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CATALOGUE OF THE MYRMOPHILOUS COLEOPTERA WITH BIBLIOGRAPHY AND NOTES.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Quite a number of our Coleoptera are known to associate in their imago or perfect state with the Formicariæ—comprehensively, ants. Very little, perhaps nothing, is known of the larval and pupal life of any of these beetles. Some, like *Batrisus bistriatus*, probably never leave the ants; but others, like the species of *Cremastochilus*, desert them in the spring, whether afterwards to return and propagate among them is an open question. The association here referred to is common inhabitancy and more or less mutual interdependency, and not mere accidental occurrences under stones, bark and common shelters as seen frequently; and it is not always easy for the collector to avoid confusion of this kind. By bringing together the most of what is recorded in American literature about these interesting Coleoptera, with this as a basis it is hoped a stimulus may be given to research, and collectors may be induced to search for them more diligently, and make public their observations. It is no easy matter to investigate properly an ant's nest, but patience and labour intelligently directed may meet with ample reward. Larvæ and pupæ should be diligently sought for in the formicariums. Only once or twice is there mention of any larva of a Coleopter having occurred with ants, and that of some Staphylinide that may have only been there as an explorer.

ABBREVIATIONS.

Tr.—Transactions of the American Entomological Society.

Pr.—Proceedings of the Academy of Natural Science, Phil. (2nd series).

An.—Annals of the Lyceum of Natural History, New York.

B. J.—Boston Journal of Natural History.

No Carabidæ are known to me to truly inhabit with ants, but several species hibernate in their burrows whether inhabited or not, as *Panagæus fasciatus*, which I find in autumn and in spring.

Pltomophagus parasitus Lec. I take this beetle occasionally in April on the under side of flat stones covering the formicaria of a large black ant (*Formica herculanea*?). With this species of ant I once found five specimens of *Hister planipes*, and *Cremastochilus canaliculatus* and *Harrisii* are its guests.

Colon. The Classification, p. 77, states that some species of *Colon* are found only in ants' nests, but I fail to find further bibliography.

Scydmanus. The Classification, p. 84, mentions ants' nests as the residence of some of the species. It might be well for the collector to consider whether the association is other than accidental.

S. capillosus Lec. Is found in March on the under side of stones, and is said (Pr., 6, 152) to sometimes occur in the nest of a small rufous ant with red legs. I take it sometimes with various small ants but just as frequently by itself, and see no connection besides that of occupying a common shelter. Georgia, Pennsylvania and New York.

S. brevicornis Say. Occurs in the nest of a small black ant. New York and Pennsylvania. (Pr., 6, 153.)

S. rarus Lec. Found with a small fuscous ant. Pennsylvania. (Pr., 6, 153.)

Adranes cæcus Lec. Found with a small black ant. June. Georgia and Illinois. (B. J., 6, 84; N. S., p. 28)

Adranes Lecontei Brend. Several specimens of this curious insect, which is without eyes and has only two joints in the antennæ, were taken by Mr. Charles Dury near Cincinnati, Ohio, with a medium-sized pale brown species of ant, inhabiting a decaying beech log. "On each side of the body and just back of the elytra is a tuft of brown hair, and from it springs a tube from which the beetle exudes a fluid that the ants are supposed to eat."—Dury, Journal of the Cincinnati Society of Natural History, July, 1884.

Ceophyllus monilis Lec. Inhabits here with a medium-sized, honey-yellow ant (*Lasius integerrimus*?) that nests under stones. When the beetle is found, which is not often, from six to a dozen occur in the same

nest. I find *Heterius brunnipennis* with this ant. April and May. Dr. Leconte took *C. monilis* under bark in August in Michigan. (B. J., 6, 73; CAN. ENT., 18, 26.)

Cedius Ziegleri Lec. Dr. Leconte took a specimen at Bedford, Pa., in the nest of *Formica rufa*, though previously he had found it under bark. (Tr., 6, 288; B. J., 6, 74.)

Imesiphorus costalis Lec. Found with *Formica rufa*. (Tr., 6, 287.)

Ctenistes pulvereus Lec. Taken at San Jose, California, "with a small piceous ant with testaceous legs." (An., 5, 214.)

Tychus puberulus Lec. With ants. San Jose, California. (An., 5, 214.)

Decarthron formiceti Lec. Found with *Formica Pennsylvanica*. April. Pennsylvania. (B. J., 6, 90.)

Batrissus Ionaæ. Found by Dr. Leconte "with a small, opaque, black ant, with rufo-piceous feet and antennæ." May. Mt. Iona, Georgia. (B. J., 6, 94.)

B. armiger Lec. Lives with a medium-sized rufous ant. Pennsylvania. (B. J., 6, 94.)

B. ferox Lec. Found with various ants. Pennsylvania, *loc. cit.*

B. cristatus Lec. Found with a large rufous ant with a brownish head. Pennsylvania, *loc. cit.*

B. riparius Say. Occurs occasionally in Pennsylvania under stones with *Formica Pennsylvanica* (?), but more frequently under pine bark in Georgia. (B. J., 6, 95.)

B. globosus Lec. Inhabits with several species of ant in Pennsylvania and Georgia. (B. J., 6, 100.)

B. bistriatus Lec. Taken by Dr. Leconte with a large rufous ant, *loc. cit.* I have taken it twice in April with a medium-sized honey-yellow ant. The ants seem to be very fond of them, and carry them off like their eggs and pupæ, while the beetles appear to be entirely impassive. (CAN. ENT., 18, 26.)

B. lineaticollis Aube. Taken with a large rufous ant. Georgia and Pennsylvania. (B. J., 6, 100.)

It is quite probable other species of this genus occur with ants. Five species in California, described as new by Mr. Casey since the catalogue

was issued, are found in wet moss and under stones near water courses, thus showing great diversity of habit in insects placed in the same genus.

Anchylarthron cornutum ♂ (*inornatum* ♀) Brend. Gregarious with ants. Mississippi Valley and South Carolina. (Tr., 14, 208.)

Trimum puncticolle Lec. Many specimens of this species were taken in an ants' nest by Dr. Horn in Arizona. (Proc. Am. Phil. Soc., 17, 384.)

Homalota. An undescribed species was taken with *Formica rufa* at Bedford, Pa., by Dr. Leconte. (Tr., 6, 288.)

Lomechusa cava Lec. About fifty specimens were taken with a colony of black ants [*Formica Pennsylvanica*] inhabiting a white oak log. Massachusetts. (Bul. Brook. Ent. Soc., 2, 4.) Dr. Leconte took it from the mounds of *Formica rufa* in the Alleghany Mountains; it occurred with yellow ants in Columbia County, Pa., Michigan and Maryland; and in Illinois in large numbers in the nests of *Formica rufa* (?). (Tr., 6, 287.)

Oxygoda. A species occurred with *Formica rufa* at Bedford, Pa. Leconte. (Tr., 6, 288.)

Leptacinus longicollis Lec. Occurs in the middle States, and usually in ants' nests. (N. S., p. 41.)

Eleusis pallidus Lec. Ants' nests, Lancaster County, Pa. (Leconte in New Species, p. 58. This insect is gregarious. I have twice taken a colony early in July under the bark of Balm of Gilead stumps (*Populus candicans*)—once with very small brown ants, and once alone. The association of this species with ants appears to me to be merely accidental. (CAN. ENT., 18, 27.)

Hister planipes Lec. Occurs, according to Dr. Horn, from Massachusetts to Georgia. Here, I took once five specimens in April in a nest of *Formica herculeana*.

H. perpunctatus Lec. Mr. F. Blanchard takes this species at Tyngsborough, Mass., with a brown ant, 4.5 mm. long. (Tr., 8, 190.)

H. repletus Lec. This, according to Mr. Blanchard, is also found in Massachusetts in the nest of a small black ant. (Ent. Am., 3, 86.) It is quite probable *H. subopacus* is also a Myrmophile. It occurs in Nebraska, Colorado, and also in Vancouver Island.

Heterius brunnipennis Rand. Occurs here occasionally with a medium-sized honey-yellow ant in April and May.

H. Blanchardi Lec. Mr. Blanchard, the discoverer of this species, took it and *Hister perpunctatus* with the same species of ant. (Tr., 8, 190.)

Echinodes setiger Lec. This singular form has occurred variously; in South Carolina and Georgia with a pale ant. (Horn. Proc. Am. Phil. Soc., 13, 305.) Zimmerman found it at Columbia, South Carolina, in April, with a small brown ant. (Tr., 2, 253.) And it has been taken in Habersham County, Georgia, in the nest of a small ant under bark. (Pr., 1859, 316.)

Cremastochilus Schaumii Lec. Dr. Horn frequently found this species in ants' nests in California. (Tr., 3, 339.)

C. Westwoodi Horn. Found in or near ants' nests in Owen's Valley, California, where it is not rare. (Pr. Am. Phil. Soc., 18, 139.)

C. angularis Lec. This species was taken frequently in ant's nests in California by Dr. Horn, who several times saw large black ants dragging the beetles towards their nests. He strongly suspects the fossæ at the anterior angles of the thorax and the finely punctured and perforated patches under the hind angles yield a secretion grateful to the ants. This species extends to Vancouver.

C. variolosus Kirby. One specimen occurred here with ants.

C. canaliculatus Kirby. Is the most abundant species found here; it is found from April till June with large black ants, perhaps of two species, inhabiting usually under stones or other covering, but not infrequently throwing up small mounds in old pastures and open ground. The nests under stones rarely yield more than two beetles, but the mounds often contain five or six at once, and with care will yield a crop every two or three weeks. The beetles are found near the surface, none having been taken below the plane of the base.

As soon as it becomes warm, from the middle of April onward, this species takes leave of the ants and flies away; like the *Cicindela* it only flies during the hottest sunshine and for short distances, alighting suddenly on a stone or the middle of a dusty road. Its flight is low and heavy, and after it lights cannot take wing again without some delay, and I have seen it flying as late as August. Whether after having left, the same beetles

return and breed among the ants, or whether it is a new brood that claims their hospitality for the winter, is absolutely unknown. I never could satisfy myself as to whether those found in the nests in June had returned or were just preparing to leave. (For some interesting observations on this species and *Schaumii* see Ent. Am., 1, 187.)

C. Harrisii Kirby. I neglected to observe the ant with which I took a specimen.

Dr. Horn incidently mentions that *C. leucosticticus*, *pilosicollis* and *castaneæ* have likewise been observed in ants' nests. (Pr. Am. Phil. Soc., 18, 384.)

Without much doubt many species of our *Staphylinidæ* will be found to be Myrmophilous as in Europe, where, according to Rev. J. G. Wood, in the Aleocharidæ alone no less than "eight genera contain species that are parasitic and spend their whole lives in the nests of ants," among them *Atemeles emarginatus* and *A. paradoxus* living with *Formica fusca* and *Myrmice ruginodis*, which take as good care of them as of their own young; also *Myrmedona Haworthii* and *Dinarda dentata*, *Quedius brevis* is said to live with *Formica rufa*, and that wonderful beetle *Claviger foveolatus*, destitute of eyes and mouth, inhabits with *Formica flava*.

Besides the species catalogued here several others in our Fauna are traditionally reputed to dwell with ants, but the observers have either not published the facts or I have failed to find the bibliography.

THE CLASSIFICATION OF THE BOMBYCIDÆ.

(*Second Paper.*)

BY A. R. GROTE, A. M., BREMEN, GERMANY.

We have seen, CAN. ENT., xix., p. 156, *et seq.*, that the Bombycidæ, or Spinner Moths, are characterized, as a whole, by their short, pectinate antennæ, ample, velvety wings, thick bodies, small heads and sluggish habit, while the pupa is usually contained in a cocoon made by the caterpillar in its last stage. To almost all these characters the subfamily groups offer exceptions, and we have seen that while Dr. Packard follows the tradition of Harris, Latreille and Linnaeus, modern German writers break up the family into independent groups limited by structural features

taken from the imago. What Agassiz calls "form" still unites these various groups—a certain correspondence in outline and habit. Dr. Packard seeks this in the shape of the clypeus, the piece between the eyes, its relative proportion. In my first paper I have adopted this view, that we have to do with descendants of a former complex and that we may still unite the Spinner Moths under a common family title. Those who differ may merely alter my sub-families into families.

Sub-family *Sarothripinæ*.

The single genus *Sarothripus* Curt. was first referred to the Tortricidæ, then to the Noctuidæ, and finally as part of the *Nolinæ*, the second sub-family or group of the Bombycidæ. In my new Check List the genus is omitted, as I had no knowledge of our N. Am. species. The form of the cocoon allies it to *Nola*. The moth is tortriciform and differs from *Nola* decidedly in the form of the wings. The fore wings are elongate, sub-quadrated, hardly widening outwardly with acute apices. The palpi are much longer than the head, more erect and prominent than in *Nola*. The caterpillar is 16-footed and makes a boat-shaped cocoon. The neuration shows a relation to *Nola* and the Lithosians. As the hind wings have only two internal veins, we see that the moth is not really a Micro, to which group it was once referred. The fore wings have no accessory cell. We shall come back to this accessory cell later and show its importance and constancy in some other groups. The antennæ are simple in both sexes. The resemblance to *Nola* lies also in the want of ocelli, and this character unites the three first groups, viz., *Sarothripinæ*, *Nolinæ* and *Lithosiinæ*; again, the elongate palpi, which are, however, equally squamous throughout. Of the European genera, *Chlæphora*, *Halias* and *Earias*, we have no N. Am. species, and these probably form a distinct group, *Chlæphorinæ*. Of *Sarothripus* we have one described from the East and one from the West. Now the European species is very variable, and whether we have more than one species, or whether our species is really distinct from the European *revayana*, is not clearly made out. Probably the earliest descriptions of forms of our Eastern *Sarothripus* are those cited by Fernald, Am. Ent., I., 36, the *Tortrix scriptana* and *frigidana* of Walker.

Sub-family *Nolinæ*.

The fore wings are broad, sub-trigonal, without accessory cell; the hind wings rounded, not as in the *Sarothripinæ*, with the outer margin

indented. No ocelli. The fore wings have tufted scale patches above. The caterpillars are 14-footed and make a boat-shaped cocoon. The neuration of our N. Am. genus *Argyrophyes* is given by me, CAN. ENT., ix., 236; and we have two species, *cilicoides* and *nigrofasciata* (= *Eustrotia obaurata* Morr.). This latter synonym recalls the fact that the ornamentation in this group of small insects resembles that of the Noctuidæ. In *Argyrophyes* the raised blotches of scales on primaries are metallic. Of the typical genus *Nola*, I have cited five N. Am. species in the new Check List.

Sub-family *Lithosiinae*.

The long palpi of the preceding groups are replaced by shorter, more bombyciform appendages. In this group the body is weak and the fore wings usually narrow, while the hind wings are wide and frail. The ocelli are wanting. Hence I refer *Crocota* to the following group of *Arctiinae*. The costal vein of secondaries springs from the subcostal. No accessory cell on primaries. The caterpillars are 16-footed and live on lichens. In the new Check List I cite the genera *Clemensia*, *Crambidia*, *Hypoprepia*, *Cisthene*, *Byssophaga* (distinct?), *Lithosia*, *Euphanessa* and *Ameria*. It is possible that the two last do not belong to this group.

Sub-family *Arctiinae*.

In this group the male antennæ are usually provided with short pectinations; the ocelli are present; the palpi are quite short and the whole appearance is bombyciform. Veins 4 and 5 are near together on both wings. The moths are usually of larger size than in the preceding groups; the wings are ample, held roof-like in repose. The caterpillars are hairy and make loose cocoons. Our North American genera are allied to the European, but Dr. Packard has drawn attention to the fact that our species are more white and yellow, less red-colored than the European. In the presence of the genus *Nemeophila* the west coast fauna more nearly resembles the European. The genera *Crocota*, *Kodiosoma*, *Seirarctia*, *Leucarctia*, *Ecpantheria*, *Euerythra*, *Halisidota*, are more especially American forms, outgrowths, so to speak, of *Spilosoma* and *Arctia*. I wish to correct here Mr. J. B. Smith's reference of *Cerathosia tricolor* Sm., to the *Arctiidae*. A comparison of its corrected characters will show that it should be rather referred to the *Noctuidæ*. The clypeus has an inferior circular rim and presents a sub-central, button-

like projection. This is a Noctuid and Pyralid feature, though a projection is found in *Copidryas* without the rim. The fore wings have an accessory cell. The hind wings have vein 5 present, but weak, not absent as stated by Mr. J. B. Smith, and this vein is equidistant between 4 and 6, contradicting the characters of the *Arctiinae*. Mr. J. B. Smith also describes incorrectly the relative positions of veins 3, 4 and 5 on primaries, as also the point of emergence of vein 10, which springs from about the middle of the upper margin of the accessory cell, not from the upper and outer angle of the cell, whence springs vein 7, giving off 8 and 9. In *Cerathosia* there is a claw on fore tibiae; the legs are thinly scaled, the palpi not so short as in the *Arctiidae*. The moth is lithosiform rather than arctiiform in appearance, but the ocelli will not allow of its being referred to the Lithosians; its neuration and total characters exclude it from the Bombycidae altogether. The squamation is rather like *Tarache* than like *Arctia*. It is not enough that a description of a genus be given; the reason *why* it belongs to the family must be stated. Added to this, Mr. Smith's description is in itself faulty and inaccurate, and affords no reason why this author should use such language in correcting Mr. Hy. Edwards's reference of certain genera, or take such a tone in correcting my own writings. In the present day when the Lepidoptera are well known, the details of structure of the different groups are all given in the writings of the past fifteen or twenty years in Europe and America.

Sub family *Dasychirinae*.

This group is allied to the *Arctiidae* by the tufted or shaggy caterpillars, the frail cocoons. The antennae are more plumose, in the female with short teeth. The palpi are short. The ocelli are again wanting. The legs are short and are usually hairy as in many of the *Arctiidae*. The pupa itself is often hairy—an unusual character. The wings are ample, but in the females of some genera wanting or incompletely expanded. Veins 4 and 5 spring near together, another point of resemblance to the *Arctiidae*. In fact we cannot but approve of Harris's and Dr. Packard's arrangements of these groups. *Hepialus* and *Cossus* should not be interpolated here, but are the lowest groups of the family. In the *Dasychirinae* the body is rather heavy, and there is a disproportion between the sexes, many males being much smaller and lighter. In the New Check List I have cited the N. Am. genera *Parorgyia*, *Carama*

and *Lagoa*. The two latter are curious, and show some resemblances to the following group, *Cochlidiinae*. *Carama* may be described by Curtis also. The genera *Orygia* and *Dasychira* are shared with Europe; in the old world the representation of the *Dasychirinae* seems to be far greater than in the new.

PARTIAL PREPARATORY STAGES OF CATOCALA INNUBENS, GUEN.

BY G. H. FRENCH, CARBONDALE, ILL.

April 28, 1887, a single larva of a then unknown *Catocala* was found on a Honey Locust which proved to be this species. By its appearance it had seemingly passed the first moult. Hence the egg and first stage of the larva is lacking in this account of its life history. If my conjecture be true, my description will begin with the conventional "after the first moult." Length, .26 inch. Color pale greenish, the anterior two and posterior three joints whitish; four purplish red stripes on each side, the lower somewhat broken; head mottled, but not heavily so; piliferous spots black, with short black hairs. Shape as usual with *Catocala* larvæ. Duration of this period unknown.

After 2nd Moult.—Length, .40 inch. Color, pale dull purplish rose in nine longitudinal stripes alternating with pale greenish white lines, the rose darker on the head and joint 2, shading into the pale rose on joint 3; the dorsal stripe a narrow line on joints 2 to 4, broken between the joints and narrow on the last three joints; stripe 2 (counting the dorsal one) contains the dorsal piliferous spots; stripe 3 without any piliferous spots; stripe 4 with the lateral piliferous spots; below this a broken and irregular stripe that contains the lowest piliferous spots. These stripes are of the double line kind, each edge darker than the middle, though there is little difference in any of them except the lowest or number 5, which has more or less of the greenish white in its centre. Piliferous spots black, conspicuous, the short hairs black; head reddish purple with mottlings of broken white lines. Duration of this period four days.

After 3rd Moult.—Length, .50 inch. Color, pale green, with seven dark reddish purple stripes on each side, composed of contiguous dots; head striped with purplish black and white; the dark on joint 2 black,

gradually shading into the purple; yellow tinted between the joints; piliferous spots black; joints in the middle of the body with black patches on the venter. The posterior pair of piliferous spots on the dorsum of joint 9 are, like other species, more approximate than the others and the intervening space elevated, the elevation containing four spots in a transverse row with a patch of pale yellowish back of these. Duration of this period five days.

After 4th Moul.—Length, 1.20 inches. Color, pale green, almost white, with a slight yellow tinge, more distinct underneath the top of joint 2, the legs and a substigmatal stripe distinct yellow; the transverse folds between the joints with more of the yellow tinge. Head striped with dark reddish purple (this was black before) and white, the markings arranged as before but the stripes are almost obliterated on the body except on joints 2 to 4, and the transverse folds between the joints where they are distinct as to the rows of black dots that mark the boundary of the stripes, faint traces of these on the middle of the joints; the black on the venter small except on the middle joints. Piliferous spots black, not very large; a prominent black patch on each side of the posterior part of joint 9, composed of three spots, a short dorsal orange line between them; the posterior pair of spots on the back of joint 12 more prominent than the others; no lateral fringe, but a slight fold above the pro-legs; the anterior two pairs of pro-legs pretty well developed.

Mature Larva.—Length, 2.25 inches. Color, sordid white, a little green tinted, very obscurely striped as at the beginning of the stage, the bordering blackish dots marking the boundary of the stripes most distinctly on the intersegmental folds; the black on joint 9 the same as before with a very short orange stripe between; the substigmatal pale stripe orange on joints 5 and 6; joints 2 to 4 with the rows of spots distinct. Piliferous spots small, black; venter white, tinted a little with yellow, black only on the joints bearing feet; no fringe. Duration of this period nine days.

Chrysalis—Length, 1.05 inches; diameter, .40 inch; of joint 5, .30 inch; tapering from joint 5 to the end; rather strongly indented on joint 1; tongue and wing cases equal, extending back to posterior part of joint 5; cremaster two long hooks at the tip, two shorter at the base, outside of these and a little removed from them several other short hooks; abdominal joints slightly punctured, the tongue and wing cases shallowly corru-

gated, terminal joint deeply on dorsal and lateral parts; head rounded. Color, chestnut brown, as usual coated with a white powder. Puparium a slight lining to the leaves that were fastened together with silk.

The larva pupated May 17th, and the imago appeared June 20th, giving a pupal period of about a month, which is about the same as the other species that have been bred. One feature of the species is that the larva has no lateral fringe. As given before, the food plant is Honey Locust.

May 12th, another larva was found that differs from the above description only in being darker, and as a natural result the stripes more distinct, the light stripes having an orange tint. After this two more were found, one of which had all the light stripes quite distinctly orange tinted. The head was reddish purple striped with numerous white lines, or rather broken lines. Like the other, the venter had the black only on the joints bearing legs. This one had passed the last moult when found, and produced the imago June 17th, showing that keeping the first in confinement had not materially interfered with its time of pupating or its other changes.

ON THE CHALCIDEOUS TRIBE CHIROPACHIDES.

BY WILLIAM H. ASHMEAD, JACKSONVILLE, FLA.

Below I give an analytical table for recognizing the genera in the tribe *Chiropachides* Thomson. It will be seen that I have placed in this group the genus *Schizonotus* Ratzburg, which Dr. Arnold Foerster, in his *Hymenopterologische Studien* (1856), says is identical with *Sclderma* Walker, an opinion in which I cannot concur, my type of *Schizonotus Siebaldi* Ratz. not agreeing at all with Walker's definition; also the genera *Mesopolobus* and *Platymesopus* Westwood, which were suppressed by Walker and other authorities, and placed in the genus *Pteromalus*; they agree in all essential characters with this group, the anterior femora being very similar to *Chiropachys*, the type of the tribe.

Two new genera will be found characterized in this group, the characters of which, as given in the table, being sufficient, it is hoped, to enable them to be easily recognized.

The arrangement proposed is as follows :—

Tribe *Chiropachides* Thomson:

TABLE OF GENERA.

Posterior tibiæ with one spur	3
Posterior tibiæ with two spurs.	
Eyes not hairy	2
Eyes hairy.	
Abdomen sessile, long pointed ovate, marginal and postmarginal veins somewhat thick, the latter being longer than the marginal ; stigmal vein short, one-third the length of the marginal ; sculpture coarsely pitted	<i>G. 1, Dasyglenes</i> n. g.
2. Collar transverse quadrate, separated from the mesothorax by a deep incision at the posterior angle ; pedicel of antennæ lengthened, funicular joints much broader than long, the club obliquely truncate from below	<i>G. 2, Schizonotus</i> Ratzburg
Collar not so formed.	
Collar transverse, rounded before, narrowed in the middle.	
Anterior femora exciso-dentate ; wings with two transverse bands	<i>G. 3, Chiropachys</i> Westwood.
Anterior femora simple ; wings with one transverse band	<i>G. 4, Acrocormus</i> Förster.
3. Abdomen petiolated	6
Abdomen sessile, long or pointed ovate.	
Marginal vein of anterior wings not thickened	5
Marginal vein of anterior wings thickened.	
Antennæ with transverse ring-joints	4
Antennæ with ring-joints large not transverse.	
Marginal vein but slightly longer than the stigmal	<i>G. 5, Pandelus</i> Förster.
4. Stigmal vein and postmarginal vein short	<i>G. 6, Metacolus</i> Förster.
Stigmal vein longer than the marginal ; ♀ with the antennal joint stylate at the apex	<i>G. 7, Raphitclus</i> Walker.
5. Parapsides only indicated anteriorly ; anterior margin of collar sharp.	
Stigmal club very large	<i>G. 8, Dinotus</i> Förster.
Stigmal club small or moderate.	

- * ♀ With marginal vein at least thrice as long as stigmal; funicular joints broader than long; middle tibiae in ♂ with a small hirsute lobe, outwardly near tip. *G. 9, Mesopolobus* Westwood.
- ** ♀ With marginal vein not twice as long as stigmal; anterior tibiae flat; middle tibiae in ♂ broadly dilated, foliaceous.
 *G. 10, Platymesopus* Westwood.
6. Collar rounded before; mesothorax lengthened with three keels. Marginal vein more than twice longer than the stigmal; parapsides indicated anteriorly. *G. 11, Rhopalicus* Förster.
- Marginal vein but slightly longer than the stigmal; parapsides complete *G. 12, Brachycrepis* n. g.

Dasyglencs n. g.

♀ Whole surface, including the abdomen, very coarsely reticulato-punctate, and sparsely covered with a pale pubescence. Head large, slightly broader than the thorax with deep antennal grooves, the grooves converging and meeting at apex. Antennae inserted slightly above the clypeus, the latter with a sinus in the middle. Eyes hairy. Collar transverse, contracted and produced anteriorly into a short neck, the neck with a delicate medium carina. Mesothoracic parapsides delicate but complete. Scutellum convex, as broad as long, slightly prolonged over the metathorax and ending in a slight projecting ridge at the apex. Metathorax short, with a delicate medium keel. Abdomen sessile, much longer than the head and thorax together, acuminate, the tip projecting slightly beyond the wings when folded. All femora swollen, the fore pair much more so than the middle pair; the tibiae are very long, the three basal joints of which are as long as their tibiae; the middle and posterior tibiae longer than their femora, and the tarsi not nearly as long as their respective tibia; the posterior tibiae are armed with two strong, divergent apical spurs. The submarginal vein, of anterior wings, is one and a-half times as long as the marginal, the marginal and postmarginal veins thick, the latter much lengthened, gradually acuminate, ending at the rounded edge of the apical margin of wing; stigmal vein short, about one-third the length of marginal, slightly bent, the stigma small and slightly emarginated at the apex. ♂ Unknown.

Dasyglencs asmiæ n. sp.

♀ Length .25 inch. Cyanous, coarsely pitted, pubescent. Flagellum of antennae brown. Legs dark red, pubescent; femora infuscated. Wings

hyaline, veins brown; the whole surface is covered with a fine brownish pubescence. Described from one ♀ specimen reared from a bee, *Osmia* species, living in Catalpa twigs.

This genus shows strong affinities with *Cleonymus* Latreille and *Aetroxys* Westwood, but is readily distinguished from both by the thickened fore femora; had it not been for this character I should have placed it in the genus *Cleonymus*.

Chiropachys Westwood.

Chiropachys colon Linn., Faun. So. Ed., ii., p. 413; *C. quadrum* Walk., Ent. Mag., iv., p. 14; *Pteromalus bimaculatus* Swederus.

This common European chalcid must now be added to our fauna, specimens having been taken in the United States that cannot be separated from types received from Europe.

The species described by Mr. Edward Norton as *Chiropachys nigrocyaneus*, Trans. Am. Ent. Soc., ii., p. 327, is not a *Chiropachys*, but belongs to the genus *Pachyneuron* in the tribe *Sphagistrides*.

Dinotus Förster.

Dinotus elongatus n. sp.

♀ Length .13 inch. Dull metallic brown, confluent punctate, sparsely covered with white hairs. Head much wider than the thorax, the width of the vertex nearly twice the length of the eye. Ocelli red, Eyes ovate, brown. Antennæ 13-jointed, filiform, pubescent, the long slender scape, pedicel and the two ring-joints, honey-yellow; flagellum brown, the first funicular joint the longest, following joints slightly subequal; the club short, three-jointed, slightly thicker than the funicle, and not longer than the first funicular joint. Collar very short, transverse; parapsides only indicated anteriorly. Metathorax not very long, not keeled; metathoracic spiracles long oval; metapleura slightly pubescent. Coxæ smooth, bluish-green, with tufts of white hair anteriorly. Legs honey-yellow, excepting the femora which are brownish in the middle. Abdomen sessile, pointed ovate, one-third longer than head and thorax combined, concave above, and of a dull greenish metallic lustre, each segment laterally with some short hairs. Wings hyaline, sparsely pubescent; veins yellowish, the marginal hardly twice the length of the stigmal, the latter terminating in a slight knob, while the postmarginal is slightly shorter than the marginal. Described from one specimen captured at large.

Brachycrepis n. g.

This genus is very similar to *Rhopalicus* Förster, but the prolonged metathorax has three distinct keels, the abdomen has a short rugose petiole, the marginal vein of the front wings is but slightly longer than the stigmal and the parapsides complete. The anterior femora are very much swollen; the antennæ are subclavate, 13-jointed with two ring joints, and are inserted slightly below the middle of the face; the pedicel is about as long as the first funicular joint.

Brachycrepis tricarinatus n. sp.

♀ Length .13 inch. Dark blue with a slight metallic tinge on the head and thorax, confluent punctured. Eyes dark brown. Antennæ 13-jointed, black, except the scape beneath, which is brownish-yellow; flagellum pubescent; the first funicular joint the longest, the others slightly subequal, but gradually growing wider toward the club, the fifth and sixth joints being wider than long. Collar transverse, narrowed in the middle. Mesothoracic grooves distinct, but very delicate as they approach the scutellum. Coxæ, femora and tibiæ, excepting their tips and the last tarsal joint, blue-black; tips and the other tarsal joints, honey-yellow. Abdomen long ovate, about the length of the thorax, blue-black with a very slight metallic tinge near the base beneath. The second segment, counting the petiole as the first, is the largest, the others gradually subequal; each segment with a single row of delicate white hairs. Wings hyaline; veins pale brownish, the submarginal vein as long as the marginal and postmarginal together, delicate, the marginal is but slightly longer than the stigmal, the latter clavate with a slight uncus.

Hab.—Riley Co., Kansas. Prof. E. A. Popenoe.

CAN INSECTS DISTINGUISH BETWEEN RED AND YELLOW?

BY T. D. A. COCKERELL, WEST CLIFF, COLORADO.

In this neighborhood (Custer Co., Colorado,) one very frequently finds a yellow spider of the genus *Thomisus* or allied thereto, seated in the middle of the umbels of *Ligusticum montanum* Benth. and Hook., and on other yellow flowers. This spider, so seated, has nothing to cover it from direct observation, and from its size and colour would be conspicuous enough elsewhere; but on the yellow flower, sitting in the depression in

the centre of the umbel, it is quite invisible unless specially looked for. Thus concealed, it waits until some insect—frequently a small bee, or a butterfly of the genus *Pamphila*, settles on the flower—but no sooner is the insect intent upon the nectar of the blossom, than the cunning *Thomisid* has it in its grasp, and is sucking its life-juices away. On one occasion, also, I found a white *Thomisid* spider seated on a white umbel, and equally concealed here by its whiteness, it had secured and was feasting on a bee. So far good. It may be argued that spiders of this family have been accustomed to sit on flowers, and being variable in colour (as in fact they are) natural selection has so arranged matters that yellow spiders preside over yellow flowers, white over white, and so on. But perhaps, also, the spider has “an eye for colour,” since he (the yellow one) occasionally sits on a small species of sunflowers which has yellow rays and a dark brown disc—and here, although the spider always sits in the *middle* of a yellow umbel, he sits on the *rays* of this sunflower, knowing altogether better than to expose himself to observation on the brown disc. But, to come to the point to be discussed, there is a species of geranium found here (*Geranium fremontii* Torrey,) having *pink* flowers—yet the *yellow* spider sits on these, apparently unconcerned at the difference of colour. Now, it is a curious thing, that throughout living organisms, whether birds (*e. g. Fringillidæ*), mollusca (*e. g. Tellinidæ, Helicidæ*), insects (*e. g. Zygænidæ, Sesiidæ, Cheloniidæ, Ichneumonidæ*), or plants, that the red and yellow pigments seem to stand in this relation to one another, that the red is a more complex form of the yellow, and hence occasionally reverts to it, yellow being in all cases the primitive color. In *Geranium*, it is true, there are not (to my knowledge) yellow-flowered varieties, but then, there are both pink and yellow-flowered species of *Oxalis*, in the same natural order. Therefore, it is conceivable that the yellow *Thomisid* first came to sit on geranium flowers at the time when these were yellow, and has continued the habit—but still, since it appears to understand the difference between brown and yellow on the sunflower, why cannot it tell that pink and yellow are not the same? Does it not look as if, to this spider, these colours were indistinguishable?

Also, the geranium-frequenting spiders do not starve, although to human eye they are very easy to be seen—does not this, again, look as if the insects frequenting those flowers could not distinguish between pink and yellow, and so, not seeing the spider, fell unwittingly into its grasp?

This is the question I wish to ask, and to answer it, it is necessary to have observations of a more extensive nature on the relation of yellow insects to pink flowers, and *vice versa*. I have myself noticed that (in Kent, England,) *Gonepteryx rhamni* appears to be exceptionally fond of settling on pink flowers, but it seemed to me rather that the butterfly was conscious of the contrast between the colours and its own conspicuousness arising therefrom.

May I rely upon your readers to supplement these notes, and so clear up this question?

CORRESPONDENCE.

DICERCA PROLONGATA.

With reference to Dr. John Hamilton's note on p. 120, I may say that I have found the larva of this species boring in *Populus tremuloïdes* in Colorado, concerning which details were published in the "Entomologists' Monthly Magazine" for March, 1888, vol. xxiv, p. 232-233.

T. D. A. COCKERELL.

CAPTURES IN 1887.

Dear Sir: My additions to the list of Canadian Lepidoptera for the past season is of the most meagre description. I took a good many micros, new to me; but as usual, with them a large proportion were single specimens of a kind. I sent to Prof. Fernald 17 specimens which I had in duplicate; of these three turned out to be variations of kinds that he had previously named for me; three proved to be all one; one, *Depressaria heracliana* Dege. was new to me, but already in the list, and one *Eccopsis nitidana* Clem. is new to the Canadian list; the rest were unknown to him. Three years ago I captured at Ridgeway, along with *Limacodes*, to which I thought it belonged, a moth new to me, and which has been from that time until lately awaiting a name. During the past winter, Mr. Johnston, of this city, was making some exchanges with Miss Emily L. Morton, of Newburgh, N. J., and received from her a specimen labelled *Adoneta spinuloides* H. S., in which I recognized my unnamed Bombycid. Miss Morton acknowledges her indebtedness to Mrs. Fernald for the correct identification of most of her Lepidoptera. On the 11th of July last I came on an assemblage of Pyralids in the grass under the shade of a butternut tree, where I had taken refuge from the excessive heat. At first

I thought it was *Botis magistralis*, on closer inspection I doubted its identity—it was like, and yet unlike. I concluded that if it was *Magistralis*, it was an unusually fine specimen, so I took a quantity of it anyway, and all the more willingly as it was quite abundant in the very spot where I wanted to stay for a while. On comparing them, I was still undecided; whilst in communication with the Rev. Mr. Hulst, about some Geometers, I sent to him a specimen and received for it the name *Botis quinquelinealis* Grote. These three names are then the only presentable result of my last season's work in this direction.

J. ALSTON MOFFAT, Hamilton, Ont.

KNOWLEDGE OF DEATH IN INSECTS.

Dear Sir: An incidental remark in one of my papers, page 6, of the present vol., has attracted the attention of a correspondent of the ENTOMOLOGIST, as may be seen by turning to page 120. I was then entirely unaware that I was meddling with an "*ipse dixit*" of Mr. Grote's, or was touching one of his 'chips,' but, in common with the readers of the ENTOMOLOGIST, I know it now. While Mr. Grote certainly had the right to show, if he could, that the alleged assertion, whether made by himself or not, was not "unsupported," was not "dogmatic;" yet he had no right to assume that I had seen his paper, and even on that assumption no right disposed person, while differing from me, could take legitimate offence at my words, which are strictly scientific. The cause is said to be weak, when the advocate resorts to the *argumentum ad hominem* to overcome his opponents *argumentum ad rem*; * * * Let us see where Mr. Grote stands, his words are: "It is by *the keeping still* that the insects seem to me to appear to 'feign death,' of the existence of which latter they could have no knowledge." Few or none will dispute the first part of the quotation. It states exactly what such insects do, that is, "keep still;" but this does not prove that insects can have "no knowledge of death;" no proof of this is anywhere offered, nor is the assertion in any way limited or qualified; hence "unsupported," "dogmatic" are appropriate adjectives, and though not made by me with any reference to or knowledge of Mr. Grote's paternal claim. Now see how he "corrects" the adjectives "unsupported," "dogmatic" (*ib*, p. 120). His words now read: "Whether insects can have any knowledge of death, as such, may be a matter of opinion," etc., quite a different statement from his former

postulate, that insects could have no knowledge of death. The reader will notice how *ingenuously* "dogmatic" is disposed of by this change of base. Now, as to what he doubts, not is the main point, that is, "the keeping still," that is only what these insects do, a mere act, and one to which even Mr. Grote himself attaches a motive, "the approach of danger." But why "keep still" on the "approach of danger"? His answer cannot be surmized. Writers have expressed various opinions about this "keeping still," "death mimicry," "feigning death," as practiced by certain insects and other animals, but I have not seen any statement that they can have no knowledge of death, except that claimed by Mr. Grote and a similar one in a Pittsburg newspaper. Dr. Lindsay, in his work "Mind in Animals," in treating of death-feigning, says: "This must require great self-command in those that practice it;" while Professor James, of Harvard College, in an article in Popular Science Monthly, June, 1887, on "Some Human Instincts," says: "It is really no feigning of death at all and requires no self-command. It is simply a terror paralysis, which has been so useful as to become hereditary." In commenting on this the newspaper man makes the remark I took exception to, my notice of which, without at the time being able to state where I had derived it, brought out Mr. Grote, whom I would most assuredly have quoted had I been aware of his assertion.

JOHN HAMILTON, Allegheny, Pa.

ARZAMA OBLIQUATA, G. AND R.

Dear Sir: In reference to Mr. Moffat's remark in the July number of the CANADIAN ENTOMOLOGIST, that the larva of this moth does not always form its pupa in the reed, I wish to say that I have taken between fifty and seventy-five chrysalids this spring, and all of them were in the reeds where the larva had been feeding. I believe that the larva sometimes goes out of the reed and wanders in other directions before going into pupa, but this is not often the case. My friend, Mr. Doll, when breaking an old cedar stump apart last spring, found in it the chrysalis of *A. obliquata*, but the larva had been feeding in the stump. Could that have been the case in Mr. Moffat's instance?

HERMANN H. BREHME, Newark, N. J.