxa.

Last two pairs of coxæ armed laterally and ventrally; the last three pairs armed dorsally.

Spines of the first legs 2, 3, 1; of the penult 1°, 3, 3, 2, with two claws; of the anal 1, 3, 2, 1, the claw single.

Genital appendages of the male as usual in the genus, distinctly two jointed.

Claw of gonopods in the female tripartite. Basal spines 2 + 2, cylindrical or clavate at base, the upper portion conical and excavated on one side, and sometimes with accessory points at base of conical portion.

Length, 17.5 mm.; width, ad 2 mm.

Localities.—Sausalito (type locality) and Mill Valley.

The species was found to be common in both these localities. The identification of this species with Stuxberg's *pusio* would have been difficult, or more probably, impossible, had it not been for the statement in regard to the spining of the posterior coxæ: "Pedium anialium articulus primus calcaribus binis, majore ventrali, minore laterale, armatus." As among the North American *Lithobiomorpha* known to the author, only the species of *Bothropolys* have the posterior coxæ armed with a ventral spine, he concluded that the type of *pusio* belonged to this genus, and, since Stuxberg represents the coxal pores as being in a single series and few in number, that it must be immature. As the species above described is common in the type locality and the only member of the genus of the coastal region having all dorsal plates straight, its identity with *pusio* is obvious. Young specimens agree fully with Stuxberg's account.

3. *Lithobius kochii* Stuxberg.

1875. Ofvers. af Kgl. Vet.-Akad. Forhandl., No. 2, p. 69; No. 3, p. 30.

A half dozen specimens conforming fully to the original description were taken at Sausalito, the type locality. It had previously been taken at Ukiah (probably), Stanford, Pacific Grove and Claremont.

4. *Lithobius obesus* Stuxberg.

1875. Ofvers. af Vet.-Akad. Forhandl., No. 2, p. 67; No. 3, p. 31.

This very distinct species was found to be very common at Sausalito, the type locality, from where it seems to range southward to Los Angeles Co., the author having in his collection specimens from Stanford, Pacific Grove and Monterey, Los Angeles, Laurel Canyon, San Bernadino, Claremont and Catalina Island.

5. *Lithobius tiganus* Chamberlin.

1909. *Lithobius utahensis* Chamberlin (ad max. part.), Ann. Ent. Soc. America, p. 187.

1910. *Lithobius utahensis*, var. *tiganus* Chamberlin, P. C. Journ. Ent., p. 374.

Very common under damp leaves, etc., at Berkeley, Sausalito and Mill Valley. Previously known from various other points in California.

6. *Lithobius patonius*, n. sp.

Dorsum dark brown; the head paler and more reddish. Antennæ brown proximally, pale brown or yellowish distally. Venter dark brown, usually a little paler than the dorsum. Legs whitish to grayish brown, the ultimate pairs bright yellow distad.

Antennæ short; composed of twenty articles, which gradually decrease in length from the second to the ultimate, not inclusive.

Ocelli 4 to 6 (7) on each side, in one straight series or sometimes more irregular, and in two imperfect series, thus, 1+3 or 1+3 (2), 2, those of the upper series well separated and the median one imperfectly divided from the contiguous one of lower row.

Prosternal teeth moderate in size, acute, and but little darkened; 2+2, uniform in size and spacing.

Angles of none of the dorsal plates produced.

Coxal pores small, round, 2, 3, 3, 3.

Last two pairs of coxæ laterally armed; last three pairs dorsally armed.

Tarsi of anterior legs undivided (*Monotarsobius*).

Spines of first legs 1, 1 (2), 1; of penult 1, 3, 3, 1, with two claws; of the anal 1, 3, 2, 0, the claw single. Anal and penult legs in both male and female strongly and uniformly crassate, but little larger in male than in female.

Claw of female gonopods relatively wide, tripartite; basal spines 2+2. Length, 5-6.5 mm.

Localities.—Sausalito, Mill Valley, Berkeley.

Common under layers of damp leaves. Related to *L. tiganus* and *L. utahensis*, but readily distinguishable by the decidedly and constantly smaller size.

7. *Lithobius angelus*, subsp. *satanus*, subsp. nov.

Dorsum brown, the caudal margins of major plates cephalad of middle darker. Head dark brown, paler in front of the frontal suture. Prehensorial feet orange, the prosternum brown. Antennæ dark proximally, becoming pale distad. Posterior pairs of legs with their distal joints conspicuously orange-coloured.

Antennæ short, composed of 34 or 35 compactly arranged articles, of which the second is largest, those beyond the third short or very short.

Ocelli 6 on each side, arranged in two series, thus, 1 + 3, 2.

Prosternal teeth 2 + 2, moderate in size, darkened, the inner one on each side larger than the outer.

Angles of the ninth, eleventh and thirteenth dorsal plates produced.

Coxal pores 3, 3, 3, 3, circular.

Last pair of coxæ armed laterally with a short, stout spine; last three pairs armed dorsally with much longer spines.

All tarsi biarticulate.

Spines of the first legs 0, 1, 1-0, 2 (?), 1; of the penult 1, 3, 3, 2, with two claws; of the anal 1, 3, 3, 1, also with two claws.

Anal legs in male slender and moderately long.

Locality.—Oakland, Cal.

Three males were secured, of which two are but partly grown, and the third lacks a little of maturity. The form is very close to *L. Angelus* Chamberlin, described originally from Los Angeles, but also found by the author at Croville (April, 1911); it differs in the greater number of articles of the antennæ, which seems to be constantly 28 or 29 in *angelus* and in their size and form, in the spining of the legs, the form of the anal legs, etc.

8. *Pseudolithobius megaloporus* (Stuxberg).

1875. *Lithobius megaloporus* (Stuxberg, Ofvers. Kongl. Vet.-Akad. Forhandl., and Ann. and Mag. Nat. Hist., p. 190).

1875. *Lithobius megaloporus*, subgenus *Pseudolithobius* Stuxberg, Ofvers. Kongl. Vet.-Akad. Forhandl., No. 3, p. 8.

1910. *Pseudolithobius megaloporus* Chamberlin, P. C. Journ. Ent.

Body wide anteriorly, parallel sided over most of length, attenuated caudad. All dorsal scuta strongly margined laterally, rugose. Sternal plates, especially the more posterior ones, broadly produced caudad, so that each at the middle more or less overlaps the succeeding one.

Dorsum brown, the first dorsal plate commonly darker and more rounded, and the scuta frequently darkened along caudal border. Head and prosternum with prehensorial feet a little darker and more reddish than the dorsum. Antennæ brown, uniform. Venter and legs a paler brown, uniform in most.

Antennæ short, composed of twenty articles, which are moderate and mostly uniform in size.

Eyes small, composed of few ocelli, the number on each side being mostly 5 or 7, which are arranged in two series, thus, 1 + 3, 2-1 + 3, 3.

Prosternal teeth mostly 3 + 3 or 4 + 4, in the latter case the innermost and the outermost on each side decidedly smaller than the two inner ones.

Angles of the ninth, eleventh and thirteenth dorsal plates produced, Coxal pores rather large, round or oval, each enclosed in a large, circular pale area, which in some might be superficially regarded as the pore; 3, 4, 4, 4, 4.

Tarsi of all legs biarticulate.

None of the coxæ armed laterally or ventrally, the last five pairs (those bearing pores) with a short, stout spine dorsally.

Spines of the first legs 3, 3, 3; of the penult 1, 3, 3, 2, with two claws; of the anal 1, 3, 3, 1, the claw single.

Anal legs of male of moderate length, slender; the fifth joint conspicuously bowed ventrad, and flattened and longitudinally furrowed above or dorsally.

Claw of the female gonopods entire or weakly notched at apex; basal spines 3 + 3.

Length of adults up to 39 mm.; width, 4 mm.; length of antennæ and anal legs ad 13 mm.

Localities.—Sausalito (type locality) and Oroville.

Two adult males were secured at Sausalito, and numerous males and females were taken at Oroville. They were found for the most part under stones and other objects lying in open treeless areas. They are slow to take alarm, often lying quite unconcerned after stones have been rolled from over them and they themselves jarred, and seem in every way more sluggish than the species of *Lithobius* and related genera.

9. *Zygethobius sokariensus*, sp. nov.

Conspicuously attenuated from region of the tenth dorsal plate cephalad; dorsum well arched, shining.

Dorsum reddish brown or chestnut, the head and ultimate segments darker, the coloration of the head uniform. Antennæ dark reddish brown proximally, becoming pale distad; prosternum with prehensorial feet, and the venter brown, often of reddish tinge, the posterior segments of the venter darker. Legs usually brown, sometimes dark except proximally and distally, and the posterior pairs usually darker than the others.

Antennæ moderately long, but not quite equalling half the length of the body. Articles 38-39, the first two long, the next twelve abruptly and also narrower, those beyond the fourteenth longer and more loosely

joined, and showing a marked tendency for two shorter articles to alternate with one longer one.

Ocellus on each side large, bluish, often showing a slight tendency toward doubling.

Prosternal teeth 3 + 3.

Angles of ninth, eleventh and thirteenth dorsal plates produced.

Coxal pores round, moderate in size; 3, 3, 3-3, 4, 4, 4.

Legs as usual; tibial process well developed, apically spinescent in anterior pairs; all feet ending in three claws; anal legs long and slender.

Claw of gonopods long, entire; basal spines 2 + 2, stout and conical.

Length, 13 mm.; width, 2 mm.; length of antennæ 6-6.5 mm.

Locality.—Mill Valley, Cal.

Ten specimens were secured under leaves and sticks in a very damp, shaded locality such as preferred by the other species of the genus.

This, the third species of the genus to be made known, is very close to *Z. dolichopus* Chamberlin, found originally in the Wahsatch Mts. at elevations above 8,000 feet; but it is larger and more robust, and presents constant differences in coloration and in some structural details.

10. *Buthobius coniugans*, sp. nov.

Light orange in colour, the head and caudal segments darker, but the head pale in front of frontal suture. Antennæ and legs yellow, the caudal pairs of the latter usually darker, orange, especially so proximally.

Antennæ short or moderate in length, being considerably variable, composed of 43-45 articles, of which the first two, or more rarely three, are largest, those immediately succeeding the second or third being very short, the more distal ones becoming again longer; the last two longer than those immediately proximad of them.

Ocelli none.

Prosternal teeth 3 + 3, small, acute, in some darkened apically.

Angles of none of the dorsal plates produced.

Coxal pores 2, 2, 3, 2-3, 3, 3, 3, round.

Ultimate coxæ produced into an acute process at distal end, this projecting caudad as in some Scolopenoriæ.

Tarsi mostly biarticulate, though often very indistinctly so in anterior pairs, and in some the articulation difficult to detect in any of the first thirteen pairs of legs. Each leg of the first fourteen pairs ending in three claws, the anal legs each with but a single claw.

Anal legs both in male and female long and slender.

Genital appendages of male long and conspicuous; composed of three distinct articles, of which the ultimate is conical and terminates in a stout bristle.

Claw of gonopods of female undivided; basal spines 2 + 2, conical distally, cylindrical or somewhat clavate proximally.

Length of male, 10.5 mm.; width at eighth dorsal plate, 1.4 mm. Female shorter, in length 8.5 mm., and more slender, the width at eighth dorsal plate being 1.1 mm. Length of anal legs in male ad 4.6 mm.

Localities.—Berkeley and Mill Valley.

This is the second species of *Buethobius* to become known. In the case of the type species, *B. oobitus* Chamberlin, found in Mississippi, all the specimens found had the gonopods terminating in claws, thus appearing to be females. The character of the appendages in the male is interesting, these appendages differing from those in the female only in lacking the terminal claw and the basal spines. It may be found that in *Lamyctes*, *Zygethobius*, etc., even these differences do not occur, and that the males and females have not been distinguished heretofore in consequence.

THE POTATO BEETLE, *DORYPHORA DECEMLINEATA*,
EATING THE EGGS OF ITS KIND.

While ridding some early potatoes of beetles at Westbrook, Maine, in June, 1911, masses of their eggs were frequently noticed, which had part or all of their contents emptied, leaving the shrivelled coverings on the leaf. My curiosity was aroused, but was shortly to be satisfied. In the large tin pail into which the egg-bearing leaves and the beetles were thrown, one of the latter was noticed feasting upon the eggs. There was no mistake. With her mouth-parts upon an egg, and with jaws and antennæ working, the egg was seen to collapse, and she moved to the next, with like result. During the next half-hour not less than a dozen were carefully observed feeding on the eggs in the pail.

It may be of interest to remark that only females were observed to do this.—ARTHUR H. NORTON, Museum of Natural History, Portland, Me.

ERRATA.—Page 356, explanation of fig. 23, line 1, for "b" and "d" read "c;" line 2, for "c" read "b and d;" line 3, for "d" read "e."

FURTHER NOTES ON DIABROTICA.

No. II.

BY FRED. C. BOWDITCH, BROOKLINE, MASS.

The paper on Part II of the genus *Diabrotica*, Trans. Ent. Soc., London, 1891, was blocked out by Mr. Baly, and on his death was finished and published by Mr. Gahan. Mr. Baly's preliminary work was apparently only partially completed, as he omitted a considerable number of forms described by Mr. Jacoby, most of which were enumerated by Mr. Gahan in his subsequent paper published, l. c., in November, 1891; five additional species described by Mr. Jacoby, P. Z. S. 1889, p. 281, seem to have escaped notice:—

- D. estabanensis* Jac., San Estaban, near *ambitiosa* Er. In addition to the type, I have a second specimen which was unnamed in the second Jacoby collection.
- D. varicornis* Jac., San Estaban, near *inaequalis* Baly. Besides the type, I have two examples from Paramba.
- D. obscuro-maculata* Jac., Colonia-Tovar, near *depressa* Jac., from Mexico.
- D. nigrodorsata* Jac., Colonia-Tovar, should be placed apparently in K sec. My specimen is ♀.
- D. simplicipennis* Jac., Carozal and Colonia-Tovar, should be placed near *uniformis* Jac., from Chiriqui.

Over 500 forms are represented in my material. Their arrangement reveals many undescribed species, some of which have already been published. Those belonging to Baly's Sec. II follow:—

D. inca, nov. sp.

Head and thorax dark chocolate black, mouth parts piceous, antennæ black, piceous at base, joints 9-10 flavous, thorax deeply foveate at the side and obsoletely behind, scutel and elytra dark chocolate brown, shining, finely and somewhat obsoletely punctate-striate, tricostate, and with a broad subsutural and lateral flavous stripe which unite at the shoulder and also at the apex; body below brown, legs flavous, tibiæ and tarsi stained with piceous. Length, 4 mm.

Eight examples, Pachitea, Peru.

General form elongate, slightly dilated behind, head with fine frontal carina, and fovea at the vertex, and some fine punctures at the sides,

November, 1911

antennæ about three-fourths the length of the body, joints 3-4 about equal, one-half longer than the second, the 4 lower joints flavous tinged with piceous, thorax elongate, shining, slightly sinuate behind, the side fovea are much more marked than the median, the elytra have three strongly marked longitudinal costæ of which that in the third interval is the widest and extends from just below the base nearly to the apex, the other two are humeral and subhumeral, forming a deep plica, are almost carinal in form, and vanish at the convexity, the subsutural flavous stripe embraces the whole of the third interval costa, and a broad margin on either side, the fine punctuation shows its striation best by being observed at an angle in a strong light. The vicinity of the scutel is distinctly depressed, some examples have indications of other elytral costæ, but the three above described are always the most prominent. Belongs to the division of *separata* Baly.

D. carinipennis, nov. sp.

Head black, mouth parts piceous, antennæ black, more or less piceous at the base and with joints 9, 10, 11 flavous with extreme tip black, joints 3 and 4 equal, each almost twice as long as the second, thorax flavous, rufous yellow, broader than long, deeply excavate bifoveate, subangulate at the sides, elytra shining black, punctate striate, and tricostate the lateral margin, except the base and a subsutural stripe flavous, body beneath flavous in front, black behind, legs flavous, tibiæ and tarsi black. Length, 4-4½ mm.

Three examples, Bolivia, green label (Chaco?).

Close to *bivittula* Kirsch., but the thorax is comparatively wider and more deeply foveate, the eighth joint of the antennæ is black, the elytra seem more depressed, so that the two side costæ, which are humeral and subhumeral, are very sharp and have the appearance of carinæ and form a deep plica from just below the shoulder nearly to the convexity; the third interval covered by the subsutural yellow stripe is strongly costate and thickened from just below the base nearly to the tip, as in *bivittula* and its allies, but the flavous colour is more diffuse, especially at the middle half, in one example (♂?) the lower part of the face is flavous.

D. granulipennis, nov. sp.

Head shining black with a deep frontal fovea and a few gray hairs in front of the eyes, antennæ black, piceous at joints, joints 3 and 4 equal,

each about twice as long as 2. Thorax rufous yellow, deeply bifoveate and impressed in front of the scutel, sides strongly sinuate behind, scutel black, elytra maroon coloured, thickly, strongly and semi-confluently punctate, obsolete plicate, with the lateral margin and a subsutural stripe flavous; this latter embraces two rather feebly raised smooth costæ, of which the outer is the most prominent, body beneath dark, legs dark, with coxæ and $\frac{2}{3}$ of femora flavous. Length, 6 mm.

Two examples, St. Catharine, Brazil; also 2 Amazon Valley, near Santarem.

This species has much the general appearance of *corrusca* Har., or *innuba* Fabr., but the punctuation of the elytra is very different and the costa much less prominent. What I have above designated as the inner costa is scarcely deserving of the name, as it becomes very feeble posteriorly; the reticulated effect which the punctures have in *corrusca* is wholly wanting here; the flavous vittæ attain the base, but do not join there; the subsutural stripe is quite distinctly limited at the sides, narrow and straight; the epipleuræ are flavous.

D. vittula, nov. sp.

Head rufous with a deep frontal fovea, and black vertex and labrum, antennæ slender, black, piceous at base, 3 joint not as long as 4, both much longer than 2, thorax rufous, broader than long, bifoveate and broadly depressed transversely, sides nearly straight behind and broadly rounded to the front, scutel and elytra shining black, the latter finely punctate, very obsolete striate, strongly plicate, a yellow vitta from the middle of the base, somewhat diagonally to near the apex, where it joins the lateral margin, which is also yellow, apex is black, body beneath flavous, anus dark, legs yellow, with apex of femora tibiæ and tarsi dark. Length, $3\frac{1}{2}$ mm.

Four examples, Peru, green label (Callanga?)

Near *dejeani* Jac., and *cerea* Jac., from Central America, but a little larger; the elytra are considerably dilated at the rear and quite broadly margined, the elytral and lateral vittæ join at the base as well as at the apex and in only one example does the elytral stripe become obsolete at the convexity; in one or two of the specimens the vitta is obsolete sinuate at about the median third; the yellow stripe, when complete, leaves a black sutural vitta from base to apex, broadest in front.

D. tucumanensis, nov. sp.

Head, antennæ and thorax black, the latter shining, bifoveate with oblique depressions, scutell black, elytra black, shining, a common sutural vitta attaining the convexity, the lateral marginal almost to the apex and a humeral elongate spot not attaining the middle all flavous; beneath black, more or less testaceous; legs testaceous with apex of femora, tibiæ and tarsi black. Length, 4-4½ mm.

Type.—Prov. Tucuman Rep. Argentine, xii, 1889, C., Bruch. Two other examples from apparently same source.

Easily distinguished by its long, narrow, parallel form, with the short elongate flavous streak back of shoulder. In the two co-types the thorax is infuscate at the middle and the sutural vitta is complete to the apex; all have the elongate humeral streak well marked.

D. Bruchii, nov. sp.

Head black, mouth-parts piceous, antennæ slender, black, reaching the posterior third of elytra, piceous at base; joints 3-4 equal; thorax flavous, rufous, narrow, elongate, bifoveate, elytra slightly dilated behind, smooth, dull black, very finely punctulate striate (in the white vittæ), the lateral margin and a straight median vitta, joined behind, white; beneath and legs black, base of femora white. Length, 3½-4 mm.

Type.—Rep. Argentine (Geb. formosa?) 1-1905, C., Bruch, also Paraguay.

Would be placed near *granulata* Jac., from Mexico. The smooth, dull black elytra easily distinguish this from all other vittate forms known to me; the Paraguayan example does not differ materially from the type.

(To be continued.)

RECORDS OF BEES.

BY T. D. A. COCKERELL, UNIVERSITY OF COLORADO.

Osmia hesperella Cockerell.

Females were found nesting in a hole in a wall, in Boulder, Colorado, June. Specimens from the same place, and apparently the same nest or group of nests, vary in the colour of the ventral scopa, from light golden to a mixture of light golden and dark fuscous. The eyes in life have the upper third and the hind margin dull sage green, the rest black. The variation in the colour of the scopa led me to reconsider the insects separated as *O. coloradella* Ckll. and *O. ramaleyi* Ckll. According to previous observations, true *hesperella* has the scopa white, *ramaleyi* has it orange, and

coloradella has it black. In the type of *hesperella*, however, it is not a pure white, but has a pale golden tint; while in *coloradella* it is variably pallid or pale orange at the base and sides. The differences described in the venation between *coloradella* and *hesperella* also seem inconstant. I think, therefore, that all three constitute a single species, remarkable for the colour-variation in the ventral scopa.

Anthophorula bruneri (Crawford).

On Aug. 3, 1911, I found both sexes common at flowers of *Helianthus lenticularis* at Sterling, Colorado. The species is new to Colorado. The other bees taken at Sterling on the same day, all from the *Helianthus*, are *Melissodes obliqua* Say, ♀; *M. aurigenia* Cress., ♂; *Andrena helianthi* Rob., ♀; *Perdita albipennis* Cress., ♀; *Augochlora coloradensis* Titus, ♀; *Halictus armaticeps* Cress., ♀; *H. pruinosiformis* Crawf. ♀.

Neopasites robertsoni Crawford.

Prof. O. A. Stevens sends me many specimens, collected on flowers of *Grindelia squarrosa* at Agricultural College, North Dakota, Aug. 18 and 19. At the same time, and on the same flowers, he collected many *Andrena hirticincta* Prov., both sexes. The latter he has also taken at *Melilotus alba*. The *Neopasites* has hitherto been known only from Nebraska.

Ceratina dupla halophila, n. subsp.

♀.—Length, about seven mm.; dark blue-green, with the usual white mark on clypeus. Differs from the usual form by the strongly infuscated wings and dark tarsi; the tegulae are shining black. *C. submaritima* Ckll. rarely has a small spot on the clypeus of the female, and then, because of the similarly dark wings, rather resembles the present insect; but in *C. submaritima* the tubercles are wholly dark, and the face is much less densely punctured.

Hab.—Woods Hole, Mass., June (Cockerell).

Other bees taken this year at Woods Hole are the following (those marked with an asterisk collected by Miss Eleth Cattell): *Sphecodes arvensis* Patton; *S. persimilis* Lovell & Ckll. (both species of *Sphecodes* at umbelliferous flowers); *Agapostemon radiatus* Say; *A. viridulus* Fab.; *Nomada articulata* Smith; *Augochlora confusa* Rob.*; *Xenoglossa pruinososa* Say*; *Bombus fervidus* Fabr.*; *B. terricola* Kirby*; *B. vagans* Smith*; *Megachile campanulae* Rob.* (male, remarkable for the extremely

densely punctured mesothorax); *M. brevis* Say; * *Prosopis cressoni* Ckll.; * *P. modesta* Say; * *Halictus armaticeps* Cress.* (ordinary form, and also female with large head, apparently identical with *capitosus* Smith); *H. coriaceus* Smith; *H. provaucheri* D. T.; * *H. cressonii* Rob.

At Bluff Point, Ram Island, I took *Augochlora confusa*.

On the Island of Cuttyhunk, Mass., July 18, I took the following: *Bombus americanorum* Fabr.; *B. separatus* Cress.; *Agapostemon viridulus* Fabr. (larger than those from Woods Hole); *Nomada articulata* Smith (one female, a variation with the anterior coxal spines reduced to mere minute rudiments).

It is interesting to note that the Bombi flying on Cuttyhunk were different from those at Woods Hole.

Megachile sapellonis Cockerell.

The northward range of this fine species is considerably extended by a female which I took at Tolland, Colorado, Aug. 23, at flowers of *Carduus centaurea* Rydb. This was at the altitude of about 8,900 feet. Other interesting bees which may now be recorded from Tolland are: *Osmia armaticeps* Cress. (coll. W. P. Ckll.); *O. bucephala* Cress. (coll. W. W. Robbins); *Stelis montana* Cress. (coll. W. P. Ckll.); *Chelynia pulchra* Crawford; *Coelioxys moesta* Cress. (coll. W. P. Ckll.); *C. ribis* Ckll.

DR. C. GORDON HEWITT, Dominion Entomologist, was married at Canning, N. S., on Wednesday, October 11th, to Elizabeth, daughter of Sir Frederick and Lady Borden. Dr. Hewitt's numerous friends in Canada and elsewhere unite in heartiest congratulations and all good wishes for the happiness of himself and his bride.

THE ANNUAL MEETING of the Entomological Society of Ontario will be held at the Agricultural College, Guelph, on Thursday and Friday, November 23rd and 24th. All members and others interested are cordially invited to attend. On the Thursday evening a lecture of a popular character on insects, in connection with the dissemination of disease, will be given by Dr. Riley, Associate Professor of Entomology at Cornell University.

Any members proposing to read papers at the meeting are desired to send in the titles at their earliest convenience to the Secretary, Guelph, Ontario.

BOOK NOTICE.

GUIDE TO THE INSECTS OF CONNECTICUT.—Prepared under the direction of William Everett Britton, Ph.D., State Entomologist and Entomologist of the Connecticut Agricultural Experiment Station. Bulletin 16, Connecticut Geological and Natural History Survey. Part I, General Introduction, by W. E. Britton. Part II, The Euplexoptera and Orthoptera of Connecticut, by Benjamin Hovey Walden, B. Agr., Assistant in Entomology, Connecticut Agricultural Experiment Station.

This is the first of a series of papers on the insects of Connecticut, in which the authors "expect that the entire subject may ultimately be treated."

Part I, comprising the first thirty-eight pages of the report, is a very brief introduction to the study of insects, adapted to the non-entomological reader. Besides a general account of insects, their structure, habits, distribution, economic status, etc., a short bibliography is given of the more important works relating to North American Entomology, and a simple but practical key to the various orders. The arrangement of these in the list which follows is that of Comstock, modified in the Neuropteroid groups by Banks.

A few statements are made that are not strictly accurate, e.g., that tracheal gills persist in the adults of some dragonflies and that the mayflies, which form a very large item in the food-supply of many of our food-fishes, are not important economically.

Part II is an excellent guide to the Euplexoptera and Orthoptera of Connecticut, and contains useful analytical tables and descriptions of the various families, genera and species of these orders known to inhabit Connecticut or adjacent territory. 102 species are described, of which 92 are definitely recorded from within the limits of the State. The nomenclature followed is that which has been in general use for a number of years, and we are glad that the author has not chosen to adopt any of the recent changes through which old and familiar generic names, by a rigid adherence to the laws of priority, have been transferred to other genera, the result being a succession of confusing alterations involving not only generic but sub-family and even family names as well.

The text-figures, of which there are sixty-six, are well chosen, and are, for the most part, copied from the works of Scudder and Morse. There are also eleven half-tone plates from photographs, the first five illustrating Part I and showing typical examples of the various orders and the early stages of a few forms, the remaining six illustrating fifty species of Connecticut Orthoptera and Euplexoptera.

Mailed November 3rd, 1911.