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COLLECTING WASPS AND BEES.*

BY F. W. L. SLADEN, OTTAWA, ONT.

By general consent the Hymenoptera are considered to be the highest order of insects, that is, the most specialized, adaptable and highly organized in the adult state; and the stinging Hymenoptera, consisting of the ants, wasps and bees are the highest section. Yet, although these insects are conspicuous, abundant and easily preserved, this is one of the neglected orders. It is true there are some "critical" groups, especially among the bees, but in many genera the species can be separated easily. During the past four years, the writer has been working at the wasps and bees of the National Collection of Canada, during time that he could spare from his apicultural duties; first, examining and separating into species the material found in the collection and, second, losing no opportunity to collect specimens, both in the Ottawa district and during his annual tour of the provinces. Sufficient material has now been accumulated, chiefly by collecting, to start making keys to the species in hand, and several genera have already been thus dealt with.

Beginners often find it hard to separate the males from the females. The best distinguishing character is to be found in the antennæ, which are thirteen-jointed in the males (only twelve-jointed in some species of the wasp genus *Crabro*) and twelve-jointed in the females; the first joint (scape) is very long, the second joint is very short, and in the bee-genus *Nomada* scarcely discernible. Further, in the males the abdomen normally has seven segments exposed, but in the females only six. However, in some genera one or two of the apical segments are covered in both sexes. The chitinous genitalia of the male are replaced in the female by the sting.

*Part of this paper was read at a meeting of the Quebec Branch of the Entomological Society of Ontario, at Montreal on Nov. 16, 1916.

The wasps are predatory, choosing as their victims spiders, flies, ants, caterpillars, etc., according to the genus. The great army of the bees has made an alliance with the flowers, cross-pollinating them in return for food of the richest and daintiest kind—pollen for the nurture of their young, aromatically flavoured nectars for their own delectation. There are many instances of certain species of bees associating only with certain species of plants. In the bees the body hairs are branched or plumose and gather up the pollen dust from the flowers they frequent, and they have beautifully adapted apparatus, becoming more intricate and perfect in the more specialized families, on their hind legs—and in one group (the leaf-cutter bees) on the underside of the abdomen—for collecting this pollen. In the wasps the body hairs are unbranched.

No species of bee runs riot, multiplying by millions under favourable conditions like certain insects in other orders, for the interesting reason that from nearly every genus in which are found species that by dint of special vigour or adaptability are inclined to overproduction, there has sprung a non-industrious genus, the species of which prey on the abundant industrious species, laying their eggs in their nests. The parasite, when it hatches, usually consumes both the host egg or larva and also its store of food, but in case of the semi-social bumble-bees, the parent parasite lives in the nest, producing young which the host workers tend and feed as they do their own brothers and sisters. As parasitic genera in all stages of separation from the host genus occur, we have here presented one of the most attractive and promising fields of study for the evolutionist that can be found. In some cases the parasite has drifted from its original host and has taken up with another. In general, the parasitic genera are less hairy than their hosts, and their tegumental colours are brighter. The bumble-bee parasites closely mimic their hosts and have so much structural similarity to them that they must have developed their parasitism comparatively recently.

In Canada by far the richest regions in species of wasps and bees are certain localities near and reaching to the southern borders. Three very rich localities can be distinguished. One of these is in Old Ontario, especially the region south of Toronto. Another,

probably one of the richest in the Dominion, is in the dry belt of Southern Alberta. The third is at low altitudes in the dry interior of British Columbia, especially its southern end. Most of the species peculiar to these regions are restricted to special habitats, of which the most important are sand hills or sandy or gravelly slopes or cliffs facing south on the shores of lakes or rivers, or in valleys, and some species are found only on certain flowers. The most productive single day's collecting I have obtained in Canada was at Medicine Hat, on August 21, 1916, on the summit of gravelly bluffs on the north side of the river. The captures would have been in better condition had I taken them two weeks earlier.

Coming second in productiveness are localities like Southwestern Quebec, Southern Manitoba, the Arrow Lakes and Victoria, B.C. On the sea cliffs bordering Beacon Hill Park at Victoria I made some good captures on August 15, 1916, although fifty yards from the edge of the cliff nothing of interest could be found. Such places as Banff and Athalmer in the Eastern Rockies must not be omitted. At places like Banff and Kaslo (which is richer) we get a mixture of boreal and southern species, and representatives of the bee-genus *Osmia* are especially abundant in spring. At Banff and Lillooet eastern forms are also found.

Passing northwards beyond these special localities, we enter into the boreal zone where the species are much less numerous and are very widely distributed. Many of the species of *Vespa*, *Megachile* and other genera stretch across the continent from the Atlantic to the Pacific practically unchanged. Many other species, including the majority of *Bombus*, will stretch from the Atlantic to the mountains of British Columbia, there to be replaced by mountain or costal species.

The coast of Nova Scotia, including the Annapolis Valley, and also the lower mainland of British Columbia, including Vancouver and its environs, have not so far proved particularly rich in species. They are essentially boreal, even more so than the south and east coasts of England.

While wasps and bees can be caught in plenty on any warm day in spring or summer, there is a pageant of newly appearing species from early spring until well on in the autumn. There are two seasons at which the number of species to be found in good

condition is much greater than at others. The first is in the spring, starting with the first fine days as soon as the willows are in bloom, at which flowers and others, numerous species of the bee genera *Andrena*, *Osmia* and *Halictus* swarm. This is the time when the beautiful, large queen bumble-bees can be secured in fresh and unfaded condition. These early insects belong to two classes; those like *Andrena* and *Osmia* that have reached the adult stage the previous autumn, but have deferred emergence until spring, and those like *Bombus*, *Halictus* and *Vespa*, consisting of females only, that have hibernated and left their mates to die before winter. After a lull in June the great summer procession begins, and it goes on until the middle of August. The species are now more numerous, but the specimens less plentiful than in spring, so that searching in choice habitats will usually prove very productive. These summer fliers have mostly passed the winter in the full-fed larval stage.

A few notes about killing and mounting wasps and bees may be helpful. A cyanide bottle is usually satisfactory for killing if used with care. It should contain plenty of dry blotting paper or other absorbent to prevent specimens rolling about and thus damaging their coats with moisture, and the specimens should not be allowed to touch the cyanide, and should be removed within one or two hours to avoid the reddening of the yellow tegumental markings by the cyanide.

On a collecting excursion, lasting several days, the specimens may be laid between layers of cotton batting in cigar boxes, and may be relaxed and mounted in the autumn. To mount them, use a No. 3 steel pin for all moderate or large-sized specimens, and a No. 2 for all small ones, except the very smallest, which may be mounted on small, triangular strips of cardboard with glue or fine points, the cardboard being run on to No. 3 pins. Avoid using No. 1 pins. In the quick handling of dried specimens mounted on these, the abdomen is very likely to fly off and the pin may bend; also use store boxes lined with deep, soft material such as pith, not thin hard cork or linoleum. Do not trouble to spread the wings, it is hard and costs much time to do this satisfactorily, and where it is attempted the specimens take up a great deal of room, but see that the propodeum (metathorax) and base of the abdomen are

exposed well to view. In some genera it is important to open the mandibles and expose the male genitalia. Any such treatment is always better accomplished in relaxed specimens than in fresh ones, the parts in the latter tending to return to their former positions. Every specimen should be labelled with the date and locality of capture, and the collector's name written or printed in very small, clear letters on a small, white card. Collect preferably only newly emerged, unfaded specimens, not dusted with pollen, and do not be afraid to make a large collection. How pleasantly the collector can spend an hour now and then during our long winter, arranging the summer's material into species, according to similarities in sculpture and livery, guided by nature, musing the while on the possible value to the species of some remarkable structures or pattern of colours! A study of the insects in the field, or of their marvellously diverse and interesting nesting habits, will confute or endorse many a theory thus formed.

SOME DRAGONFLIES FROM PRINCE EDWARD ISLAND.

BY E. M. WALKER, TORONTO.

Somewhat more than a year ago I received from Dr. A. G. Huntsman, Curator of the Dominion Biological Station, St. Andrews, N.B., a number of dragonflies, including a few nymphs, which he very kindly collected for me during a few days spent in Prince Edward Island in the summer of 1915.

Hitherto there have been apparently no records of dragonflies from this Province, so that, although the number of species listed here is small, and doubtless represents but a fraction of the Odonate fauna of this island, it seems worth while to record them.

All of the species are widely distributed, and with one exception all could have been predicted almost with certainty to occur in this region.

The localities and dates of collection are as follows:—

Charlottetown, pond in Victoria Park, Aug. 3.

Souris, pond on New Harmony Road, Aug. 1.

Little Harbour, near Souris, Aug. 14.

Souris, Sept. 5.

Rollo Bay, Aug. 21.

1. *Lestes congener* Hag. Eleven nymphs, 8 full grown and 3 belonging to the penultimate stage, were taken from the pond on New Harmony Road, Souris.

2. *Lestes unguiculatus* Hagen. Charlottetown, 2 ♂s, 1 ♀; New Harmony Road, Souris, several nymphs from the pond, probably belonging to this species.

3. *Lestes uncatu*s Kirby. Charlottetown, 1 ♂.

4. *Lestes disjunctus* Selys. Charlottetown, 1 ♂, 1 ♀; Little Harbour, Souris, 2 ♂s, 4 ♀s; Rollo Bay, 1 ♀.

These four species of *Lestes* seem to be generally distributed in the Canadian and Transition zones from Atlantic to Pacific. It will be noticed that the same four species and no others are included in Mr. Whitehouse's list from Red Deer, Alta., (Can. Ent., vol. XLIX, 1917, p. 96).

5. *Nehalennia irene* Hagen. New Harmony Road, Souris, 1 ♂.

6. *Ischnura verticalis* Say. New Harmony Road, 1 ♀; Little Harbour, Souris, 6 ♂s, 7 ♀s; Rollo Bay, 2 ♂s, 6 ♀s.

One of the males from Souris is somewhat teneral, the others are fully mature, the females all pruinose.

7. *Enallagma hageni* Selys. Charlottetown, 2 ♂s; New Harmony Road, 3 ♀s; Little Harbour, 8 ♂s.

This and the preceding two species are unknown in the western half of the continent; Nos. 5 and 7 ranging into Manitoba, while No. 6 has not been taken in Canada, west of Nipigon, Ont.

8. *Enallagma civile* Hagen. Souris, Sept. 5, 1 ♂ in full colour.

This is chiefly a western species, and is rare in Canada. Its occurrence in Prince Edward Island was unexpected, although there is an old record of its capture in Quebec. I have also received it from Manitoba.

9. *Æshna interrupta interrupta* E. Walker. Little Harbour, 1 ♂. The spots formed by the interrupted lateral thoracic bands are rather large and rounded, though completely separated. New Harmony Road, one full-grown female nymph.

10. *Æshna umbrosa* E. Walker. Charlottetown, fragments of two male exuvia from pond, apparently this species; New Harmony Road, one ♂ exuvia and four very young nymphs.

11. *Somatochlora elongata* Scudd. Rollo Bay, 1 ♂. Not known west of Wisconsin.

12. *Libellula quadrimaculata* L. Charlottetown, 3 ♂s; New Harmony Road, 4 nymphs, two belonging to the penultimate stage, the others younger.

13. *Sympetrum obtrusum* Hagen. Charlottetown, 5 ♂s, 2 ♀s, two of the ♂s recently emerged; Little Harbour, 2 ♂s; New Harmony Road, 1 full-grown nymph.

14. *Sympetrum rubicundulum* Selys. Charlottetown, 3 ♂s; Little Harbour, 1 ♂, New Harmony Road, 1 ♂ 3 ♀s., all teneral.

15. *Leucorrhinia hudsonica* Selys. New Harmony Road, 2 nymphs, penultimate and ante-penultimate stages.

This and the preceding three species are transcontinental species, *L. hudsonica* being confined to the boreal region.

16. *Leucorrhinia intacta* Hagen. New Harmony Road, one nymph of the penultimate stage apparently belonging to this species. Another similar younger nymph was also found.

Distributed as far west as Alberta, (see Mr. Whitehouse's list, Can. Ent., vol. XLIX, p. 96.) but not common in the Canadian Zone.

THE STATUS OF LECANIUM CORNI BOUCHE IN NEW JERSEY (HOMOP.)

BY HARRY B. WEISS, NEW BRUNSWICK, N.J.

This insect is undoubtedly the best recorded of all the species listed in Smith's "Insects of New Jersey," inasmuch as it appears at least eleven times disguised under as many synonyms. J. G. Sanders, in his paper, "The Identity and Synonymy of Some of Our Soft Scale Insects," (Jour. Econ. Ent., 1909, p. 428) mentions 41 or 42 synonyms of *Lecanium corni* Bouche, and eleven of them managed to appear in Smith's list.

Sanders states that it is widely distributed in North America, the most important hosts being plum, peach, apricot, pear, currant, blackberry, mulberry, osage orange, elm, ash, linden, pecan, maple, Cornus, etc. It also occurs in Europe in greenhouses on peach and grape and outside on various plants including currants, goose-

berries, raspberries, Cotoneaster, Corylus, Boxwood, Thuya, Viburnum, locust. It has been found recently in New Jersey on boxwood in nurseries at Rutherford, Elizabeth and Riverton, evidently having been imported from Holland on such stock within the last few years inasmuch as it is sometimes reported by inspectors examining imported boxwoods.

It has been correctly recorded from New Jersey in "Entomological News," vol. XXVI, p. 102, where it appears as *Lecanium corni* Bouche, although nothing is said there concerning its synonyms, and the only host mentioned is boxwood. In Smith's list it appears as follows under the genus *Eulecanium*:

E. armeniacum Craw. The apricot scale; found also on plum, pear, cherry, peach, etc., but not abundantly enough to be injurious.

E. canadense Ckll. Mass. to Ohio on elm, maple, oak, hickory and peach, and should be found in New Jersey.

E. cerasifex Fitch. New York plum scale. On cherry, plum, peach, apple, pear, etc.; not common nor injurious in New Jersey.

E. corylifex Fitch. On *Corylus* and *Viburnum*.

E. cynosbati Fitch. On gooseberry and *Gleditschia*.

E. fitchii Sign. Found in N. Y. on raspberry and blackberry.

E. juglandifex Fitch. The butternut scale.

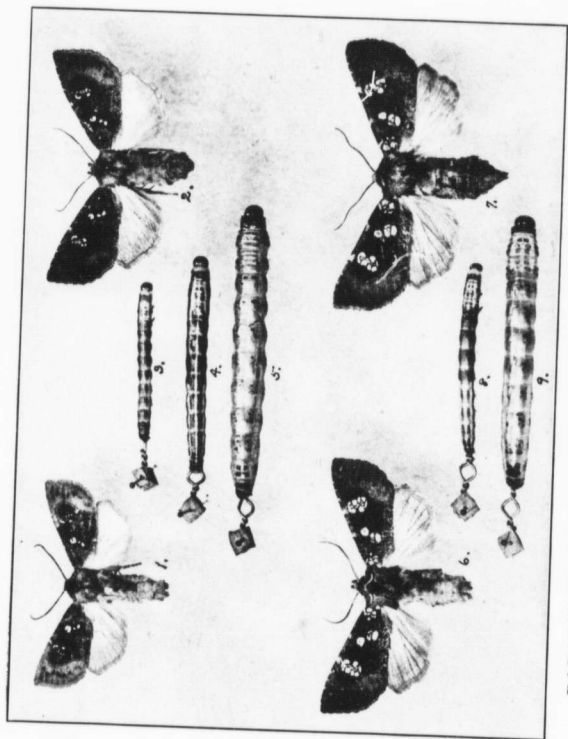
E. kingii Ckll. On sassafras and *Vaccinium corymbosum* in Mass. and Conn.

E. lintneri Ckll. & Benn. On sassafras in N. Y. and probably in N. J.

E. pyri Schr. On pear, apple, hickory and white thorn.

E. ribis Fitch. The "currant scale." Found on currant, gooseberry, mulberry, etc.

While all of the above are not strictly New Jersey records, it is evident that the species occurs on various hosts within the State, but never in sufficient numbers to be injurious. This condition of affairs, true at a time when the list was prepared, still holds good. If anything, this particular scale can be said to be rather rare in New Jersey at the present, and at no time was it ever abundant enough to require the application of remedial measures.



PAPAPEMA POLYMNIAE AND P. ERYNGII. (See p. 128.)

NEW SPECIES AND HISTORIES IN PAPAPEMA
SM. (LEPIDOPTERA.) NO. 19.

BY HENRY BIRD, RYE, N.Y.

With the hope of further disclosures under this heading, an investigation of the flora in the vicinity of Washington, D.C., was undertaken in June, 1915. *Papaipema nephrasyntheta* Dyar, described from this locality and unknown in the larval stage was particularly in mind, but results for this species were unsuccessful. The perennial plant life showed some departure from that of the latitude of New York, one instance of easy notice occurring with *Polymnia uvedalia* L. At the first occurrence of this plant a contained larva was noted, and it seemed different from any of the congeners. While conspicuous on account of size, but few examples of the plant were found, and only six larvæ resulted from the search of that year. After observing several of the larval stages, it was evident an unknown one had been discovered, but it seemed too small to be the wished-for desideratum. Eventualities claimed all of these larvæ prior to pupation, so it remained for a search in 1916 to uncover a sufficient number in late July, when near maturity, whereby a convincing series of adults came to hand. Though the departures with the adult are slight, with the sum of evidence it is very clear an undescribed species is involved. From the fact the genus *Polymnia* is restricted to America, in itself suggestive of a possibly ancient relation between the two, and because of it clearly proving to be a preferred food plant in the faunal area where discovered, we propose as a name:

Papaipema polymniæ, n. sp.

Head generically normal and smooth on frons; heavily clothed with long, erect scales of brownish colour mixed with grey and pervaded with a purplish tone, which colouring holds for the entire thoracic vestiture. At the base of the antenna a ring of light, but not pure white scales occur; the antennæ are simple, under magnification showing minute cilia and with scarcely any sexual disparity. The thorax is heavily clothed, the collar margined above with yellowish usually; the erect, spreading anterior thoracic tuft of the normal pattern; the tegulæ more or less powdered with yellow; the posterior tufts prominent and spreading; legs have long hairs on femur, the fore- without, the mid- with one pair, and the hind

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tibia with two pairs of spines; the tarsus ringed faintly at the joints with light scales.

Fore wing: basal area, median field and terminal space brassy yellow which may be said to be the pervading colour, the purple-brown body-colour appearing as minute powderings, sometimes in the terminal space obliterating the yellow, except at the apex. the ante- and post-median areas purplish, tempered by the body brown, becoming more bluish in some specimens and exhibiting a glistening sheen especially in the outer area. Maculation of the usual pattern but not sharply drawn; basal line vague, except as it outlines the basal spots which are yellow and never white; ante-medial line brown, sinuous, extending close to the claviform, below which, at the submedian vein, it outcurves to the inner margin; median shade-line occasionally traceable as an angled brownish shading, best defined in the lower median field; the post-median line geminate, the inner brown, the outer dull purplish, outcurved over the cell, thence incurved with a nearly full ogee sweep to the inner margin. The sub-terminal is very irregular, paralleling in a way the outer margin, and consists of a series of dentations running outward on the veins in little points. It defines the terminal area with a glistening boundary that is not, however, very contrasting. The fringes are slightly dentate, dull purplish and glistening. The stigmata are of the usual formation, but not large; the orbicular is rounded, white, with a yellow scale at centre; claviform double, two spots in line with the orbicular, the upper minute and occasionally yellow, the lower white. The reniform consists of a lunulate, yellow marking around which are a number of small spots clustered in the usual manner and cut by the veins, the innermost usually white, the outer one yellow. The secondaries are smoky-brown, shaded darker at the outer margin. The abdomen is of similar hue. Expanse 32 to 43 mm.

The male genitalia are generically typical and offer no particular specific feature. The corona is more fully rounded than most of the allies, with the pollux prolonged prominently and at right angles to the costa, and this section of the valva heavily spinose, as is customary. At the clavus, or perhaps better defined as the anterior margin of the sacculus, a patch of dense setae occurs.

Habitat.—Washington, D.C., and its immediate environs; a

specimen from the Black Mountains, N.C., (W. Beutenmuller), also a pair from Elizabeth, N.J., (O. Buchholz), are referred to this species. Type locality, Roslyn, Va. A male type is with the author, also four paratypes which may later be distributed. In coloration the species is near *cataphracta*, indeed were the early stages unknown it would easily pass as the white-marked variety *cataphracta fluxa*. In the structure of the genitalia it seems nearest *merricata* and may find a serial position near that species.

Polymnia larvæ do not depart from the typical feeding habits. The hibernated ova doubtless hatch about the last week of May, and the plant is entered well up the stem at some tender point. When in luxuriant plants, whose height attains seven feet at times, the gallery is at some midway portion; in small plants it may finally reach the root crown by maturity. While the stem has a slight hollow core and though the walls are heavy, feeding continues at one point long enough for the plant to produce a noticeable swelling that gives ready intimation of a contained host. No parasites were encountered, but a heavy mortality resulted from fungus infection, probably the same as occurs with *speciosissima*, as the coloration and effects seem identical. The gallery is abandoned at maturity, and in confinement a pupal cell is formed about two inches underground. Larvæ, at the latitude of Washington, leave the plants Aug. 1 to 10.

Larval observations have been made from June 15 onward, and the following instars noted.

Stage IV.—Head polished, honey yellow, obliquely marked at ocelli with a black line; body colour pale brown, with a more or less pinkish tone. The dorsal is a continuous stripe from cervical shield to anal plate; the sub-dorsal and sub-stigmatal are continuous on thoracic segments to the middle of joint three, thence interrupted to the middle of joint seven where it continues to the plates of joint thirteen, this break being productive of the girdled appearance common to the genus. These markings are yellowish white, the sub-stigmatal on the abdominal joints merging into the yellow white of these segments ventrally. Cervical shield laterally edged with black; anal plates conspicuous; tubercles well defined though small, all excepting IV smaller than a spiracle. On joint ten there is evidence of IVa forming.

Stage V.—Structurally similar, but colour much darker, frequently a deep purple brown with the stripes showing very contrastingly. On joint ten IVa is well developed, though not bearing seta, as does IV.

Stage VI.—Colour fades to dull pink, the pale yellow lines wide and conspicuous. Tubercles I and II become more prominent, especially on joint eleven; and on twelve their mergence into a single plate preceding the anal shield, is even of greater definition.

Maturity.—The full-grown larva is normal for the group, though rather robust as compared with the resultant moth. The lines become vague and the general tone a yellowish translucence, with the brown plates at the tubercles conspicuous when they are larger than the black spiracle. The single seta they bear is scarcely discernible except with a lens. The head assumes a darker hue, and the anal plate becomes heavier and nearly black. Tubercle IVa on joint ten seems never to bear setae. Larval lengths for the stages: 27, 33, 40 and 47 mm. respectively.

The pupa shows no departure from normal. It is polished brown, the shell of rather thin texture so that the white stigmata of the primaries may be discerned a week prior to emergence. Fungus claimed a large percentage whether left in the earthen cell or removed and given antiseptic treatment. Thus the assumption arises that infection occurs while the larva is yet feeding. The pupal period is about four weeks; emergence dates for the series bred, Sept. 3 to 23.

One of the first plants to attract attention while examining the flora of the Chicago Plain in 1915, was *Eryngium aquaticum* L., one of those anomalous denizens of this area which subsist equally well through great extremes of moisture, or of dryness. We were under the able guidance of local entomologists, Messrs. A. Kwiat and E. Beer at the time, and remarked this one seemed favourable for tenanting a *Papaipema*, its Yucca-like foliage suggesting something quite different from the usual line of food plants. Should such an one be selected, the associate might be expected to show some departure from the customary type, and our enquiry if this plant had been followed up previously elicited the reply that numerous observations of it the preceding year were negative in result. At a momentary pause, Mr. Beer devoted himself to several

plants in the foreground, and was successful in finding, in the crown of the taproot, a penultimate stage *Papaipema* larva, close to *P. cerussata*, yet differing in one important detail. As this discovery happened early, the remainder of the time allotted the trip gave opportunity for securing a representation, and ultimately the details at hand show a distinct and undescribed species. While it would be fitting to honour the discoverer, our confreres consider it will be more helpful to call the species suggestively:

***Papaipema eryngii*, n. sp.**

Head smooth on frons and similar to the preceding species, except that the colour is a darker purple, as is also the body tufting. The upper tarsal joints on all legs are prominently ringed with white in this instance. Fore wing: at the extreme base a white dot; the usual basal spots conspicuous and yellowish to pure white; the ante-, post-median and terminal areas are rich purple brown; the median field dark castaneous to red brown, becoming lighter near the inner margin where it shows yellow powderings; near the apex a powdery yellow patch prevails. The lines follow the characteristic courses, as with the preceding, are ill defined, and except for the large and brightly white marked stigmata, there would be little contrast. The post-medial line is drawn sinuately from a prominent yellow spot on the costa above reniform outward in an uneven sweep past that marking, thence obliquely and irregularly to the inner margin. The subterminal line is vague, a broken sprinkling of yellow scales defining a boundary of adjacent areas that are for the most part concolorous. The reniform is comparatively large, a central yellowish lunulate line is surrounded by seven white spots; the orbicular and claviform appear as an equally pronounced marking and consist of three superimposed white spots, the claviform being divided into two, the upper of which is smallest and stained with yellow. Several white dots appear on the costa, and one outside the basal spots; fringes slightly dentate. The hind wing is a dull, smoky fawn, sometimes assuming a rosy tint and overlaid with dark purplish powderings, deepening near the margin into a vague sub-terminal shading, and occasionally an outer line may be discerned. Beneath, the wings are deeply powdered with smoky purple. Expanse 35 to 48 mm.

The male genitalia exhibit in this case a good instance of specific individuality. This modification exists in the terminal character of the clasp, with the harpe, a stout sickle-shaped member, larger than in any ally. Instead of the produced costal angle at the corona, the margin terminates squarely and is prolonged below into a curved hook or pollex; this section of the valva heavily spinose as usual. The harpe arises in close juxtaposition and exceeds the pollex so that these two points, unique in their nearness, may be seen in the specimen without preparation of the parts.

Habitat.—The type locality is the prairie environs of Chicago, Ill., and the species doubtless enjoys a wide range through the prairie zone supporting the food plant, though it has thus far eluded collectors, apparently. A large series of bred specimens are under observation, and a number have been labelled "paratype" as representative for several collections. A male type and several further paratypes remain with the author. Variation in ground colour runs from a dark, almost blackish-purple, powdery effect to an even, rich, reddish tone, while one of the series showed the stigmata much reduced. These conspicuous white markings, inclusive also of the basal spots, are similar with *marginidens* and *nephrosyntheta*, with a strong superficiality in the direction of the latter. The larval features denote a relationship to *cerussata*, while the genitalia denote a proximity with Californian species in one direction, which might not be unexpected, as the food plant is generically more at home in the Southwest.

The character of this food plant is such that the entry and future operations of the larva produce little evidence along the usual lines suggestive of *Papaipema* work. The egg overwinters and the young larva emerges about the first of June. A conspicuous amount of frass is thrown out, but may be hidden in the cluster of close-lying leaves which by reason of their spined edges are not pleasant to handle. The flowering stem is mined to some extent, though most of the work is in the root-crown, the larva working usually in more than one taproot. As old clumps consist of several taproots, this is easy, also one clump may furnish several larvæ and these older plants are invariably selected for oviposition. Fire plays a most important role in the economy of the species, and the early failure of my co-labourers to meet with it was doubt-

less due to this factor. They kindly secured some of the early stages in 1916 which were missed the previous year, and such fullness as this note contains is largely due to their efforts.

Stage IV.—Of the cylindrical type common to the genus. Head honey yellow, mouth parts concolorous, the ocelli only darkly marked. Body of deep purplish brown tone, contrastingly marked by the longitudinal dorsal, sub-dorsal and sub-stigmatal white lines, the latter on the six posterior segments merging ventrally to a concolorous under surface of whitish. These lines are broken on the first four abdominal segments, which appear as a dark girdle completely encircling the larva. The cervical shield sharply bordered with black laterally, with the other plates and tubercles normal. Tubercle IVa on joint ten begins to show definition.

Stage V.—Similar.

Stage VI.—The dark body colour still holds, with the lines which are always broken on the first four abdominal segments, broad and contrastingly drawn in white. Tubercles attain greatest definition in this stage, being black for the most part and those laterally surrounding the spiracles very conspicuous. On joint ten the spiracle is surrounded by five tubercles, III, IIIa, IV and V about the size of the spiracle, while IVa is even larger and very close to the upper corner, caudad; on eleven, III and IIIa are merged into an elongate plate bearing one seta. The anal shield is heavy, rugose and brown—not black. Ventrally a salmon tone prevails that is quite characteristic.

Maturity.—Similar to preceding, the colour lighter but does not fade to the frequent translucence of this instar. Proportionate to the increase in size, the tubercles seem smaller. Observations were from June 14 to Aug. 15, when all larvæ had left the plants to pupate. The duration of stages increases toward maturity with the last instar lasting twelve days in two cases observed. Length of larvæ from the stages, approximately, 34, 39, 45 and 50 mm.

Eryngii larvæ approximate closely *cerussata*, differing in coloration of the last stages, and in having the anal plate brown, whereas it is black with the latter.

The burrow seems to be deserted generally for pupation, but two instances occurred in confinement where this was not so.

The pupa is robust, dark shelled, and active; the frons is in no way produced, the thoracic region and wing-covers rugose, the remainder shining except the interstices of the abdominal sutures which are finely punctured. Two sharp spines occur at the cremaster, and a subsidiary spine occasionally on the last segment laterad.

Average length 23 mm.; diameter 7 mm.

Emergence dates range from Sept. 25 to Oct. 15.

***Papaipema nephrasyntheta* Dyar.**

The unique type of this species has remained in the United States National Museum since its description in 1908 until recently, without a counterpart. In conversation with its captor, Mr. E. A. Schwarz, we learn it was taken at light on Plummer's Island, Md., Sept. 27, 1904.

A second example from the same source and caught at the same time, has recently been placed in the Museum collection and this, though unspread, gives a better idea of the coloration since it is brighter, whereas the type would seem as if it might be somewhat faded. It was at first believed the *Eryngium* feeder was this species, but a careful comparison forces an opposite conclusion. The Dyar species is of a lighter, clay, ground colour, with the central marking of the large white reniform a white lunulate line, an unusual feature in the genus. *Eryngium aquaticum* does not flourish at the type locality, and we incline, with its author, to consider it a close ally of *marginidens*, with the larva yet unknown. Both the specimens at Washington are females, hence the value of genitalic comparisons are not available.

EXPLANATION OF PLATE VIII.

(Figures Natural Size.)

- Fig. 1. *Papaipema polymniæ*, male.
- " 2 *Papaipema polymniæ*, female.
- " 3 *Papaipema polymniæ*, larva, stage IV.
- " 4 *Papaipema polymniæ*, larva, stage V.
- " 5 *Papaipema polymniæ*, larva, mature.
- " 6 *Papaipema eryngii*, male.
- " 7 *Papaipema eryngii*, female.
- " 8 *Papaipema eryngii*, larva, stage IV.
- " 9 *Papaipema eryngii*, larva, stage VI.

THE OCCURRENCE OF THE GENUS *PARACHRYSOCHARIS* GIRAULT IN THE UNITED STATES.

BY A. A. GIRAULT, GLENNDALE, MD.

The following species was found in the collections of the U. S. National Museum:

Parachrysocharis semiflava, new species.

Female.—Length 0.87 mm.

Dark metallic green, the head below the antennae, the legs, ventral aspect of the abdomen, the scape, the pedicel (except above at basal half), venation and tegula, lemon yellow. Cheeks yellow. Wings hyaline. Head and thorax densely, not very finely scaly. Propodeum distinct, moderately long, tricarinate, the spiracle round, moderate in size. Axillae much advanced. Mandibles tridentate, the outer tooth largest, widely separated from the middle one, falcate, the third tooth minute. Funicle joints all a half longer than wide. Parapsidal furrows complete, distinct. Club with a distinct terminal nipple. Postmarginal vein very slightly developed. The male seems to be similar but the funicle 4-jointed (no good specimens). Eight females. Austin, Texas, August 16, 1904, (Carl Hartmann).

Types.—Catalogue No. 20803, U. S. National Museum, three females on tags plus a slide with the appendages. There are two ring-joints in this species, the second very short.

THE INSECT DRIFT OF LAKE SHORES.

BY JAMES G. NEEDHAM, ITHACA, N.Y.

During the summer of 1906, while still living in Lake Forest, Illinois, in a pleasant cottage near to the shore of Lake Michigan, I spent all my spare time upon the beach studying the insect accumulations of the shore-line, and trying to settle some of the questions raised by my earlier observations (1900-1904). I visited the beach nearly every day, and collected insects from the drift-line whenever there were any deposited there. Through early and late summer I merely collected when the collecting was good; but during the month of August I made daily careful observations on the insects at the shore-line, and on accompanying conditions of wind, waves and weather. As often happens, I settled a few of my questions and raised many new ones. After waiting ten years

April, 1917

without finding another opportunity for continuing these observations, I have concluded to publish the results. First, I will give the data obtained during August to show the ordinary course of beach collecting (see accompanying table), and then I will add notes on the more abundant species for the entire season.

The shore of Lake Michigan at Lake Forest extends due north and south; hence it is the east wind that deposits drifting insects upon the beach. My observations show that the wind was E.-N.E. when the greatest accumulations of insects occurred. Only once (Monday, Aug. 27th) were there any deposits of insects on the beach while the wind was blowing from the westward, and at the time of that observation the waves were still running in from N.-N.E., whence the wind had recently shifted.

A number of piers project from the shores, and in the lee of these the flotsam gathers and slowly rotates in isolated broad eddies.

CONDENSED RECORD OF DAILY OBSERVATIONS.

Aug.	Wind.		Flotsam.	Drift.	Abundant forms.
1	N.-N.E.	light	in black patch beside pier	faint lines on sand.	midges and ladybirds.
2	S.-S.E.	"	in diffuse lines.	almost none	skins of midges and caddis-flies.
3	O.		none.	" "	
4	S.-S.E.	faint.	thin gray layer.	none.	midges.
5	W.		none.		
6	E.	strong.	"	scattering.	live beetles, etc.
7	O.		thin streaks.	none.	
8	E.	faint.		"	skins of midges and caddis-flies.
9	S.W.	moderate.	none.	"	
10	N.-N.E.	"	scanty, gray.	almost none.	
11-17 Observations interrupted.					
18	S.E.	moderate.	little.	none.	
19	W.	"	none.	"	
20	W.	"	"	"	
21	N.W.	"	"	"	
22	N.E.	"	"	"	
23	E.-N.E.	strong.	"	scattery-trashy	butterflies, etc.
24	E.-N.E.	abundant.	"	abundant, trashy	crickets, etc.
25	S.E.-E.	subsiding.	much.	"	many forms.
26	N.E.	brisk.	none.	little.	
27	N.-N.W.	"	much.	much.	grasshoppers, beetles, etc.
28	W.	gentle.	almost none.	"	grasshoppers, butterflies, etc.
29	W.	moderate.	none.	almost none.	
30	W.	"	none.	none.	
31	S.E.-E.	"	"	"	

This flotsam often consists of nearly pure insect material. The most characteristic constituents are the cast skins of may-

flies, midges and caddis-flies, which gather in inconceivably vast numbers, in floating felted mats, that are sometimes an inch or two in thickness, and square rods in area. Every cubic inch of this material represents thousands of specimens. When with shift of wind and rising of waves these mats are cast upon the pier, they cover the planking with a plaster-like coating of ashen-gray hue. There is no place where flotsam can accumulate when the wind blows parallel with the piers, or when the waves break over them.

During the month of August, 1906, there was but one period of abundance of insect drift upon the beach,—a period of three days, the 22-24th inclusive, while the wind was E.-N.E., and following upon warm weather with westerly winds. There were scanty accumulations also on the 1st, 2nd, 6th, 8th, 10th, 25th, 26th, 27th and 28th, always accompanying an easterly wind. Sometimes the drift was a thin line of nearly pure insect remains, scarcely discoverable as a tracing along the sand at the farthest reach of the waves, as on the 1st; sometimes it was a conspicuous line of trash, with insects scattered thinly through the trash, as on the 22nd. On only twelve days of the twenty-four recorded was there any discoverable deposition of insects at the drift-line.

These regular observations supplement earlier more casual ones, and confirm certain opinions as to the occurrence of the drift upon the shore of Lake Michigan as follows:

1. Floating insects can be deposited at the drift-line only when the waves are running shoreward. The wind is, of course, the actuating cause of their transportation by water. The waves follow the wind, but do not quite keep up with its changes. In my notes I find three entries that bear directly upon this:—

"6th Aug.: wind blowing strongly from eastward (it had blown from the west the preceding day). I saw the drift begin to come ashore at close to 7 a.m., bringing in at first many live *Rhynchophora*."

"22nd Aug.: wind shifted inshore (from N.W.) in afternoon and drift began to appear in the evening. No flotsam; waves too rough."

"27th Aug.: wind N.-N.W. on land, but waves still running in strongly from N.E.; many grasshoppers."

2. Deposits of drift vary with the strength of the wind. When too strong, the sand is disturbed and many insects are buried in it. Long, evenly-running waves driven by a steady on-shore breeze give the best deposits.

3. The proportion of insect material in the drift varies with such purely local and accidental causes as the dumpings of straw and ashes from lake steamers, and with many natural causes, the two most important of which seem to me to be:—

(a) Storms, with attendant floods, that carry vast quantities of plant fragments into the lake. Occasionally an abundant accumulation of insects may be entirely hidden amid a still more abundant windrow of this sort of material. Mr. Schwarz once expressed the opinion (1890) that storms have nothing to do with the insect drift; and while it is true that the deposits occur whether there be storms or no, yet I am sure that if an off-shore storm wind blows while any insect is swarming, within a few days that insect will appear in unusual abundance in the drift-line on some lee shore.

(b) Emergence periods of particular insects. This is the most significant of all factors for the collector to bear in mind. What wind and waves gather depends on what nature has brought forth, ready to be gathered. Extraordinary accumulations of May-beetles and of Mayflies are well known to occur at regular times. It was an extraordinary shore deposit of black crickets that first interested me in the insects of the drift line (1900). Hancock has recorded (1894) for another species just the conditions of swarming and flight that made ready this crop of crickets that was gathered by the storm wind. Just after the publication of my paper (1900) recording the accumulation of the crickets in the drift on the shore of Lake Michigan on the 13th of August following a storm from the west, a friend wrote me that there had been an extraordinary swarming of the same species in the streets of the city of Rockford, Ill., (some 65 miles westward) on the 11th—the day the storm occurred. In my August collecting of 1916 I found but four specimens of this species.

Every one who has run a trap-lantern or who has sugared for moths knows how much atmospheric conditions have to do with bringing insects out in abundance. It is the night of high humidity just before a rainstorm that finds most of them astir. The col-

lector who would profit by the salvage of the shore-line would, therefore, do well to pay careful heed to season and to weather. After conditions favourable for swarming accompanied by off-shore winds, then let him search a low, sandy beach on a lee shore. It is doubtful whether there is any other place where specimens may be accumulated so easily and in such variety. Schwarz (1889) records that he and Hubbard in four days collected more than 1,100 species of beetles on the shore-line of Lake Superior at a time when the collecting there was not at its best. The Lepidoptera of the drift-line, to be sure, are worthless as specimens; most of the Coleoptera, however, are good enough for the cabinet, and insects of other orders are often in good condition.

WHAT THE DRIFT-LINE OFFERS.

Besides the vegetable debris brought down by woodland streams, the cinders and straw and other waste contributed by lake steamers, the dead vertebrates such as fishes and birds, a few of which are always present, and a few miscellaneous invertebrates—shells of mussels and snails or occasionally whole specimens of *Gammarus fasciatus*—there are always many insects present in the summer season. There are far more kinds of them than may profitably be listed here; but it may be worth while to mention in each of the orders, the forms most abundantly found in the drift-line, as indicated by my collections through the summer of 1906, during which season I collected merely a sample of the insects present whenever the collecting from the beach was good.

Coleoptera are by far the most abundant insects of the drift. My specimens, 2,248 in number, as determined for me by Mr. Herbert Morrison, represented 26 families and 127 species. The species that were represented by more than ten specimens, the date of principal occurrence, the number of specimens found on that date and the total number of each are as follows:

CURCULIONIDÆ:

Listronotus squamiger Say. VIII, 6:116-127.

Lixus terminalis Lec. VI, 19:10-12.

CARABIDÆ:

Elaphrus fuliginosus Say. VI, 13:31-31.

Pterostichus lucublandis Say. VI, 18:102-179.

Platynus cupripennis Say. VI, 18:12-13.

Platynus placidus Say. VI, 18:9-15.

Galericia janus Fab. VI, 13:232-267.

Harpalus pennsylvanicus DeG. VIII, 12:117-121.

DYTISCIDÆ:

Ilybius confusus Aube. Date? 8-14.

Agabus confusus Gryl. VI, 13:331-335.

GYRINIDÆ:

Gyrinus analis Say. VI, 19:153-153.

COCCINELLIDÆ:

Megilla maculata DeG. Date? 27-57.

Hippodamia 13-punctata Linn. Date? 14-27.

Hippodamia parenthesis Say. VI, 18:35-39.

Coccinella sanguinea Linn. Date? 5-10.

Anatis 15-punctata Oliv. Date? 44-67.

Chilocorus bivulnerus Muls. Date? 59-66.

LUCANIDÆ:

Lucanus placidus Say. VI, 12:16-23.

SCARABÆIDÆ:

Aphodius fumentarius Linn. VII, 22:88-89.

CHRYSOMELIDÆ:

Leptinotarsa decemlineata Say. Date? 45-75.

Lina scripta Fabr. Date? 17-26.

Diabrotica 12-punctata Fabr. Date? 15-30.

Disonychia pennsylvanica Ill. Date? 101-169.

It may be that owing to my special interest in aquatic beetles, I picked up a larger proportion of such genera as *Agabus*, *Ilybius*, and *Gyrinus* than of the others. I missed the annual swarming of the *Lachnosternas*.

Of Hemiptera, doubtless the most abundant were the aphids, which I did not collect at all, owing to their minuteness and bad state of preservation. Only the larger forms were taken. More than half of these were Pentatomidæ. The grotesque Membracids were represented by three species, *Smilia camelus* Fabr., *Xantholobus trilineatus* Say, and *Cyrtolobis vau*. The aquatic *Nepa* and *Ranatra* were represented by single specimens. My list, determined also by Mr. Morrison, shows nine families represented by 20 species and 53 specimens. Those represented by more than four specimens are:

SALDIDÆ:

Salda pallipes Fabr. VII, 21:4-5.

GERRIDÆ:

Gerris marginatus Say. VII, 13:9-9.

Limnoporus rufoscutellatus Latr. VI, 13:5-6.

PENTATOMIDÆ:

Cenus delius Say. VIII, 6:3-5.

Euschistus variolarius P. B. VI, 13:4-7.

Apateticus cynicus Say. VIII, 1:3-6.

Apateticus maculiventris Say. VI, 13:10-11.

The Diptera of the drift, are represented mainly by innumerable cast skins of Chironomidæ from the lake bottom, and the many adult midges mixed with them are always in bad condition. Scattering craneflies are always present—species of *Tipula*, *Pachyrina* and *Dicranomyia*. Besides the flesh-flies of the drift that have been so well treated by Herms ('06) there are often numbers of Anthomyiidæ (*Chortophila*, *Cænasia*, etc.), Borboridæ (*Limosina*), etc., rarely in fit condition for specific determination.

Lepidoptera are represented during the course of the season

by nearly all the free-ranging butterflies, and by many strong-flying noctuids. *Utelheisa bella* was not uncommon in the drift-line on Aug. 23rd.

Hymenoptera and Lepidoptera I did not save for determination owing to their dilapidated condition. The former group is well represented by *Bombus*, *Apis* and several Ichneumonids and a few saw-flies.

The true Neuroptera are represented only by the delicate lace-wings. As determined for me by Mr. Roger C. Smith, these are.—

<i>Chrysopa oculata</i> Say.	VI, 13:24-28.
" <i>chlorophana</i> Burn.	VI, 13:1-1.
<i>Hemerobius stigmatatus</i> Fitch.	2.
" <i>conjunctus</i> Fitch.	4.
" <i>hyalinatus</i> Fitch.	4.
" <i>humuli</i> Linn.	2.
<i>Micromus posticus</i> Walb.	1.

Of Trichoptera, the pupal skins of three species, all undetermined, appeared abundantly in both flotsam and drift, the dates of maximum accumulations being Aug. 1st, 8th, 24th and 25th. The one common adult of the drift-line was *Agrypina curvata* Banks—not "*Glossosoma* sp.?" as reported in my first paper (1900) on Banks' determination. *Neuronia concatenata* Walk. once appeared, a single specimen, and also an undetermined Leptocerous.

Of Odonata, there are always present a few large dragonflies, species of *Æschna* and *Anax*, and often there are smaller ones, *Sympetrum*, *Lestes*, and *Nehalennia*.

The Orthoptera of my drift collection, numbered but seven species. The three which numbered five or more specimens each (as determined by Mr. H. H. Knight) were:—

<i>Tettigidea lateralis</i> Say.	VI, 13-148, of which but 34 were females.
<i>Melanoplus femur-rubrum</i> DeG.	VIII, 23-24, of which one was a female.
<i>Chorthippa viridifasciata</i> DeG.	VI, 13-5, all brown females.

The Ephemeroidea are represented abundantly in both flotsam and drift by innumerable cast nymphal skins, and by much fewer adult specimens. I have seen acres of the water surface along shore covered in scattered patches with floating felted masses of the skins of *Ephemerella simulans*. On the 21st of July, 1906, there occurred a peculiar drift, that was composed almost entirely of the wings and other disintegrated fragments of adult Mayflies. It lay in grayish, curving lines, so thin it might have been easily overlooked, spread over the sand at the farthest reach of the gentle waves that

were then rushing in. Though inconspicuous, innumerable Mayflies were represented; about half of them, *Ephemera simulans* Walk. and the other half, three species of *Heptagenia*; *H. pulchella* Walsh, *H. interpunctata* Say, and an undetermined species. These were probably the remains of adults that had finished mating and egg deposition and had fallen, spent, upon the surface of the lake.

The insects one finds at the drift-line on any shore fall in three principal categories:

1. Those present by accident; having fallen into the lake and been swept up by the waves on to the beach. Here belong representatives of practically all orders of insects, among which the strong-flying and highly specialized members of the dominant orders do most abound. It is these that have chiefly been noticed hitherto. The lists that have been published by myself, by Miss Snow (1902) and by Dr. Schwarz show good general agreement.
2. Those that dwell in the lake, and that, on transformation, leave their exuviae floating on the surface. Here belong mainly three groups of aquatic herbivores: Mayflies, midges and caddisflies. It is chiefly the cast skins of these, less often the insects themselves, that one finds floating in the flotsam or cast upon the sand. More careful collecting and study of these would doubtless yield data of great value concerning the times and seasons and relative numbers of the insect population of our lakes.
3. Those that live as scavengers upon the carcasses of the drift-line. Here belong especially many beetles of the families Staphylinidae, Histeridae, Scarabaeidae and Carabidae together with a number of flies that have flesh-eating larvae.

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ON SOME NEW OR NOTEWORTHY COLEOPTERA
FROM THE WEST COAST OF FLORIDA.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

Among the Coleoptera taken in the vicinity of Dunedin, Florida, during the past two years are several species which are evidently undescribed, and some others worthy of note on account of their rarity or known distribution. I therefore present the following notes and descriptions relative to them. It may be added that Dunedin is located on Clearwater Bay, three miles north of Clearwater, the county seat of Pinellas County, and 27 miles northwest of Tampa. The bay is formed by a number of keys or islands which parallel the coast of Pinellas Peninsula, about two miles from the mainland. One of these, Hog Island, about five miles long and one-half mile wide, has its southern end opposite the town of Dunedin. Its surface is of sand, somewhat thickly clothed with the characteristic sand-loving vegetation of the west coast keys. On the mainland east of the town, which is situated in a noted citrus-growing district, are numerous small lakes or ponds, some of which become almost extinct during the dry or winter season. Along the margins of these ponds and in and about the wet hammocks, which are densely grown up with deciduous trees and underbrush, most of the species noted have been taken. My collecting has been done between Oct. 20 and April 15, though a few species are included which were taken in summer and sent to me.

Scarites californicus Lec.—I regard this as a valid species. It can be separated at a glance from *subterraneus* Fab., of which it has been placed as a variety by Leng and other recent writers. It is strictly maritime, occurring only beneath seaweed or half-buried

logs, rarely on the beach of the bay, more frequently on that of the Gulf, where 12 specimens were taken in several hours' search on March 25, beneath thick masses of seaweed along Hog Island. Since *californicus* has never been recorded as mating or even associating with *subterraneus*, and since the latter is an inland form occurring usually in or about the margins of cultivated grounds, the two, in my opinion, are distinct and separate species.

Tetragonoderus fasciatus Hald.—Among a number of beetles taken by my son and his wife at electric light on the porch of my residence at Dunedin, in June and July, 1915, was a single one of this species. It is not included in Leng's "List of the Carabidæ of Florida,"* he merely stating that one had been taken in Mobile County, Alabama, by Loding. It is frequent in sandy places in Indiana, and Horn gives its range as Michigan and New York to Louisiana and Lower California.

Lebia pulchella Dej.—Single specimens of this handsome Carabid were taken beneath boards along the margins of ponds on Jan. 16 and April 4. Schwarz has taken it at Ft. Capron and Tampa, but it is rare wherever found.

Agonoderus indistinctus Dej.—Single specimens were taken at Dunedin, March 28 and Sanford, March 24. Not included in Leng's list.

Haliplus punctatus Aube.—A single example of what I take to be this species, judging from the translation given by Roberts† of Aube's original description, was taken Jan. 30 from a pond in an old clay pit. It is not any one of the species described by Matheson,** and so was sent to that gentleman for examination. He pronounced it a new species, but as he and Roberts disagreed as to what the *H. punctatus* of Aube really is, I place it under that name provisionally.

Peltodytes oppositus Roberts.—Several specimens were taken from ponds and ditches between Feb. 10 and April 2. This and the preceding are the only two species of the family so far taken in the vicinity of Dunedin.

Notomicrus nanulus Lec.—This minute Dytiscid was taken

*Bull. Am. Mus. Nat. Hist., XXXIV, 1915, pp. 555-601.

†Journ. N.Y. Ent. Soc., XXI, 1913, 95.

**Loc. cit., XX, 1912, 156-193.

from a pond east of Dunedin on Jan. 19 and Feb. 9, 1913, eight specimens having been secured. It has not since been found though especial search has been made for it. It occurs on the underside of wholly immersed boards, and is only detected when it moves. LeConte described it from Louisiana in 1863, from specimens taken by Dr. Schaum, and it has not before been recorded from Florida.

Philhydrus estriatus, sp. nov.—Broadly oblong-oval, feebly convex. Above black, shining, the side margins of thorax and elytra reddish-piceous; under surface dark piceous, the antennæ, palpi and tarsi paler. Thorax and elytra very finely, rather closely and evenly punctate, the elytra without trace of sutural striæ, each with two irregular rows of large punctures located along the lines of the fifth and seventh striæ, were the latter present. Under surface finely and very densely punctate. Mesosternal crest low with front edge strongly oblique. Length 6.5 mm.

Described from three specimens taken from ponds on Jan. 21 and March 23. Intermediate in size between *consors* and *perplexus* of LeConte, being smaller and much less convex than *consors* and larger and more broadly ovate than *perplexus*. In both those species the punctuation is much coarser, the sutural striæ very distinct and the coarser punctures of elytra in four rows. From *P. cinctus* Say, which it resembles in colour, *estriatus* is separated by its less convex form, absence of sutural striæ and oblique front edge of mesosternal crest.

Helocharis maculicollis Muls.—A female of this species, taken Feb. 25, had a large mass of eggs attached to the under side of the abdomen. They were very regularly placed in a double layer, the median portion of 12 eggs consisting of two rows, each made up of three eggs placed end to end. On each side of this longitudinal median axis and arranged at right angles to it were two rows, each composed of nine eggs placed side by side. There were thus 36 eggs in the double layer each side of the median support, or 84 in the whole mass. I can find no previous record of the egg-bearing habit of this species.

Arthmius gracilior Casey.—Taken in some numbers by sifting vegetable mould in a low, wet thicket. Originally described from Tampa, it was placed as a synonym of *Batrisus globicollis*

Lec. by Henshaw, but Fall, in a recent letter, states that the sexual characters are different and that it is probably distinct.

Exochomus marginipennis childreni Muls.—This variety is common on oak throughout the winter, and mention is made of it here only to record the taking of two specimens having the elytra wholly pale, the usual subapical black spots being absent.

Hyperaspidium militaris Lec.—Schwarz records this species as "rare on oak shrubs." About Dunedin it is swept in numbers in late autumn and early spring from a species of *Helenium* and other low Compositæ, and has never been taken from oak.

Scymnus oculatus, sp. nov.—Oval, convex. Head, thorax, legs and last ventral wholly pale yellow; under surface reddish yellow, finely and densely punctate; elytra black with a large oval, common reddish spot on median third. Upper surface rather thickly clothed with very fine semi-prostrate whitish hairs. Thorax almost smooth; elytra coarsely not closely punctate. Length 1 mm.

Described from a single specimen beaten from *Myrica cerifera* L. on March 24. A small and uniquely coloured species belonging to Horn's Group B, i. e., having the metacoxal line running parallel to the first ventral suture. Neither Horn nor Casey describe a form having a single common elytral pale spot, hence I have little hesitation in adding a new member to this already over-crowded genus.

Tritoma dissimilis, sp. nov.—Elongate-oval, feebly convex. Black, legs, antennæ and palpi reddish brown. Head and thorax sometimes piceous, minutely alutaceous, finely and sparsely punctate; sides of thorax straight from base to apex. Elytra slightly wider at base than thorax, widest and most convex at basal third, thence tapering to the rounded apex; striæ with feebly impressed rows of small, close-set punctures; intervals very minutely and sparsely punctate. Under surface finely and sparsely punctate. Length 4-4.5 mm.

Taken from beneath bark of dead oak; March 23, 24. Close to *T. angulata* Say but larger, with distinctly longer and more tapering elytra and straighter sides of thorax.

Tomarus hirtellus Schwarz. Frequent beneath piles of chips and old leaves. Not listed by Henshaw though it was described in 1878.

Dermestes elongatus Lec. A single specimen was taken from beneath the carcass of a gopher turtle on March 8. LeConte described it from Georgia as rare, and Schwarz records one specimen from Hauløver, Florida.

Monædus guttatus Lec. Taken in numbers Feb. 23—29, and again December 13, by beating masses of a very slender milkweed, *Metastelma scoparium* Nutt., near the border of a wet hammock. Horn in 1882* characterized the genus *Monædus*, placing it in the family Lathrididæ, and described *M. guttatus* (crediting the species in a footnote to Dr. LeConte) from "a single specimen taken by H. G. Hubbard at Cedar Keys, Fla."**

In 1894 Sharp erected the family *Adimeridæ* for a supposed new genus, *Adimerus*, of which he described three species from Central America.† Arrow in 1909 states‡ that *Adimerus* Sharp (1894) is a synonym of *Monædus* Horn (1882), and corrects Horn's mistake regarding the number of tarsal joints. He retained the family name *Adimeridæ* and listed five species of *Monædus*. In 1913 Champion‡‡ accepted Arrow's conclusions regarding the synonymy of *Adimerus* and placed *M. dubius* Sharp as a synonym of *M. guttatus*, but still retained the family name proposed by Sharp.

In conformity with Article 5 of the International Rules of Zoological Nomenclature the family name *Adimeridæ* Sharp should be abandoned, being based on a generic name which was a synonym, and should be replaced by *Monædidæ*, with *Monædus* Horn as the typical genus.¹ The genus is represented in Guadeloupe and Central America by several species which are said to occur under bark. *M. guttatus* is represented in the U. S. National Museum collection by three specimens from Florida, all taken by Hubbard and Schwarz at Biscayne on May 10; also by specimens from Tampico, Panama, Cuba, Guatemala and Monteserrat.²

*Trans. Amer. Ent. Soc., X, 116, Pl. IV, fig. 10.

**Mr. H. S. Barber, in a recent letter, states that Mr. Schwarz "averts that *guttatus* was not taken by either Hubbard or himself at Cedar Keys, but that the type specimen came from Jupiter, Fla."

†Biol. Cent. Amer., Col., vol. II, pt. I, 441, Pl. XIV, figs. 3, 3a and 4.

‡Ann. Mag. Nat. Hist., IV, 195.

‡‡Trans. Ent. Soc. London, 73.

¹ Since this was in type Mr. Barber has called my attention to the fact that Leng and Mutchler (Bull. Am. Mus. Nat. Hist., vol. 33, p. 415) have used the family name *Monædidæ* for four species of *Monædus* from Guadeloupe.

² Auct. H. S. Barber, to whom I am also indebted for several of the citations above given.

Tenebroides foveatus, sp. nov. Elongate-oblong, subdepressed. Black, feebly shining, antennæ, palpi and tarsi piceous. Head finely and rather sparsely punctate, vertex with a large, rounded median fovea. Thorax subquadrate, slightly wider than long, sides almost straight, feebly diverging from base to apex; disc sparsely and finely punctured, hind angles almost rectangular. Elytra at base not wider than apex of thorax, sides parallel to apical third, thence broadly rounded to apex; striae with rows of unimpressed, medium sized, close-set, round punctures; intervals flat, smooth. Under surface finely and sparsely punctate. Length 10 mm.

One specimen taken at light on porch of house, July 5. Its large size, foveate head and flat, smooth intervals distinguish it from our other described forms.

Lacon curtus Lec. Taken in small numbers on several occasions from beneath logs half buried in dry sand. From three to a dozen are usually found together. Originally described from Georgia, it is not given in Schwarz's "Coleoptera of Florida," though he lists *L. rectangularis* Say as common. I have not seen the latter species in Florida, and Dr. Schwarz may have been mistaken in his identification.

Elater discoideus Fab. A single specimen of this handsome Elaterid was beaten from the bayberry, *Myrica cerifera* L. on Feb. 23. Its range is given as Canada to Georgia, and no previous Florida record can be found.

Cebrio mandibularis Lec. Two specimens of this interesting species were taken at light on June 15, as was also one of *C. bicolor* Fab. The latter species is the only one listed by Schwarz, though LeConte's species was described from Florida in 1865.

Pyractomena lucifera angustata Lec. In 1851 LeConte described* *Pyractomena angustata* from the "Southern States," and stated that: "The thorax is usually longer than wide; in one specimen (probably distorted) the reverse is the case." His species was afterward, by himself and Henshaw, placed as a synonym of *P. lucifera* Melsh. Among the specimens of Lampyrids taken at Dunedin and Eustis, Fla., are three males having the thorax distinctly longer than wide and its sides perfectly straight and parallel

*Proc. Acad. Nat. Sci. Phil., 1851, 336.

from the base to beyond the middle, then strongly oblique to the obtusely angulate apex. In all specimens of *lucifera* at hand, from Indiana and Florida, the thorax is fully or quite as wide as long, with sides more or less curved or oblique from base to apex. The elytra of the Dunedin and Eustis specimens are more distinctly granulate-punctate, and the seventh ventral segments are narrower than in the true *lucifera*. With the belief that these specimens represent at least a distinct variety and that they are probably the same as LeConte's *angustata*, I have restored his name as above given.

Telephorus albolineatus, sp. nov. There has long been confused with the *Telephorus rectus* of Melsheimer, a form which I here separate and name as above. The body is distinctly narrower and has the thorax narrower with sides more curved and apex more rounded than in *rectus*. The black median stripe of the thorax is narrower, with its sides less irregular than there. The elytra are more coarsely, rugosely punctate, are clothed with coarser pubescence and have the suture and side margins narrowly but wholly pale. Legs black, the femora sometimes with basal third yellowish. Length 5-5.5 mm.

Common at Dunedin in March and April, where it occurs on oak, bay and other foliage in wet hammocks. Sanford, March 27. A very closely related, if not the same species, occurs in the tamarack marshes of northern Indiana. LeConte had this species before him when he wrote his second paper on Lampyridæ,* and placed it as "variety" B of *rectus*. I have not as yet taken the true *rectus* in Florida.

Disonycha abbreviata leptolineata, var. nov. During the winter months there occurs in small numbers beneath boards and chunks along the borders of lakes and ponds near Dunedin a form of *Disonycha*, which is evidently an undescribed variety of *D. abbreviata* Muls., if not a distinct species. It differs from northern specimens of *abbreviata* in having the body a brighter red, the antennæ deep black, not piceous, and especially in having the black lines of elytra very narrow, not over one-half the width of those of *abbreviata* and more finely punctate than there. In size, form and structure there appears no difference, hence it may for the present be regarded as a southern colour variety of that species, though Horn in his "Halticini" says of *abbreviata*: "This is one of the least variable of our vittate species."

*Trans. Amer. Ent. Soc. IX, 1881, 52.

SOME EUGLOSSINE BEES.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The Euglossines are perhaps the most brilliant of all bees, and appropriately, many of them seem to visit the magnificent orchids of the South American forests. I have recently had occasion to study some previously unnamed Euglossines in the U. S. National Museum, and the results are presented herewith:

Eufriesia purpurata (Mocsary).

I have a male from F. Smith's collection, labelled *Euglossa brullei* Lep., but it does not at all agree with the description of that species, and is a *Eufriesia*, related to *E. pulchra* (Sm.). The locality is S. Paulo, Brazil. It agrees well with *E. purpurata* (Mocs.), and is referred to that species. Mr. Meade-Waldo, to whom I wrote concerning the matter, replied that in the British Museum they had four specimens under *E. brullei*, "all with dark heads and thorax, and abdomens varying from reddish-bronze to almost clear green." He also objected to the reference to *E. purpurata*, since Mocsary's figure (which I have not seen) represented it as having the "head, thorax and abdomen totally reddish-bronze." The description, however, as quoted by Friese, agrees with my specimen. It is stated that the abdomen (excepting the first segment) is "viridi-vel igneo-auratis," as in the British Museum so-called *brullei*. In my specimen it shines copper-red and golden-green in different lights.

Euglossa subg. **Glossura**, n. subg.

Mouth-parts extremely elongated, extending far beyond apex of abdomen; scutellum bigibbous. Type *Euglossa piliventris* guerin. Also includes *E. ignita* Smith.

Euglossa piliventris Guérin.

Bartica, British Guiana, May 17. (U. S. N. M.) I have one from Maroni.

Euglossa bicolor Ducke.

Near Para, Brazil (Miss H. B. Merrill, U. S. N. M.). The sides of the thorax and the last three abdominal segments are green.

Euglossa mandibularis Friese, var. **bernardina**, n. var.

Male. Face and front golden-green, vertex blue-green; mandibles with a minute, cream-coloured spot at base, and a larger one on malar space; thorax and abdomen above shining greenish

blue. As Friese notes, this has very nearly the general form of *E. piliventris*, with bigibbous scutellum. The mesothorax is shining, with minute punctures, not very dense on disc. The mouth-parts do not reach to the end of the abdomen. There is a minute, black fleck in middle of scutellum. The labrum is broader than long, the reverse being the case in *E. piliventris*; and the cream-coloured band at lower sides of face extends broadly from orbits to labrum, whereas in *piliventris* it forms an L-shaped mark.

Hab.—San Bernardino, Paraguay, Oct. 4. (K. Fiebrig; U. S. N. M.) This is very distinct from all species I have seen, but the specimen appears to represent a colour-variety or race of *E. mandibularis*. Friese's description of *mandibularis* omits some of the salient characters of our insect, so it is possibly a different species, to be called *Euglossa bernardina*.

***Euglossa variabilis* Friese.**

Friese separated *E. variabilis* as a species very closely related to the common *E. cordata* L., but distinguished by the more shining, less densely punctured thoracic dorsum. He considered it to be very variable, and named three varieties. Ducke, on reviewing the subject, referred most of Friese's *variabilis* back to *cordata*, but separated one of the varieties as a species, *E. azurea* Ducke. Since this appears to be Friese's *E. variabilis* var. *cyanea*, it is presumably to be called *E. cyanea* (Friese). So far as I am able to judge, *E. variabilis* (excluding *cyanea*) is sufficiently distinct for recognition, and it even seems probable that the varieties deserve specific rank. There is certainly much individual variation in colour, but series collected at the same time and place present a recognizable facies.

***Euglossa variabilis*, var. *mixta* Fries**

Females, collected by Aug. Busck in the region of the Panama Canal, are labelled Tabernilla, July 21, and Cabima, May 21. Another comes from Las Cascadas, collected by A. H. Jennings. The abdomen is variably but always evidently suffused with copper-red or carmine. The insects are a little larger and more robust than the next variety.

***Euglossa variabilis*, var. *purpurea* Friese.**

Friese says the entire body is purple-red. The insects before me are green, suffused with copper-red, but it seems probable that

Friese's type was merely an extreme example of the same race. The specimens seen are from Costa Rica, with the following data: male, Sixola River (Wm. Schaus); female, Pozo Azul, June 5 (M. A. Carriker).

***Euglossa variabilis*, var. *hemichlora* n. var.**

Female. Like the Costa Rica form just mentioned, but abdomen almost pure green, contrasting with the coppery thorax. The small size (as compared with *mixta*) agrees.

Hab.—Paramba, Ecuador, April, from W. F. H. Rosenberg. (U.S.N.M.) If we regard *mixta* and *purpurea* as species, *hemichlora* is a colour-variety of *purpurea*; but if it turns out that Friese's extreme *purpurea* form is specifically distinct from the Costa Rica insect, then *E. hemichlora* will be the name for the series represented by the Costa Rica and Ecuador specimens before me.

***Euglossa cyanura*, n. sp.**

Female.—Length about 10 mm.; like a small *E. variabilis*, but head and thorax brilliant emerald green, abdomen splendid purple-blue, green at base and apex; black tuft or fleck on scutellum very large, extending from apex three-quarters of distance to base; ocelli much closer together than in *variabilis*, the posterior ones separated by a distance only equal to the diameter of one; labrum very short; the dark spots nearly circular; punctures of mesothorax sparser than in the Costa Rica *purpurea*.

Hab.—Porto Bello, Panama, Feb. 24, 1911. (Aug. Busck; U. S. N. M.)

***Euglossa charapensis*, n. sp.**

Female.—Length about 12 mm.; like *E. cordata*, but distinctly larger and more robust; wings very brown; scutellum more densely punctured, shorter in proportion to its width, less filled out at sides posteriorly, and with the black tuft large and broad, extending as in *E. cyanura*; apical part of abdomen with very strong copper-red tints. The face is distinctly broader than in *cordata*.

Hab.—Rio Charape, Peru, Sept. 17, 1911, (C. H. T. Townsend). This may possibly be Friese's *E. cordata* var. *aureiventris*, but Friese gives no particulars except that the abdomen is shining golden-red; so his insect presumably has the structure of true *E. cordata*. *E. cordata* extends right across South America; it has it from Bahia on the east, and Ecuador on the west.

ON THE SYNONYMY OF *DELPHAX MAIDIS* ASHM.

Through the kindness of Dr. L. O. Howard and the courtesy of the National Museum, Washington, D.C., I have been able to examine a male cotype of *Delphax maidis* Ashm., and can now state definitely that it is synonymous with *Pundaluoya simplicia* Distant. Unfortunately I have not been able to examine a male specimen from India, but Mr. Distant has stated that the Hawaiian and Indian specimens are the same species. I have not seen the type of *Delphax psylloides* Leth., but from the description and figures I conclude that it is the same as *D. maidis* Ashm. It is true that the figure shows no spur on the hind tibia, but this should not over-ride the other characters or the fact that Lethierry placed it in Delphacidae. Green's description of the habits confirm me in this conclusion.

I have now examined specimens of this species from North America, Hawaii, Fiji, Australia, Amboriva, Java, Philippines, Formosa, Malay Peninsula and British India. It is also recorded from Ceylon, Seychelle Islands, West Africa, Cuba, Nicaragua and Brazil. Which of these places is the natural habitat I am unable to say, for in the Malay Archipelago and the Philippines it lives on native grasses as well as *Zea mays*.

I have not seen specimens of *Pundaluoya ernesti* (Kirk.), but from the figure and description I am unable to place it in the same genus with *D. maidis* Ashm. I recognize Kirkaldy's genus *Peregrinus* as distinct from *Liburnia*, and therefore consider the following as the correct synonymy:

***Peregrinus maidis* (Ashm.) Kirk.**

Delphax maidis Ashmead, 1890. Psyche, p. 323.

Delphax psylloides Lethierry, 1894. Indian Museum Notes, p. 105.

Dicranotropis maidis Van Duzee, 1897. Bull. Buffalo. Soc. Nat. Sci., p. 240; Van Dine, 1911, U.S. Dep. Agr., Bur. Ent. Bull. 93, p. 34.

Peregrinus maidis Kirkaldy, 1904. Entom., p. 175; 1906, Haw. Sugar Planters' Assn. Ent. Bull. I, p. 407; 1907, op. c. III, p. 132; Van Duzee, 1907, Bull. Buffalo Soc. Nat. Sci., p. 43.

Pundaluoya simplicia Distant, 1906. Faun. Brit. Ind. Rhyn., III, p. 468; 1916, op. c. VI, p. 134.

Honolulu, Dec. 1, 1916.

April, 1917

F. MUIR.

A NEW MARITIME ANTHOMYID (DIPTERA).

BY CHARLES W. JOHNSON, BOSTON, MASS.

Phyllogaster robustus, sp. n.

♂. Face silvery white, front brownish and occiput grayish pollinose, antennæ, arista, palpi and proboscis black, arista pubescent, thickened near the base. Thorax grayish with three conspicuous brownish lines when viewed from behind, all the bristles prominent, dorso-centrals three, scutellum with two large apical and one lateral bristle. Abdomen grayish, an interrupted blackish median line and large blackish spots on the sides of the second and third segments near the posterior margins, hypopygium prominent, the subanal, phylloid; appendages which extend posteriorly from beneath the third ventral segment are broad and slightly contracted near the middle. Legs black, only the extreme tips of the femora and bases of the tibiæ yellowish, halteres yellow. Wings grayish hyaline, veins dark brown, squamæ white. Length 7 mm.

♀. Similar to ♂, front slightly wider, about one and one-half times as wide as each eye. The blackish abdominal markings are as conspicuous as in the male, the end of the ovipositor is grayish and armed with two hook-like spines. Length 8 mm.

Holotype and allotype, Edgartown, Mass., June 29, 1910; two paratypes, Chatham, Mass., June 30 and July 1, 1904; and two paratypes, Buttonwoods, R.I., June 17, 1912, in the collection of the Boston Society of Natural History. Paratypes from the above localities are also in the Museum of Comparative Zoology, American Museum of Natural History, Academy of Natural Sciences, U. S. National Museum, and the collections of Dr. J. M. Aldrich and the author.

This is one of the most conspicuous of the group of Anthomyids that frequents the grayish sandy beaches of our coast. Its larger and more robust appearance, darker legs and more prominent abdominal markings, readily distinguish it from *Phyllogaster cordyluroides* Stein.

Dialyta flavitibia Johannsen.

This species, which has quite recently been described by Dr. O. A. Johannsen, from the Adirondack Mts., N. Y. (Trans. Amer. Ent. Soc., XLII, 394, 1916), is quite widely distributed. I have collected it at Machias, Me., July 21; Brookline, July 7; Plymouth, July 28, and Cheshire, Mass. Also at Danbury, Conn., June 15, and Ricketts, North Mt., Pa., Sept. 1. I have received it from Winchendon, Mass., July 1 (A. P. Morse); Colebrook, Conn., July 20 (W.E. Britton), and Kearney, Ont., July 7, 1909 (M. C. Van Duzee).

Mailed April 7th, 1917.