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# The Canadian Entomologist.

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VOL. VIII.      LONDON, ONT., OCTOBER, 1876.      No. 10

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## MEETINGS OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCE- MENT OF SCIENCE.

(Concluded from September No.)

Mr. Scudder then read an interesting paper on "Mimicry in Butterflies explained by Natural Selection," quoting largely from a recent contribution by Fritz Muller on this subject, in which he gives the results of observations made by him on butterflies in Southern Brazil. This paper will appear in *Psyche*, the organ of the Cambridge Entomological Club.

Mr. Riley gave the result of some observations on the eggs of *Corydalis cornutus*, from which it would appear that the mass of eggs hitherto regarded as belonging to this species are probably those of a *Belostoma*. He had found in one day thirty or forty patches of eggs which he believed to be those of *Corydalis cornutus* on the leaves of trees whose branches overhung the water. These flat patches were very strangely arranged and contained an immense number of eggs, often numbering between three and four thousand in a patch. The eggs are at first translucent, but become darker as they approach maturity, when the young larvæ break through the eggs beneath.

Dr. Morris doubted whether these really were the eggs of *C. cornutus*, and questioned whether the larva was aquatic at all.

Dr. Hagen thought that there was something strange in reference to these insects. Mr. Riley had kindly sent him a large number of eggs, but when hatched he had failed in every attempt to keep the young larvæ alive. Since they are furnished with both branchia and stigmata, he thought they must be regarded as water insects.

Mr. Lintner had found the larvæ under stones, but when they enter the chrysalis state they make their way into the water, and in this condition they are often captured in large numbers and used as fish-bait.

Mr. Riley said that the larvæ in Missouri are frequently found in water, and he had no doubt but that the eggs he had referred to were those of *Corydalis cornutus*.

Mr. Scudder stated that Mr. Sanborn had frequently taken large numbers of the larvæ in the water in the neighborhood of Cambridge.

Mr. Saunders had never found them in the water, but had frequently captured them buried in moist sand or under stones along the banks of rivers.

Mr. Riley next exhibited to the Club some silken masses containing eggs of *Hydrophilus triangularis*, which were very remarkable and interesting.

Mr. Saunders offered some remarks on a mass of pupæ and escaping insects of *Calopteron reticulatum*, which he found one morning early in summer at the roots of some long grass. The mass was fully as large as a hen's egg, and must have contained some hundreds of individuals. A large number of the freshly escaped insects were captured with a view to ascertain whether there was much variation in the markings and whether the form *terminalis*, which is said to be a variety of *reticulatum*, could be found among them. He saw none approaching this latter form—all were well marked specimens of *reticulatum*.

Dr. LeConte mentioned the curious fact that in some species of *Calopteron* the larval skin was not shed when it pupated, but that the larva skin and pupa skin both remained *in situ* until the perfect insect escaped.

Dr. Morris then made some interesting remarks on the mouth parts of the woodpeckers.

Mr. Riley exhibited specimens of blown larvæ very nicely set up; he thinks, however, that in this condition they are scarcely of value for scientific study, and for this purpose prefers the specimens preserved in alcohol.

Mr. Scudder differed from Mr. Riley, and thinks that the advantages are in favor of the blown specimens, and much prefers to study larvæ in this way.

Dr. Hagen agreed with Mr. Scudder that blown larvæ were advantageous for study.

Dr. Morris asked if any of the gentlemen present who were in the habit of raising larvæ, had made any observations in reference to the length of time the development of the perfect insect may be retarded.

He stated that three or four years since he had placed a number of cocoons of *S. cythia* on a shelf in his house, and that after lying there all that time some of them had this year produced the perfect insect.

Dr. Hagen referred to an instance related by Kirby & Spence where a beetle, *Buprestis splendida*, was ascertained to have existed in the wood of a pine table more than twenty years (7th edition, p. 121).

Mr. Saunders mentioned the fact that the perfect insect of *Æcanthus niveus* frequently came to sugar at night, when they were readily captured. He thought that where they were very numerous this method of trapping them might be employed with advantage.

Mr. Lintner observed that he had taken 16 species of *Catocala* at sugar this season, and that a friend of his who has been sugaring industriously has found the *Catocalas* to be most abundant about midnight.

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On the 24th another meeting of the Club was held at 2 p. m., the President in the chair.

The Committee on Nomenclature, consisting of Dr. LeConte, S. H. Scudder, A. R. Grote, C. V. Riley and W. Saunders, reported a set of rules, on some of which they were unanimous, while on others there was a divided opinion. They had given all the attention to the subject possible within the limited time at their disposal, but had not found time to consider the explanations offered in the majority report presented, and suggested that these be referred back to the Committee with power to print such explanations as may be agreed on with the rules.

The following are the rules submitted :

1. The binominal system, as originated by Linnæus, is the only one to be recognized. The use of a third word, however, connected with the second by a hyphen, as is common and desirable in the case of gall insects, e. g., *Cynips quercus-palustris*, is not to be considered as an infraction of this rule. (Unanimous.)

2. Where a specific name has been generally adopted during a period of twenty years, such name shall not be changed for one of prior date. (Divided opinion.)

3. The name placed after a genus should be that of the author who established the genus in the sense in which it is actually used, but the name of the author who first proposed the term should be cited in brackets. (Unanimous.)

4. No generic or specific name should be acknowledged which has not been printed in a published work. (Unanimous.)

5. A generic name, when once established, should never be cancelled in any subsequent subdivision of the group, but retained in a restricted sense for one of the constituent portions of the original genus. (Unanimous.)

6. In constructing family names they should end in *idae*. (Divided opinion.)

7. The tribe should occupy an intermediate place between the subfamily and genus. (Unanimous.)

8. The authority for the species and not for the generic combination should follow the name of an insect. (Divided opinion.)

9. The proposition of a genus by simple designation of a type is to be greatly deprecated. All new names should be accompanied by ample definitions that will permit no doubt as to the species intended or as to the characters of the genus proposed. (Unanimous.)

10. No description should be made from a figure. (Unanimous.)

11. The number of individuals upon which either a specific or generic diagnosis is based should always be stated. (Unanimous.)

After a lengthy discussion, on motion of Mr. E. B. Reed, the following resolution was unanimously passed :

That the report of the committee be adopted, and that any rules on which this committee have expressed a divided opinion have a marginal note attached thereto, reciting such fact.

It was also resolved that all the explanations, &c., offered in the majority report be referred back to the committee with power to print such explanations as may be agreed on, with the rules.

Moved by Rev. C. J. S. Bethune, seconded by S. H. Scudder—That no alteration or addition to the rules now adopted be made, unless such alteration or addition be proposed at one annual meeting of the Club, and be adopted at a subsequent annual meeting. Carried unanimously.

The election of officers for the ensuing year then took place, resulting as follows: President, Dr. LeConte; Vice-President, S. H. Scudder; Secretary, C. V. Riley.

Mr. Scudder brought to the notice of the members a pattern insect box, which he believed to be pest-proof. These boxes are exceedingly

well made (manufacturers, Hancock & Greeley, Cambridgeport, Mass.), are about 19 x 15 in., and are sold at \$2.70 each, without cork.

Mr. Saunders suggested the desirability of the Club appointing a permanent committee to whom disputed points in reference to Entomological matters might be referred. On motion of Mr. Mann, seconded by Mr. Saunders, it was resolved that the Permanent Committee of the Club shall consist of the President, as chairman, and four other members to be named by him.

Mr. Lintner presented to the meeting a very complete and extensive list of insects taken at sugar by him during the present season. These were arranged in a tabular form in a very neat and methodical manner, showing at a glance the insects taken each evening, and whether they were abundant or scarce.

On motion of Mr. Riley, Dr. Larkin was requested to bring before the Club some facts in reference to a mite said to be parasitic on the human subject, when he read a very amusing letter from an afflicted patient in reference to this matter. The Club then adjourned.

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### LARVA OF ANAPHORA AGROTIPENNELLA.

BY MISS MARY E. MURTFELDT, KIRKWOOD, ST. LOUIS, MO.

In Vol. 4, p. 137, of the CANADIAN ENTOMOLOGIST, Mr. Grote first published a description of the large and characteristic Tineid above named. The imago has been very common with us for several years, but until the present season its larval history had eluded my investigation.

Early in April I found among the roots of a bit of white clover sod a very active and singular larva, whose long and rather sprangling thoracic legs gave it, at first glance, the appearance of a Coleopterous larva. A second look, however, discovered the characteristics of a Lepidopteron of which the following description was taken :

Length, 0.75 inch. ; diameter greatest at head and 1st joint, slightly tapering thence posteriorly. Incisions quite deep. Color a dark purple brown, the general surface dull, having the appearance of very fine

stippling, but variegated with conspicuous, slightly elevated, polished spots, eight on each thoracic, and ten on each abdominal joint. The anal segment and the one immediately preceding it lighter in color than the others, and somewhat translucent. Head horizontal, broad and thick, of a highly polished black color, the triangular face outlined by a fine line of brown. Basal joint of antennæ transparent, 2nd joint tipped with black, terminal joint entirely black. Maxillæ similar. Thoracic legs unusually long, black, except at the joints, where they are translucent cinereous. Venter and prolegs—the latter only moderately developed—of a translucent smoky brown, the anal pair variegated with irregular patches of opaque dark brown.

This larva was placed in a large jar partially filled with earth, and from time to time the clover sod was renewed; but I saw nothing more of it until about the 1st of May, when, thinking it to be dead, I was proceeding to sift the earth in the jar. My attention was soon attracted by a long string of webby matter in the soil, which I at first supposed was some sort of fungus growth, although remarkably tough and strong for anything of that kind. As I was pulling it to pieces, a shining black head was suddenly protruded from one end, and I at once recognized the missing larva. The webby substance proved to be a silken gallery, white and smooth inside, which constituted the concealed retreat of this interesting little creature. The gallery has an open entrance at the surface of the ground, from which its inmate emerges at night to feed. A little pressure from below forced the larva from its hiding place, and I was enabled to observe that it had increased in size, the length being about one inch with a diameter of 0.15 inch. at the 1st joint; the color was also a shade lighter than when my description was taken; otherwise it was unchanged.

June 16th I carefully unearthed the gallery a second time, and found it to be nearly six inches in length, descending by irregular windings to the bottom of the jar, two and one-half inches. About mid-way reposed the insect in the pupa state. The chrysalis is slender, elongate, the abdominal segments sharply edged, but not serrated, and of a mahogany brown color. The palpal sheaths are conspicuous, extending down on the ventral side as far as those of the antennæ. June 29th the moth issued, and I was delighted that it proved to be the species of *Anaphora* whose larval habits I had long desired to ascertain.

LIST OF CATOCALÆ OBSERVED IN THE VICINITY OF  
CINCINNATI, OHIO, 1876.

BY CHARLES DURY, CINCINNATI, O.

*Catocala* Schrank.*Group 1*—Secondaries black without bands :

Viduata Guen., the largest black-winged species ; rare ; 3 taken in  
10 years.

Lacrymosa Guen., rather common this season, but only 1 seen in 10  
years before.

Desperata Guen., not rare.

Retecta Grote, not abundant.

Robinsonii Grote, not abundant ; occurs in fall only.

Levettei Grote (= Judith Streck.), rare ; occurs in early summer.

Epione Drury, abundant ; in early summer comes freely to sugar,  
sometimes before dark.

Tristis Edwards, very rare ; the smallest black-winged species ; only  
one specimen seen.

Obscura Strecker, abundant.

Flebilis Grote, not abundant.

Insolabilis Guen., rare previous to 1872 ; now abundant.

*Var.* Residua Grote, not abundant.

*Group 2*—Secondaries red with black bands :

Cara Guen., abundant ; 150 taken this summer.

Amatrix Hüb., abundant.

Ilia Cram., abundant ; very variable.

Innubens Guen., abundant.

*Var.* Scintillans Grote, not rare ; this species may properly belong in  
Group 3 ; reared on Walnut.

Ultonia Hüb., abundant.

Marmorata Edwards, rare ; one specimen of this princely colored  
species taken this summer.

Parta Guen., abundant ; reared on Willow.

Coccinata Grote, rare.

Unijuga Walk., not abundant ; appears late ; one specimen taken  
October 6th.



*Group 3*—Secondaries yellow with black bands or band :

*Neogama* Guen., abundant ; reared on Walnut.

*Subnata* Grote, not rare.

*Piatrix* Grote, abundant.

*Palacogama* Guen., very abundant.

*Var.* *Phalanga* Grote, not abundant.

*Habilis* Grote, not abundant.

*Serena* Edwards, not abundant.

*Nebulosa* Edwards, not rare in 1874.

*Cerogama* Guen., rare.

*Illecta* Walk., rare ; taken in July feeding on blossoms of *Catalpa*.

*Grynea* Cram., abundant ; appears early.

*Minuta* Edwards, not abundant.

*Polygama* Guen., not rare.

*Var.* *Mira* Grote, not abundant.

*Var.* *Pretiosa* Lintner, not abundant.

*Fratercula* G. & R., rare ; one specimen taken.

*Androphila* Guen., not abundant.

*Var.* *Lineella* Grote, not abundant.

Forty Species and Varieties.

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## NOTES ON NOCTUÆ.

BY A. R. GROTE,

*Director of the Museum, Buffalo Society Natural Sciences.*

### *Segetia fidicularia* Morr.

This species, which I have referred to *Caradrina* and as a synonym of *C. multifera* Walk., in the Check List, seems to me identical with the European *Caradrina cubicularis* S. V. A single European specimen of the latter has the common line beneath more extended, the hind wings whiter (♂'s compared) ; these characters are not, I think, likely to be constant. There are no other differences. I have a single poor Cali-

formian specimen which may belong here. On page 13 of my Check List I would then make the following correction :

456. *cubicularis* (S. V.)

*Segetia fidicularia* Morrison.

? *Caradrina multifera* Walker.

*Caradrina flavimaculata* Harvey.

I have examined Dr. Harvey's type and a second Californian specimen. I regard both as extreme varieties of *Laphygma frugiperda* (Abb. & Sm.) In the Californian specimens the fore wings are dusty grey, pale, with only the stigmata obscure yellowish. This name, bearing the No. 1114 in my Check List, must then be referred to No. 358 among the synonymy.

*Hadena interna* Grote.

I find on a nearer comparison that this name is founded on a very dark specimen of *H. delicata* Grote, wanting the green shading on the reniform, costal region and subterminal line, which characterizes fresh specimens of *delicata*. The name, which is numbered 274 in my Check List, must then be referred as a synonym to No. 269.

*Ipimorpha subvexa*, n. s.

♂. This species is of an olive fuscous gray and resembles in color the European *subtusa*, but is very much larger and wants the claviform. The external pale margin to this spot is to be perceived in *pleonactusa*; this is not indicated in *subvexa*, which also has the orbicular much reduced. The t. p. line shows no bending on the subterminal fold, and it is slightly more outwardly rounded opposite the cell than in either of the allied species. The median yellowish lines are accompanied by dark edging as in the European *subtusa*. The s. t. line is accompanied by quite heavy preceding darker shading. Terminal line dotted, blackish. There is a faint median shade below the reniform. The basal-half line and t. a. line are further apart on costa than in *pleonactusa*. The stigmata are disproportionate, owing to the small size of the orbicular, which is much smaller than in *subtusa*. Hind wings fuscous with pale costal region and pale, faintly interlined fringes. Thorax and abdomen above olivaceous fuscous, concolorous with primaries. The t. a. line seems to show a faint notch on median vein.

*Exp.* 35 mil. *Hab.* Texas (Belfrage, May 12, No. 632).

*Chytoryza, n. g.*

♂ ♀. This form I would refer to the series of *Anomis*, *Aletia*, *Pteraetholix*. It much resembles the latter in size and color, but it differs by the external margin of the primaries being even, not sinuate, and the want of the ♂ venational characters. Eyes naked, prominent, legs unarmed, abdomen smooth, cylindrical, untufted; wings wide and ample, thorax smooth, untufted. The shape of the wings recalls *Poaphila*, but the apices are blunt, not pointed. Male antennæ simple, ciliate beneath slender.

*Chytoryza tecta, n. s.*

♂ ♀. Primaries cupreous brown with the lines fine, denticulate accompanied by whitish scales. Reniform conspicuous, being inferiorly filled in with white or yellowish scales, forming a prominent spot which strikes the eye at once. The upper portion of the reniform is obsoletely indicated. The brown shade of the subterminal space deepens up to the s. t. line, which is relieved outwardly by a fine powdering of pale scales, Fringes blackish, paler at the tips. Secondaries wholly blackish, without line, with fringes whitish at tips, at base obsoletely interlined. Beneath pale, hind wings irrorate, with a median denticulate line and small black discal mark preceded by an obsolete dash. Fore wings darker with the terminal space and costal region shaded with yellowish. Legs pale, thorax above like fore wings. *Expanse* 23 mil. Texas (O. Meske).

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SYNONYMY OF THE COLEOPTERA OF THE FAUNA  
BOREALI-AMERICANA, KIRBY.

BY GEO. H. HORN, M. D., PHILADELPHIA, PA.

(Concluded).

274. *APOTOMUS ovatus* Fab. belongs to the genus *PTEROCOLUS*.  
 275. *Anthribus fasciatus* Oliv. is a *TROPIDERES*.  
 276. *Chlamys plicata* Oliv.  
 277. *Cryptocephalus pubescens* Fab. is a *PACHYBRACHYS*.  
 278. " *notatus* Fab. is *SELLATUS* Suff.

279. *Eumolpis vitis* Fab. is correctly determined, but is an ADOXUS.
280. *Chrysomela philadelphica* Linn.
281. " *CONFINIS* Kby. is *C. spiracæ* Say and a variety of the preceding.
282. " *BIGSBYANA* Kby.
283. " *MULTIPUNCTATA* Say.
284. " *CLIVICOLLIS* Kby. This name should remain. The *C. trimaculata* Fab. is the same, but the name was pre-occupied by Linneus.
285. " *RUFIPES* De Geer is *C. PALIDA* Linn., a GONIOCTENA.
286. *Phaedon Adonidis* Pallas. is an ENTOMOSCELIS.
287. " *raphani* Fab. Probably a correct determination. The species is known in American cabinets as GASTROPHYSA *formosa* Say.
288. " *POLYGOINI* Linn. is a GASTROPHYSA.
289. *Phyllosecta vitellinae* Linn.
290. *Haltica VICINA* Kby. appears to be DISONYCHIA ALTERNATA Illig.
291. " *PUNCTICOLLIS* Kby. is DISONYCHIA TRIANGULARIS Say.
292. *Galeruca OLIVIERI* Kby. is PHYLLOBROTICA DECORATA Say.
293. " *CANADENSIS* Kby. A TRIRHABDA, and Crotch thinks it a variety of TOMENTOSA Linn.
294. " *sagittariæ* Gyll. This species and its allies form the genus GALERUCELLA Crotch.
295. " *BILINEATA* Kby. is a variety of GALERUCELLA NOTULATA Fab.
296. " *MARGINELLA* Kby. is a GALERUCELLA.
297. *Orsodacna TIBIALIS* Kby.
298. " *CHILDRENI* Kby. These two are considered identical, and the latter name adopted.
299. *Haëmonia NIGRICORNIS* Kby. This seems to be the same as that subsequently described by Lacordaire as *Mel-sheimeri*. I have seen Canadian specimens which do not differ.
300. *Donacia FEMORALIS* Kby.
301. " *FLAVIPES* Kby.
302. " *AFFINIS* Kby. is KIRBYI Lac.
303. " *EMARGINATA* Kby.
304. " *PROXIMA* Kby.
305. " *CUPRÆA* Kby.

306. *Donacia* HIRTICOLLIS Kby.
307. " *æqualis* Say.
308. *Hispa* bicolor Oliv. is an ODONTOTA.
309. *Coccinella* EPISCOPALIS Kby. is an ANISOSTICTA.
310. " *tredecimpunctata* Linn. is a HIPPODAMIA.
311. " *TRIDENS* Kby. is HIPPODAMIA PARENTHESIS Say.
312. " *QUINQUESIGNATA* Kby. is a HIPPODAMIA.
313. " *QUINQUENOTATA* Kby. In the revision of the *Coccinellidæ* Trans. Am. Ent. Soc., 1873, p. 370, Crotch allows the name to remain. In his general revision (published posthumously) London, 1874, the name is placed as a synonym of *TRANSVERSOGUTTATA*, which is probably correct.
314. " *TRICUSPIS* Kby. In the London publication the name by Kirby is said to be pre-occupied and changed to *KIRBYI* by Crotch, but is allowed to remain in the American publication.
315. " *INCARNATA* Kby. is *ANISOCALVIA DUODECIMMACULATA* Gebl.
316. *Pimelia* ALTERNATA Kby. is *ELEODES TRICOSTATA* Say.
317. *Upis* ceramboides Linn.
318. *Tenebrio* molitor Linn.
319. " *pensylvanicus* Kn. is a NYCTOBATES.
320. *Diaperis* bicornis Ol. is a HOPIOCEPHALA.
321. *Bolitophagus* cornutus Fab. is *BOLITOTHERUS BIFURCUS* Fab.
322. " *obcordatus* Kby. is a PHELLOPSIS.
323. *MERACANTHA* CANADENSIS Kby. is *CONTRACTA* Beauv.
324. *Arthromacra* DONACIOIDES Kby. is *AENEA* Say.
325. *Cistela* ERYTHROPA Kby. is *ANDROCHIRUS luteipes* Lec., which is not rare in Canada.
326. *Xylita* buprestoides Payk. *X. LAEVIGATA* Hellén. is an older name.
327. *Notoxus* monodon Fab.
328. *Cantharis* UNICOLOR Kby. is a *MACROBASIS*, *cincta* || Fab. and *Fabricii* Lec. are its synonyms.
329. *Meloe* IMPRESSA Kby.
330. " *NIGRA* Kby.
331. *Dasytes* FOVEICOLLIS Kby. is a *DOLICHOSOMA*.
332. *Necrobia* violacea Linn. is a *CORYNETES*.

333. *Thanasimus ABDOMINALIS* Kby. is *nubilus* Klug, a variety of *UNDULATUS* Say.
334. *Cyphon FUSCICEPS* Kby.
335. *Telephorus ater* Linn. (Kby.) is erroneously determined and is *FRAXINI* Say.
336. " *WESTWOODII* Kby. The legs of this species are dark. It seems to me merely a variety of the next.
337. " *SAMOUELLII* Kby.
338. " *CURTISII* Kby. This and the preceding are the same.
339. " *PUNCTICOLLIS* Kby. is a *PODABRUS*.
340. " *LAEVICOLLIS* Kby. is a *PODABRUS*.
341. " *MANDIBULARIS* Kby. does not differ from *FRAXINI* Say.
342. " *BENNETHI* Kby. is *PODABRUS TRICOSTATUS* Say.
343. *Lampyris corrusca* Linn. is an *ELLYCHNIA*.

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*Synopsis of Kirby's Species.*

Number of species described as new by Kirby.....	238
Those which retain Kirby's specific names and are known to us.....	111
Number which must be considered synonyms .....	108
Specific names pre-occupied and a more recent name used.....	6
Species in doubt and undetermined by us.....	10
To be dropped (name pre-occupied and type lost in one instance). ..	2
Two species mixed under one name.....	2
Number of species quoted from previous authors.....	105
Of these there are correctly determined.....	68
Those which must be placed in synonymy on account of incorrect determination or otherwise.....	35
Uncertain and unknown to us.....	2
Australian species described in error.. . . . .	1

## ON GENERA.

BY DR. H. HAGÈN, CAMBRIDGE, MASS.

(Read before the Entomological Club of the A. A. A. S., at Buffalo, N. Y.)

There will hardly be a naturalist who has not spent considerable time to study the questions—What is a genus, and what are generic characters? Indeed, work is nearly impossible without having taken a position with regard to these questions. A full record of the literature, even the most condensed one, would be here out of place, but I have been induced by a recent and most surprising discovery bearing upon this question to make this communication. I have been speaking here only about *natural* genera. The consideration of the genus as an artificial division differs fundamentally, and to avoid mistake we should not call artificial divisions by this name. The characters of artificial genera depend solely upon the taste of the worker and the convenience of separating into groups animals and plants. All species are considered to belong to the same natural genus which agree in structural characters, external and internal, or anatomical ones in the different stages, in transformation, in the manner of living. These definitions of a genus are accepted as well by naturalists who are strong Darwinians as those who oppose the development theory. In a prize essay of the Jena University, D. P. Mayer, a pupil of Prof. Haeckel, in a paper on the "Ontogeny and Phylogeny of Insects," enlarges this definition in so far as he asks for a conformity in the embryological characters. I believe no one will object that this definition is a good and exhaustive one; but if we attempt to use it in a special case we become bewildered by the astonishing amount of characters unknown to us, and the impossibility to make them out for our work. At present we know hardly well enough the external characters of the imago. Of other characters our knowledge is merely fragmentary and often a *tabula rasa*. We may say that a century of hard work will not fill these gaps in our knowledge. It is obvious that we cannot wait till this enormous amount of work is done. And it is certain that naturalists will not and can not stop creating new genera.

Genera created with such a limited amount of knowledge will depend upon the experience and taste of the worker. Many of such genera will have to be modified or dropped by a farther advancing knowledge.

The most important question (what are generic characters?) is still unanswered.

The large literature and the difference of opinion emitted by prominent authorities seem to prove that a sufficient affirmative answer is impossible till our knowledge is further advanced. But here, as in other abstract questions, we can proceed in a negative manner by exclusion.

Genera consist of a number of related species. If we knew the character of the species, the specific character, we can by exclusion come nearer to the character of the genus. Species differ by structural character, and as the species form the lowest degree of the classification, we can be sure that species must differ at least by minutest points of structure.

I think there is no objection of consequence possible. I know very well that differences in minuter points of structure have been considered as generic characters. But naturalists beginning with the construction and definition of the higher degrees of class, order, family, &c., used up all characters at hand, till, coming to genera, nothing was left but minute differences of structure; the simple consequence of having used specific characters for generic ones was that nearly every species was considered to be a genus.

I said before that species must differ at least by minuter points of structure. The discovery which I mentioned before proves that structural characters of species are more important, and can by a different manner of living be changed in such a way as to represent forms which were formerly believed to belong to different genera. *Branchipus* and *Artemia*, belonging to the Phyllopod Crustacea, are represented by several species here and in Europe. The two genera are nearly related one to the other, and differ principally in the following points: *Artemia* has eight post-abdominal segments, the last one very long. *Branchipus* has nine post-abdominal segments, the last two of equal size. *Artemia* has three articulated claspers in the male; *Branchipus* two articulated claspers. *Artemia* is often propagated by Parthenogenesis, *Branchipus* never.

Nobody will deny that those characters of structure go very far beyond minuter points of structure, and are marked well enough to justify the separation sixty years ago by Dr. Leach. Now, it is proved that not only the species of *Artemia* known up to to-day from Europe, Asia and Africa, but even some species of *Branchipus* belong to one and the same genus and species. In the American fauna five species of *Artemia* and three of *Branchipus* are described; of course they will have to be studied again



in a similar manner as the European ones. The two European species of *Artemia* are remarkably different. *Artemia salina* has a strongly bifid tail surrounded by 15 to 20 bristles and narrow gills; *Artemia mulhauseni* has a rounded tail without bristles, and very large gills. This latter species lives in pools of a very concentrated salt water of 25° Beaumé; the other species in common salt water of about 8°. In 1871 a dam which surrounded a salt pool containing *Artemia mulhauseni*, broke down by accident and the sea water washed in at the same time; *Artemia salina*, which abounds in the sea water, appeared in large numbers in the pool. The dam was immediately repaired, and in the space of three years the amount of the salt in the pool arrived gradually at the same concentration as before.

A Russian naturalist, Mr. Schmaukevitch, living near the spot and studying carefully *Artemia*, was astonished to find the species somewhat changed in every following generation, till in three years the *Artemia salina* was changed entirely into *mulhauseni*. The fact was so extraordinary that he decided to confirm it by a more conclusive proof. He raised at home in open glass dishes *Artemia salina*, and by successive additions of salt to the water, he was able to transform the species into *Artemia mulhauseni*. To make the counter proof he diluted the water gradually and the species returned to the form of *Artemia salina*. But by continued dilution of the water he was more surprised to find that in the third generations the long abdominal segment began to be separated into two segments, and finally to be changed as in a *Branchipus*. He found later in salt pools of only four to five degrees (living together) *Artemia salina* and *Branchipus spinosa*, and in water with a lower degree of salt two other related species, *Branchipus ferox* and *media*.

Mr. Schmaukevitch has made similar experiments with similar results on *Daphnia*, *Cyclops* and *Canthocamptus*, which he has not yet published. There can be no doubt about the facts under such conclusive proof, and Prof. V. Siebold is now engaged in raising the American species from Salt Lake for similar experiments. These facts oblige us to consider all these different forms as belonging to one and the same species, since it is possible to change at will one form into another by altering the conditions of living. As long as this is possible they cannot be considered as differentiating or Darwinian species. We have now the proof that specific characters exist which do not depend on minuter points of structure. Therefore we are taught that we must considerably enlarge the characters of species and those of the genus.

What has been thus proven in Crustacea will certainly be observed also with other Articulates. Since insects do not possess a post-abdomen, there cannot occur the same differences as in the case cited, but analogous ones will not be wanting. It is obvious that so-called "salt insects" are the first ones which will need new and careful study. Those known are Coleoptera, Diptera, Hemiptera and Orthoptera, and the species are often nearly related to other ones which do not live in salt regions. Further, it is evident that similar changes will be the result of different conditions of life. So-called "local varieties" are certainly nothing else, and a vast field of observation and study is opened by the remarkable discoveries of Mr. Schmaukevitch. I believe that we are now justified when we exclude from generic characters all the following ones :

1. Every character based on the number of parts, when the number ceases to be a small one ; the more so when it varies in related species. If a number is larger than about a dozen, we can never rely upon the constancy of the number in antennal joints or anal appendages. In spines, bristles, spurs, a much smaller number is constant ; transversal veins of the wings belong to the same category.

2. The external coating of the body, consisting in hairs, scales and other appendages, is not a generic character. The hairs, tufts, brushes, spines, spurs, are often only sexual and can not be considered generic characters ; also, hairy eyes, since we find this character changing in the most related species and probably in the same species in Diptera.

3. The presence or want of the ocelli or eyes is not a generic character.

4. The veins of the wings give only to a certain degree generic characters, viz : the principal branches, but certainly not after their bifurcation.

Having arrived so far by exclusion, it is important to state what is left for generic characters.

So far as I am advanced in the study of generic characters, I think the following should be used :

1. The form and relation of the three principal parts of the body.
2. The organs providing nutrition (mouth parts).
3. The organs making possible the working of the mouth parts, *i. e.*, the organs of locomotion.

The anatomical characters may be of prominent help. At present our knowledge as to their details is too limited to admit our using them to a

profitable extent. We begin to be better acquainted with the previous stages, and this acquaintance will bring these characters into more prominence. I doubt embryological characters to be of generic value. But very little is certainly known about them, and nothing known is ready for our use. The parts serving for propagation have probably a higher value than generic characters. Characters for genera should be of a co-ordinate value. I think it is obvious that a genus should never be accepted if its characters are not satisfactorily given, and that genera based on the mere specification of a type should never be accepted.

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CORRESPONDENCE.

DEAR SIR,—

In the early part of June I found on the Wax-Myrtle (*Myrica cerifera*) three larvæ unknown then to me. I regret now that want of time prevented me from making an accurate description of them, but my notes simply say: "Looks like a *Geometra*—may be small *Catocala*; prettily marked with dark grey; central segments underneath white or light grey."

Only one of the caterpillars produced an imago, and this proved to be *Catocala badia*. It was about fourteen days only in the chrysalis state, and I am now forced to the conclusion that *C. badia* must be double brooded.

W. V. ANDREWS.

P. S.—From what I have observed of the larval habits and appearance of *Catocala*, I am convinced that this genus should be very close to *Geometra*.

W. V. A.

Brooklyn, July 7th, 1876.

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EXTRACT FROM A LETTER.

DEAR SIR,—

As an example of retarded development, let me mention that three or four years ago I laid aside some old cocoons of *Samia cynthia*, which I thought were empty, and to my amazement, three splendid specimens have this season made their appearance. I know that wonderful stories are told about the abnormally long continuance of some Coleoptera in the chrysalis form, but I never before observed a similar instance in Lepidoptera. Do you know of any?

How are you off for *Schaphnotus elevatus* up there in Ontario? A few days ago, in half an hour, I took thirty from under old railroad ties lying along the track. I was sufficiently *elevated* with my success for one day, and ceased further operations, lest I might exterminate the species!

J. C. MORRIS, Baltimore, Md.

IMPORTANT CAPTURES.

DEAR SIR,—

I made, as I think, a very important capture on the 26th of August which you and some of your readers may be interested in knowing, viz., two fine, fresh and absolutely perfect examples of *Catocala marmorata* Edwards. This is, I think, unquestionably the handsomest of all our known species of *Catocala*. I was not a little surprised, and as might well be imagined, delighted beyond measure to find two such unexpected strangers. My friend, Mr. Charles Dury, of Cincinnati, informs me in a letter received from him a few days ago that he also took one this season in his locality. A figure and description of this truly regal insect may be found in Strecker's work, Plate 9, No. 6. In a note accompanying his description he says: "One can but regret that so little concerning this fine species is known; the original description contains no further remarks than 'from Yerka, California,' and we can only hope that time, which 'at last sets all things even,' will enable us to receive specimens and learn more concerning this superb insect."

My specimens are both males; they were found on the trunks of two separate trees (White Wood or Tulip tree), fifty or sixty feet apart, about five feet from the ground, and both were started before I noticed them, but their flight was very short—only darting around to the opposite side of the tree, where they remained perfectly quiet until I covered them with the bottle.

The peculiar brown dash or band which obliquely traverses the primaries near the posterior extremity, is more dense in my specimens than is represented in Strecker's figure. Mr. Dury says in his it is quite black.

The abdomen of Mr. S.'s figure is, as he tells us, nearly imaginary, the specimen he had to work from not having any remaining, and he was not certain even as to which sex it belonged. The abdomen of mine is very much like *parta*, but heavier, and a shade darker. Length of body 1½ in.; diameter of abdomen in middle, 3½ lines. Anal brush white beneath and blackish above.

Both specimens are alike in size and expand  $3\frac{1}{8}$  in. No one could fail to be impressed with the princely appearance of this rare insect, and unhesitatingly accord it the first rank among its peers in the interesting group to which it belongs.

*Catocala* have been very abundant here this season. I have taken between 900 and 1000 specimens, and among them some rare species and some that I seldom or never took here before. For example, I have taken *atarah* (as has also my friend, Mr. C. Whitney, in N. H.), which I believe has not been recorded before as occurring north of Texas. I have also taken *amasia*, and a species allied to it, which may prove to be an extreme variety. This also is put down in the published authorities as a southern species. Mr. Whitney informs me he also has taken this species in N. H. this season. And now *marmorata*, which hitherto has been known only as a Californian species. I have one, and perhaps two, that I think are new species, which I may give you a description of when I get time. After a while I may also prepare you a list of the species of *Catocala* occurring here.

JAMES ANGUS, West Farms, New York.

#### HOW DO SPECIALISTS PREFER TO RECEIVE MATERIAL?

DEAR SIR,—

Dr. Henri de Saussure writes in the introduction, page xix, to his Synopsis of "Solitary Wasps" (Amer. Wasps) as follows:

"In a great many collections it is usual to spread the wings and legs of the Hymenoptera. This is mere amateur's work, of no utility for study, sometimes even quite opposed to the purpose in view, by dissimulating the character of the insects instead of exposing it to view. This practice is to be regretted, moreover, by its increasing the value of the insects, on account of the time and expense wasted thereby, so that one is loathe afterwards to place them in the softener, when it becomes necessary to dissect the moth."

In connection with this, I would ask whether Dipterologists and Micro-lepidopterologists prefer things (to be sent to them for study) *spread* or merely pinned. Mr. V. T. Chambers is satisfied to get Tineidæ dead and dry, and even untouched by a pin. Let Mr. Cresson and other specialists announce their preferences. I should be glad to see published the names and addresses of such gentlemen as now are engaged in the study of Tortricidæ, Pyralidæ and Alucitæ, of which groups I will contribute all my accumulated Californian specimens without reserve.

JAS. BEHRENS, P. O. box 1,173, San Francisco, Cal.