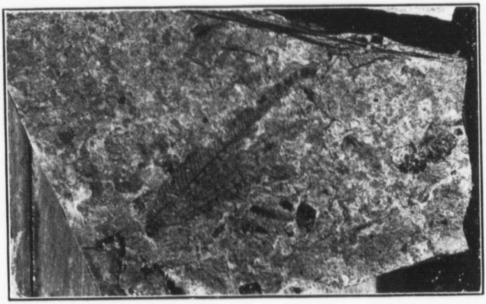
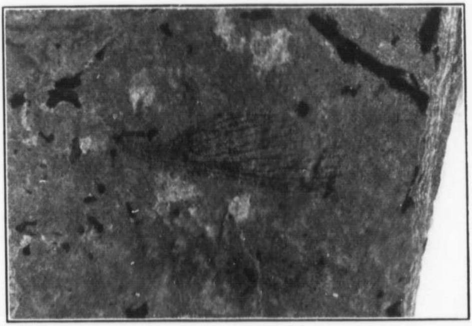


FOSSIL OSMYLUS—O. COLUMBIANUS.



FOSSIL MANTIS—LITHOPHOTINA FLOCCOSA.

The Canadian Entomologist.

VOL. XL. LONDON, OCTOBER, 1908. No. 10.

FOSSIL OSMYLIDÆ (NEUROPTERA) IN AMERICA.

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

The Hemerobiidæ, as understood by most authors, are divided by Handlinsch into several families: Dilaridæ, Osmylidæ, Polystoechotidæ, Sisyridæ, Nymphesidæ, and Hemerobiidæ. Of these, the Hemerobiidæ proper are abundantly represented in the North American fauna; while (according to Banks, as shown by his recent Catalogue) we have two species of *Polystoechotes*, one each of *Sisyra* and *Climacia* (Sisyridæ), and one of *Dilar*. The Osmylidæ are not represented. In the Miocene shales of Florissant we find instead one *Polystoechotes*, two Osmylidæ, and no Hemerobiidæ, Sisyridæ or Dilaridæ. Probably not much importance should be attached to the apparent absence of several groups, but the existence of Osmylidæ, an Old World group, is significant, and in harmony with other facts, such as the occurrence of a species of Nemopteridæ in the shales.

Scudder described one of the Florissant Osmylids as *Osmylus requietus*. He prefaced his account (Tertiary Insects, p. 162) with the following remarks: The species we have placed here agrees somewhat closely with the species from amber, *Osm. pictus*, referred by Hager to this genus, but differs from it in its lack of any diverse colouring in the wings, as well as in some minor points of the neuration, as in the distance of the outer series of gradate veinlets from the outer border of the wing, their regular connection with one of the basal branches of the radius, the regularity of the inner series of gradate veinlets, as well as the structure of the cubital region. The two Tertiary species, however, agree together, and disagree with the living types in the simple character of the costal nervules, the much smaller number of sectors, and the character of the basal half of the wing, where the sectorial interspaces are regular and broken by few and irregularly scattered cross-veins, instead of being so numerously supplied as to break up the field into an almost uniform and minute reticulation. The two fossil species would therefore appear to form a section apart.

I found *Osmylus requietus*, Scudd., in the shale at Station 13. The specimen agreed with Scudder's type, except that it was a little smaller, the wings 14 mm. long instead of over 15. The insect differs conspicuously from typical *Osmylus* in the characters mentioned by Scudder, and may, I think, form the basis of a new genus *Osmylidia*. Whether the species from Baltic amber should be considered strictly congeneric, I will not venture to decide. In many of its characters this genus is closely allied to the very much older *Nymphites Craneri*, Haase, from the lithographic stone of Bavaria; indeed, it may fairly be said that *Osmylidia* is intermediate between *Nymphites* of the Jurassic, and *Osmylus* of the present day.

Osmylidia requieta (Scudd.) is, however, not the only Osmylid fossil at Florissant. At Station BB, this year, my wife found a much larger species, represented by a wing, of which enough is preserved to show the generic characters. This wing is about 25 mm. long, with dark veins, and dark spots very much like those of the living *Osmylus chrysops*. Toward the apex, the costal region is irregularly and diffusely maculated; in the middle region of the wing there are two small round spots, the first about 6, the second about 15 mm. from the base; toward the hind margin, 10 mm. from the base, is a rather larger spot. All of these spots correspond with those existing in *O. chrysops* (anterior wing). As regards the venation, many of the costal nervules are forked, exactly as in *O. chrysops;* the cross-nervures in the region of the media are numerous, as in *O. chrysops;* and, in short, the insect is a perfectly typical *Osmylus*, closely related to the living species. The cross-nervures between the radius and radial sector are most of them heavily clouded; the oblique branches of the radial sector leave at approximately regular intervals; the costal area is perhaps not quite so full as in *O. chrysops*. This insect, which proves that genuine *Osmylus* once inhabited the Rocky Mountains, may be termed *Osmylus Columbianus*, n. sp. I take this opportunity to add notes on two other Neuroptera.

(1) *Hemerobius moestus*, Banks, 1897 (not of Hagen, 1854, a fossil species), must be called *H. bistrigatus*, Currie, 1904.

(2) *Megaraphidia*, Ckll. (fossil at Florissant). The characters of this genus are approached by the living *Raphidia rhodopica*, Klapálek, Trans. Ent. Soc. Lond., 1894. It is possible that *Megaraphidia* should be reduced to a subgenus.

THE FIRST AMERICAN FOSSIL MANTIS.

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

Only two species of Mantidæ have been described from Tertiary formations: *Mantis protogæa*, Heer, from the Upper Miocene of Œninger, and *Chætoessa brevialata*, Giebel, from Baltic amber. *Chætoessa*, or more properly *Chæteessa* (Burmeister, 1838), is known to-day by three species, all from Brazil; it is not very likely that the amber insect is really congeneric. Heer's *Mantis protogæa* is a very poorly preserved object, from which little can be learned. The discovery of a nearly perfect tegmen in the Miocene shales of Florissant adds the group to the fauna of the American Tertiaries. The venation is of a comparatively simple type, and may be compared with that of the E. Indian and African genus *Gonypeta*, as figured by Handlirsch (Fossile Insekten, Part 1, pl. 2, f. 5). I sent a drawing of the venation of the fossil to Mr. A. N. Caudell, calling attention to its supposed affinities, and asking him whether he could find any other genus showing stronger resemblance. He kindly replies: "I know of no modern genus more likely to contain it than the one you mention. I presume without doubt it is an extinct form representing a new genus." In the meanwhile, however, I have received from Mr. Rehn a copy of his figure of *Photina brevis*, from Paraguay (Proc. Acad. Nat. Sci. Phila., 1907, p. 157), and this is apparently as near to the fossil genus as *Gonypeta*. The most that can be said about the fossil is that it represents a generalized form of the subfamily *Mantinæ*, apparently distinct from, though allied to, those now living.

Lithophotina, n. g.

Costa little arched; costal region narrow, reticulated, so that the cells above the subcosta (very irregular) are mostly double; subcosta terminating on costal margin about 2½ times as far from base as from apex; radius ending a little above apex of wing, *not at all branched below* (branched below, forming a radial sector,* in *Gonypeta* and *Photina*), but giving off about three very oblique branches above, the last of these being itself branched; media branching a little before the middle, the upper branch again branched about 5½ mm. from the apex, *but the lower simple;* cubitus with three long branches, of which the first is branched about 10 mm. from the base of the tegmen; anal with three branches,

*I here follow Handlirsch's interpretation (for *Gonypeta*), but comparison with the fossil suggests that the so-called radial sector is really the main stem of the radius, while the supposed end of the radius is the last of the upper branches.

the first two united for about 1½ mm. beyond the separation of the lowest; anal lobe obliterated, but I do not think it was very large.

Lithophotina floccosa, n. sp.

Length of tegmen about 21½ mm., width 7; apparently subhyaline, with brown veins, and obscure, irregular brown mottling.

Florissant; Miocene, Station 14 (*W. P. Cockerell*, 1907).

THE GENUS EUPITHECIA AND ITS ALLIES.

BY RICHARD F. PEARSALL, RROOKLYN, N. Y.

The present paper must necessarily be, in part, of a tentative character, for the active attention which has been accorded the Geometrinæ of late has resulted in giving us many new species, and their affiliations are yet to be wrought out. My object is partially to clear the way for future and more mature work. Of the genera allied with *Eupithecia*, Dr. Hulst has placed two in our list, one of which, in the light of recent research, must be excluded therefrom, and the other greatly restricted, viz., *Chloroclystis*, Hubn., and *Gymnocelis*, Mab. The former is represented by a single species, *inconspicua*, Hlst., the female type of which is in the Hulst collection at New Brunswick, N. J. Upon examination, it proves to be the female of *Selidosema Wrightiaria*, Hulst (Dyar, 3829), a species described in 1888 from four males, taken in Southern California. It has vein 8 of hind wings not connected with cell, and vein 5 wanting. *Inconspicua* becomes therefore a synonym, and the genus is left without a known representative in our fauna, and must be dropped. This conclusion was first reached through study of a small series of *Wrightiaria*, taken at Pasadena, Calif., in my own collection, and later confirmed by reference to the type.

Gymnocelis has been the subject of a recent paper by Mr. J. A. Grossbeck (Journ. N. Y. Entom. Society, March, 1908), presenting facts relating to the various species under it, which are in line with my own observations, and show conclusively that *minuta*, Hlst., is the only species which we know at present as fitted to remain in the genus. The others form a group, as he points out, not possible of combination with *Eupithecia*, even if it were desirable to place them in that already overcrowded genus, and although in individuals of one species, *remorata*, Gross., the upper spurs of the hind tibiæ may be absent, in other respects it does coincide with the group, nevertheless it appears to me that they should be assembled under a distinct genus. For this genus I propose the name *Nasusina*, the nose-like prominence of the front being common to all, with the following limitations :

Nasusina, n. gen.
Type *inferior*, Hulst.

Fixed.	*Variable.*
Antennæ, flattened, shortly ciliate, slender.	Thorax, untufted.
Palpi, moderate.	Abdomen, with low tufts, or none.
Front, horizontally projecting, with pad or cushion of scales, rounded above clypeus.	Venation, hind wings, 6 and 7 long-stemmed, 3 and 4 widely separate.
Tongue, developed.	Accessory cells, one.
Fore tibiæ, unarmed.	
Hind tibiæ, end spurs normal, upper spurs much reduced, or absent.	
Hair pencil in ♂ absent.	
Venation, hind wings, vein 5 present, vein 8 anastomosing with cell nearly cell's length.	

The species at present recognized are :

inferior, Hulst.
desperata, Hulst.
remorata, Gross.
gypsata, Hulst.
discoidalis, Gross.
artestata, Gross.
mellissa, Gross.

The type form is constant so far as I can determine, but the species are rare in all collections. Of the type, I have not seen more than twenty examples, ten of which are in my own cabinet.

Eupithecia, the central genus, should be left for later assemblage into a series of groups or sections, having as a basis for separation, for instance, the biciliation of the antennæ as in the *lachrymosa* group, or even minor characters, some one thing which will serve to include an orderly series. For the present this is impossible, until the species themselves are determined, and especially does this apply to the many forms inhabiting our western territory.

NOTES ON CALIFORNIA BUTTERFLIES.

BY KARL R. COOLIDGE, PALO ALTO, CALIF.

Observations on the Life-history of Chrysophanus gorgon, Boisd.

Chrysophanus gorgon flies throughout California in the foothills and lower mountains, not inhabiting the valleys and plains to any extent. It is also found in Nevada. Like other *Chrysophanids*, such as *editha*, *zeroë* and *cupreus*, it has a rather wide distribution, yet is very local. I had collected over two years in this county before I was aware of its existence here. Mr. J. G. Grundel, at Alma, in this county, wrote me last season that it was quite common there at an elevation of several thousand feet, on the dry, hot hillsides, where its food-plant thrives. Several days later I caught a fine fiery ♂, the only one I have ever seen in the valley proper. Of the life-history, Mr. Grundel has published a few brief notes (Entom. News, XV, 97, 1904), and I have given a description of the egg, which I here repeat, in my review of the genus.*

Egg.—Diameter about 1 mm.; colour dirty creamy-white. Hemispherical, flattened at base, marked by numerous polygonal or semicircular depressions. The food-plant is a species of *Eriogonum* (not *Erigonum*), probably *nudum*, Douglas, a genus closely related to Rumex, which is a common food-plant for *Chrysophanids*. The plant grows only on the very dry hillsides, and it is in such places that *gorgon* may be found abundantly. The eggs are laid in the forks of the plant, only one being laid in a single fork by the same female, but the act is repeated by others until there may be as many as seven or eight. On the last day of May this year Mr. Grundel and I were collecting in the Santa Cruz Mountains, where we found *gorgon* unexpectedly abundant and fresh. The females are ordinarily quite rare, but we took the sexes in about equal proportion. Several times I observed a female ovipositing. Alighting on the stalk, she slowly backs up until she reaches the fork, when, curving her abdomen downwards, she deposits an egg. In late May, June and July oviposition takes place, and the young larvæ normally hatch towards the end of August. They are nocturnal, hiding in the daytime in the leaves and rubbish at the base of the plant. They very readily feign death, and sometimes, when disturbed, remain motionless for hours at a time. At first the larvæ feed on the upper sides of the leaves, which they greatly resemble in colour. Later, after several instars, they become lighter, and they then feed on the under surface, to which they are now

*Psyche, XIV, 118, 1907.

similar. They grow very slowly, as the eggs hatch in late August and the larvæ do not attain maturity until the latter part of April and early May.

Mature Larva.—Onisciform, attenuated at the extremities, with the posterior end well rounded; thickly pilose, hairs somewhat clavate; colour light whitish-green, but slightly darker than the under side of the leaves of the food-plant. Segments sharp; head minute, pale, retractile within the first segment. Dorsal surface convex, with a wide but faint dorsal band in which is contained a narrower darker line; ventral surface flat, hiding legs and prolegs, somewhat lighter than above; a creamish-white lateral stripe just above the spiracles. Length about 18 mm.; width about 8 mm. Pupation takes place on the under side of the lower leaves and in the leaves and rubbish on the ground. The pupa is suspended by the anal extremity and with a median loop. Two of my larvæ pupated freely among the leaves in their boxes.

Pupa.—Short, stout, of the same general colour as the larva, slightly ashen posteriorly; abdomen with numerous rather faint black points, arranged in longitudinal series. Length, 10 mm.; width, 5 mm. I had but three pupæ, and as these emerged during my absence, my description is drawn from a few rough notes. The imagoes vary considerably in colour, the females particularly. One specimen which emerged from a pupa, the larva of which was obliged to pupate prematurely on account of lack of food, expanded but a little over one inch. The average expansion is from 1.25–1.30 inch. I have also in my collection a striking ♂ aberration, in which the spots of the under surface are greatly produced into long black dashes, somewhat after the fashion of the inferior surface of the secondaries of *Lycæna sagittigera*; above it is quite normal.

The Larva and Pupa of Lycæna piasus, Boisd.

As far as I am aware nothing is known of the life-history of *piasus*, except that Lembert (Entom. News, VI, 138, 1895) writes of its oviposition, "on the racemes of the *Lupinus densiflora*, and on the bracts of *L. chamisonis* after they have fruited." He also writes, "*Lycæna* var. on the inner side of the unopened buds of the thrysus of the *Æsculus Californicus* (Buckeye)." The latter is also probably *piasus*, as I have several times this season found the larva on *Æsculus* blossoms. On the first of June, while on a collecting trip, I found several full-grown larvæ, which I collected, intending to get a description of them. Both had pupated, however, before I returned home. The larva, as I remember it, was of a light greenish-white colour, somewhat pink-tinged. It was slug-shaped, attenuated, the dorsum convex, the ventral surface flattened, the legs retractile. Pupation took place freely among the leaves.

Pupa.—Colour dark brown, somewhat lighter on the ventral surface. On abdomen several indistinct longitudinal series of black spots. Posterior and anterior ends well rounded; ventral outline straight; dorsal outline, except for a depression on the mesonotum, very evenly rounded. Length, 7 mm.; greatest breadth, 4 mm. One larva pupated June 1st, and the perfect insect emerged June 23rd.

A SECONDARY SEXUAL CHARACTER OF APHIDIDÆ, II.—SUPPLEMENTARY.

BY JOHN J. DAVIS, OFFICE OF THE STATE ENTOMOLOGIST, URBANA, ILL.

Since the publication of "A Secondary Sexual Character of Aphididæ," in CAN. ENT., August, 1908, Dr. John B. Smith has called my attention to two important papers on the tibial sensoria, which I overlooked in the review of previous literature on the subject.

In Science for January 20, 1893 (Vol. XXI, p. 31), Dr. Smith speaks of having found these "sensory pittings" on the hind tibiæ of several species of the oviparous female aphides, and that "these structures differed in each of the species examined in size, arrangement and number." He quotes a letter from Dr. C. V. Riley, to whom he had written for data as to the occurrence of these sensoria in other species, which states that he had found these "pits" present in *Aphis mali*, *A. pruni*, *Myzus mahaleb*, *Siphonophora rosæ*, *Siphonophora sp.*, on rose; *Callipterus sp.?* on oak; in *Phyllaphis fagi*, and in *Melanoxanthus salicti*, but had not found them present in *Schizoneura*, *Glyphina*, *Pemphigus* or *Phylloxera*. Dr. Smith further mentions and figures these tibial sensoria, in Bulletin 143 of the New Jersey Agricultural Experiment Station, pp. 19–20, 1900, as occurring on the hind tibiæ of the oviparous females of *Aphis mali*.

Mr. R. A. Vickery, in "A Comparative Study of the External Anatomy of Plant Lice" (separate from the 12th Report of the State Entomologist of Minnesota, May, 1908), says, in his discussion of the legs of the *Aphididæ*, p. 11, "In the oviparous female of *Nectarosiphum rubicola*, *Rhopalosiphum hippophaë*, *Callipterus trifolii*, *Toxoptera graminum*, *Macrosiphum pisi* and others the tibia of the hind leg is swollen for its whole length, and is thickly dotted with clear pits, which closely resemble the sensoria of the antennæ. The tibia in this case has some function in connection with oviposition."

A NEW SPECIES OF THE TORTRICIDÆ.

BY PROF. C. H. FERNALD, AMHERST, MASS.

Argyroploce abietana, n. s.—Expanse of wings, 21–23 mm. Head, thorax and fore wings dark brown, varying somewhat in intensity of colour, some specimens being lighter than others, caused more or less by yellowish-brown scales intermixed with the dark brown. This is especially noticeable in specimens taken in Amherst, Mass., as compared with specimens taken in Maine. The fore wings are crossed by three silvery-white bands, the first of which, arising from the basal fourth of the costa and ending at the basal third of the hinder border, is divided by about three fine, thread-like, irregular dark brown lines extending across the wing through this band which receives, near the middle, an outward angle or tooth of varying form, from the basal brown part of the wing, and there is sometimes a similar one on the outer side. The second band arises from two small geminate white spots on the costa above the end of the cell, the stripes from which unite at the end of the cell, and this band ends at the outer fourth of the hind margin, and has a dark brown tooth extending into it on the inner side on the median vein. The sides of this band are irregular, caused by indentations from the dark brown on each side. On the costa, beyond the costal origin of the middle band, are two equidistant, geminate, silvery-white streaks, the first of which is short, while the other extends downward, giving off two branches in succession, to the outer margin above the middle, and is often connected below with a similar stripe extending up from the anal angle, and also giving off branches to the terminal margin. Fringes dark fuscous, with a darker extrabasal line.

Hind wings and abdomen above fuscous, with lighter fringes, which have a darker extrabasal line. Under side of fore wings fuscous, with the geminate costal spots reproduced beneath. Under side of hind wings, thorax, abdomen and all of the legs fuscous, the tarsal segments tipped with whitish.

Described from three male specimens taken in Amherst, Mass., one of which I make the type, and four males from South Paris, Maine, sent to me by Miss Edith M. Patch, Entomologist at the Maine Agricultural Experiment Station at Orono, Me. Miss Patch wrote me as follows: "On May 20 I received from South Paris, Maine, webbed twigs of spruce containing pupæ of a Tortricid which had ruined some small spruces. The moths began to emerge May 29."

This insect occurs in Amherst on Norway spruce. The larvæ were found May 7 to 10, 1891, and the following description was prepared by Miss Rose L. Davis :

"The larvæ of this insect were found on young Norway spruces on the Agricultural College grounds, under white silken webs at the base of the leaves, which were mined by these minute larvæ. A small hole was made on one side near the base and the entire contents were consumed, leaving the leaf dead and of a dull reddish colour.

"The larvæ, when full-grown, are about 7 mm. in length, cylindrical in form, with the head of medium size, of a shining yellowish-brown colour, and with a few fine hairs scattered over the surface. The rest of the body is of a light greenish-brown colour, semitransparent. The thoracic and anal shields are of a pale greenish colour, with the usual fine hairs on these and over the surface of the body. When disturbed they quickly let themselves down by a silken thread. The moths emerged June 2 to 5, 1892."

I received four male specimens in poor condition from Prof. R. A. Cooley several years ago, taken in Montana, but without any particulars as to food and habits. These differ in no specific way from the Maine specimens sent me by Miss Patch, except in size, the wing expanse of which is 14–15 mm.

THE EARLY STAGES OF *SAMIA COLUMBIA NOKOMIS*.

BY W. J. FREEDLEY, JR., PHILADELPHIA, PA.

Eggs deposited April 18, 1908 ; length, 2.6 mm.; breadth, 2 mm.; depth, 1.5 mm. Flattish, and with a slight compression top and bottom. Colour of egg apparently creamy-white, but very much discoloured by the brown adhesive matter which attaches it to the object on which found. Eggs much smaller than those of *S. Cecropia*. Larva, when first emerged, from 3 to 4.5 mm. in length, glossy-black, with light green shading at the base of tubercles. The tubercles glossy-black, with from 3 to 7 spines also glossy black. Head large, glossy black, sparsely clothed with hairs. Within two hours the larvæ lost all the green shading, changing to glossy black all over. On the fourth day the segments had a faint ochraceous shade showing, which on the sixth day developed into a strong ochre-yellow ground colour for the larvæ, which still had glossy-black head, tubercles and spines. At the end of the sixth day the length was 10 mm.

The tubercles were numbered as follows: Eight on each of first five segments, six each on next five, five on the eleventh, with the dorsal one large and prominent, six on the twelfth.

On the eighth day the larvæ stopped feeding and showed signs of the first moult; anteriorly they had a slightly swollen appearance, owing to the head being drawn into and partly under the first segment. On the ninth day the swollen appearance increased, and the larvæ diminished in length; all, with the exception of two, losing the bright ochre-yellow colour, which was replaced by a dull yellowish-brown, shading darker near the base of the tubercles.

On the tenth day all but five of the larvæ had moulted. Immediately after moulting they came out a brilliant orange-yellow, with head, legs and tubercles translucent, and black spines on tubercles. At this stage the length equals 13 mm. On the eleventh day increase in size was the only change noticed.

On the twelfth day the largest larvæ were from 14 to 17 mm. in length, had moulted once, and the colour faded from ochre-yellow to a pale canary, with the joints between segments showing pale pea-green. Head, tubercles, spines and a band near the base of the abdominal legs, also the prolegs, glossy black.

On the thirteenth day the larvæ were from 17 to 18 mm. in length; no other change; but on the fourteenth day the largest stopped feeding, evidently ready for the second moult. Head drawn into and under the first segment; colour pale yellow, with slight greenish tinge between segments.

On the fifteenth day the largest larvæ moulted, changing within two hours to a greenish-yellow, but on the sixteenth day this changed to a pale pea-green, with a slight bluish tinge dorsally and canary-yellow at base of tubercles. The length was from 20 mm. to 23 mm. A slight increase in size was the only change noted on the seventeenth day, the largest being from 26 to 29 mm. in length. All the larvæ fed ravenously on *Salix alba* (cf. Canad. Entom., Vol. X., pp. 43–44). During the afternoon one of the larvæ, a very large one, showed signs of being ready to moult.

Except for a slight increase in size, no change was observed during the next two days, but on the twentieth day they passed the third moult. Length from 28 mm. to 31 mm.; head yellowish-green, spotted slightly with dark brown; ocelli black; prolegs yellowish-green; thoracic legs a glossy black. Segments clear bluish-green; first segment with eight black tubercles with black spines; from the second segment to the tenth, inclusive, the two dorsal tubercles bright yellow with black spines; the large dorsal tubercle on the eleventh segment the same colour; all the lateral tubercles and all the tubercles on the twelfth segment glossy black, with black spines.

On the twenty-first day the only change noticed was that the thoracic legs were greenish-yellow with glossy-black tarsi, but on the twenty-second day the increase in size was very marked. The length had increased from 36 mm. to 44 mm. At this stage the larvæ, when resting, assumed nearly the same position as when ready to moult, but the head was not quite as much withdrawn into the first segment. On the following day the larvæ were preparing to moult, assuming the same position as usual, with head drawn into and under the first segment, contracting to the length of 33 mm.

On the twenty-fourth day the larvæ moulted for the fourth time, coming out a greenish-slate colour, with head translucent pea-green, dorsal tubercles ochre-yellow, lateral tubercles light blue. On the twenty-fifth day the larvæ were from 48 to 52 mm. in length; head yellow-green; first segment pea-green; segments 2 to 12, inclusive, slate-green; segment 13, prolegs and anal prolegs pea-green and sparsely clothed with hairs; thoracic legs clear green with black tarsi; mandibles clear green with a slight pinkish tinge. Tubercles on first segment small, glossy black, with no spines; the two dorsal ones on 2nd, 3rd and 4th large and prominent, ochre-yellow, with side towards head glossy black, with eight glossy-black spines. Two dorsal tubercles on segments 5–10 ochre-yellow, with from one to three glossy-black spines; large dorsal tubercle on segment eleven ochre-yellow, with eight black spines; all tubercles on 12th segment light blue, with from two to five spines; two dorsal tubercles on 13th segment, glossy black, with light blue tips and black spines. Lateral tubercles on segments 2, 3 and 4 light blue, with black spines; on segments 5–10, inclusive, pearl colour, with from one to three spines; all spines throughout glossy black.

On the twenty-seventh day length was 52 mm. contracted, 60 mm. extended; no other change. On the twenty-eighth day a slight increase in size was the only change noted; but on the twenty-ninth day the increase was much more marked. At this time the length was from 68 mm. contracted, to 76 mm. when in motion; the larvæ were very healthy looking, and eating most of the time. On the thirtieth day there seemed no change, except that the largest showed less inclination to eat. On the thirty-first day all the larvæ were feeding well again, and the length was from 73 mm. contracted to 84 mm. when in motion. At this stage the segments were exactly the colour of the under surface of the leaves of *Salix alba*, a light gray-green. Otherwise there was no change. On the thirty-second day the only change noticed was that two of the larvæ stopped feeding, emptied their intestines of a very dark viscous fluid, and began to wander around the jars in which they were confined. On the thirty-third day, at 11 a.m., one of these began to spin, and at 7.30 p.m. the other did the same. On the thirty-fourth day the remainder of the larvæ, with one exception, fed ravenously, and on the thirty-fifth day one more cocoon was found in the jar. This cocoon seemed very much lighter in colour than the other two, possibly owing to its being spun on a white handkerchief, instead of directly on the side of the jar, as in the case of the other two. At this time the remaining larvæ were clear pea-green, with a slight bluish tinge dorsally; otherwise the colour was unchanged.

On the afternoon of the thirty-sixth day another of the larvæ began to spin, but the rest of the lot kept on feeding. The one spinning did not empty its intestines, nor did it wander around the jar. On the thirty-seventh day another cocoon was found, and the remaining larvæ all showed signs of spinning, with the exception of one. Another cocoon was found on the thirty-seventh day, and still another on the thirty-eighth. One larva died from no apparent cause, as it simply refused to feed and gradually shrivelled up. This larva was examined carefully with a glass, but showed no signs of being parasitized; the only peculiar thing noted was that it was continually passing a clear watery fluid, and no regular "balled" frass.

The cocoons which were spun directly on the glass of the jars were very free of the silvery threads so characteristic of Columbia, the silver-silk being apparently used up in making a mat on which to construct the cocoon. This mat, stretched over a space of about 4½ inches by 2¾ inches, was very loosely laid at the outer margin, but next to the cocoon was quite dense. Those cocoons formed on the twigs provided for the purpose were a strong reddish-brown colour, with streaks and patches of silvery-silk distributed over the surface of the cocoon. The inner cocoon was of very close texture, much like parchment, and of a rather light coffee colour; very different from the inner cocoon of Cecropia, which is very fluffy and of a light straw colour. The size of the cocoon is as follows: Length from 2 to 2⅛ inches; thickness from 1⅞ to 2⅛ inches. It was rounded at one end and drawn out to a point at the other, with the effect of a valve at the pointed end; the inner cocoon was egg-shaped.

The above description is based on larvæ raised from moth to cocoon by myself at the Academy of Natural Sciences of Philadelphia, through the courtesy of Dr. Skinner, the entomological curator. Dr. Skinner kindly turned over to me a number of eggs of this fine moth, seven of which I succeeded in bringing through the various larval stages.

NOTE BY DR. HENRY SKINNER.—The Rev. Clement Hoyler, of Strathcona, Alberta, kindly sent me a number of these cocoons last March. He says of them: "About 75 per cent. of the cocoons I obtained this season were attached to young willow shoots, so far as they were brought to me attached to anything. The remainder were attached either to rose bushes, balsam or trembling poplar, and in individual cases to the stalks of an herb, the twining stem of *Lonicera parviflora* and a tamarack fence-post. In all cases the cocoons were either in the midst of or comparatively near willow bushes. As to their height above ground, the distance ranged from 8 to 18 inches as a rule." The moths are smaller than *Columbia* and much brighter in colour. Dr. Fletcher writes me that this variety was described as *Platysamia Columbia nokomis* in "The Biological Review of Ontario," in October, 1894. As this publication is not in our library, I have been unable to examine it. The larvæ present many differences from the descriptions of those of *Columbia* in the literature The larvæ were given a variety of plants,* but refused to feed on any kind but *Salix alba*, and flourished on it.

ENTOMOLOGICAL RECORD.

With Mr. Gibson's assistance, I have been taking notes during the past season of all rare captures of insects made in Canada, or of insects which have occurred at unusual seasons or outside their known limits. These will be worked up for the Entomological Record for the year, as usual. I shall be obliged to all readers of the CANADIAN ENTOMOLOGIST who will send in to me to the Central Experimental Farm, at Ottawa, any records suitable for this purpose. I would also ask those sending in records in the orders studied by them, to prefix in all cases the number in the recognized check list of the order, or in the case of Diptera, the page in Prof. Aldrich's Catalogue. This is a small matter for those sending in the lists, but is a much more serious undertaking when all of these lists have to be consolidated and worked up in a short time after all the lists have been received.—J. FLETCHER, President Ent. Soc. Ont.

*Ash, Norway Maple, Alder, Apple.

MOUNTING INSECTS FOR THE MICROSCOPE.

BY J. R. DE LA TORRE BUENO, WHITE PLAINS, N. Y.

Dr. Packard's little book, "Entomology for Beginners," while not exactly adapted to mere tyros, is really most suggestive to such as have gone more deeply into the science. Its last chapters on dissection and the preparation of insects for the microscope are especially useful, and contain many helpful hints. From them I gathered my first notions of the use of alkaline solutions for cleaning material, and of turpentine and carbolic acid as cleaning and fixing agents. From Professor Gage's book, "The Microscope," I learnt much of technique, and among other things the use of carbol turpentine.

In my work in breeding water-bugs, it has been my endeavour to dissect where possible or necessary, and to mount entire where the size of the insect permitted, for the microscopic study of anatomy, which is a far more satisfactory method than the examination of the entire insect by means of a hand magnifier, or even under the microscope by reflected light.

My first work was very orthodox. My dissections and bugs were passed through different grades of alcohol, then through turpentine, and finally cleared by means of oil of cloves. From Professor Gage's book I absorbed the idea that all the gradual changes in the alcohol might be advantageously omitted, which was done, and by various steps not necessary to detail, my present procedure was evolved. It must be borne in mind, however, that it is not my aim to bring out details of internal anatomy, such as muscular structure, nervous or digestive systems, etc., but to prepare the insect for the study of its external organization.

The simplest process is by the use of carbol turpentine. This I have prepared by mixing approximately equal parts of carbolic acid crystals with spirits of turpentine. Gage's exact formula for this is 40 cc. carbolic and 60 cc. turpentine. Into this the living insect is plunged, and it ceases to struggle in a minute or less. In general, the legs and wings are spread out when the insect finally succumbs, and no further arrangement is necessary for mounting. After 24 hours or so, or even as little as 12, it is possible to mount. In fact, the longer the time that elapses, the harder and more brittle the insect becomes, so that there is danger of breaking off appendages by the mere weight of the cover glass. Flies killed in this medium extrude the tongue most beautifully.

For dead insects from the cyanide bottle the method is slightly different. These are put at once into 95% alcohol, and after dehydration for not less than 24 hours, are drained on a piece of filter paper and put into pine spirits of turpentine, or sometimes into the carbol turpentine, for some hours. I generally leave all this material overnight or longer, according to the time I have for mounting.

All mounts are in balsam in xylene (xylol), without pressure, except for flat objects. If a sufficient amount of balsam be used, the insects will not be crushed out of shape. For bulky ones, however, a cell of some kind is advisable.

In the work on the respiratory system of *Belostoma* and of *Ranatra*, while the final dissections were mounted by the alcohol and turpentine method outlined above, the specimens were obtained as follows: The bug preserved in alcohol was cut longitudinally in half by means of a scalpel or a pair of scissors. The two halves of the body were then carefully boiled in a strong solution of caustic potash after the alcohol was quite thoroughly washed out. This, of course, largely takes place in the preliminary dissection. The boiling potassium hydrate dissolves out all the viscera and leaves the entire tracheal system untouched *in situ*. Care must be exercised, however, not to carry the solution too far, as otherwise the tracheæ themselves will be attacked. It is now a simple matter to dissect out tracheæ and spiracles for mounting. The dissections must be repeatedly and carefully washed in clean water, which must be changed each time, until not a trace of the alkali remains, before being put into plenty of 95% alcohol. The turpentine clearing is the next step, and the preparation is ready for mounting.

Mounts of the false spiracles of *Ranatra* thus prepared show the occluding membrane of the round perforations and the slit-like true spiracle situated in the widened peritreme.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The forty-fifth annual meeting will be held at the Ontario Agricultural College, Guelph, on Thursday and Friday, November 5th and 6th. On the former evening there will be a public meeting in Massey Hall, when addresses will be given by President Creelman, of the College; Mr. C. C. James, Deputy Minister of Agriculture for Ontario; Dr. Fletcher, President of the Society, and an illustrated lecture by Dr. E. P. Felt, State Entomologist of New York. Morning and afternoon sessions will be held, at which papers on scientific and economic entomology will be read, and officers will be elected for the ensuing year.

GENERA INSECTORUM, Fascicule 72.—Innumerable errors mar the pages of this Fascicule. While mostly of minor importance, these mistakes are, nevertheless, decidedly objectionable. Many of them would have been eliminated had it been possible to secure a second proof of the text. This, however, the publisher refused to send, in spite of a very urgent request from the writer to do so. The most serious error noted is on p. 25, 6 lines from the top, where *Psorodonotus radiata* should read *Psorodonotus pancici*.—A. N. CAUDELL.

SOME REMARKS ON THE PHYLOGENY OF THE HEMIPTERA-HETEROPTERA.

BY G. W. KIRKALDY, HONOLULU, HAWAIIAN ISLANDS.

The classification of the Heteroptera, as usually adopted by the Systematists of to-day, seems to be somewhat far from representing the real phylogeny of the suborder. Schiödte's illuminating paper of 1869 has been little followed by the majority of workers, who seem to have misapprehended some of the salient points.* The order of families adopted by Lethierry and Severin, that put forward by Osborn, and that used lately by Distant, which is practically a copy of Saunders's, are all apparently unnatural.

Schiödte's divisions are based on the method of articulation of the hind coxæ, and appear to me to be natural, sharply limited, and probably very ancient. Which of the two groups is the more generalized, however, is not easy to decide.

The following brief notes are intended to stir up some thought on the subject. I am obliged to take as granted, or very probable, certain unproved points, as this is simply a summary, but later on I hope to treat the subject in detail.

My conception of a typical, rather primitive, Heteropteron, say of late Carboniferous time, is of an insect not very distinct, perhaps, from a modern Cimicine (Asopine), such as *Cimex* (*Picromerus*) *bidens*.

*Sharp, in reproducing Schiödte's table, places the "Capsidæ" in the Trochalopoda. No wonder that Sharp finds that "Schiödte's characters do not divide his two divisions at all sharply!"

This primitive form would, as an adult, be rather strongly and heavily built; the tegmina would be sharply divided into three areas, viz.: clavus, corium and membrane, the latter being membranous and numerously veined, the two former coriaceous. The antennæ would be 5-segmentate,† the base concealed under the head; the labium (*rostrum*) would be free, and would be composed of four segments; the tarsi would have three segments, and the metasternal glands would be very strongly developed. The nymphs would also possess well-developed stink-glands, three in number at least, and paired.

This development of the stink-glands, the sharp limiting of the membrane from the coriaceous part of the tegmina, the quadrisegmentate labium, etc., are, in my opinion, fundamental characters of a typical Heteropteron, and it is in those forms which are obviously highly modified, that any departure from the above is specially shown. Entirely membranous tegmina are found in Gerridæ and Enicocephalidæ, obviously highly-modified families. It is in the Gerridæ also, and the true water-bugs, that degeneration of the metasternal stink-glands has proceeded so far.

Osborn, in his classification, has allied the Miridæ with the Pyrrhocoridæ, the Acanthiidæ with the Gerridæ, and the Aradidæ with the Clinocoridæ, but these alliances are certainly superficial, not phylogenetic.

The classification adopted by Distant is entirely artificial, as well as inaccurate in details. He retains the discredited divisions of "Gymnocerata" and "Cryptocerata," and proceeds at first in the former by separating off the Gerridæ and the Næogeinæ, because the sternites are clothed beneath with silvery-velvety pubescence! The Cimicidæ are then separated off by the scutellum reaching at least to the base of the membrane (though this is not the case in at least some Urostylinæ), the scutellum in the other families being stated not to reach the base of the membrane, although this is certainly the case in most, if not all, Macrocephalidæ and Aradidæ. The Acanthiidæ are associated with the Reduviidæ, the Aradidæ with the Macrocephalidæ, and the Nepidæ with the rest of the Waterbugs.

†The possession of only four segments in almost all Heteropterous nymphs may prove that the adults of my supposed primitive Heteropteron really had only the same number, but it is a matter of little consequence.

In 1907 I proposed a classification of two superfamilies in each main division, and six families in each superfamily. My friend, Dr. Bergroth (*in litt.*), suggests that in the Cimicoideæ, the Cimicidæ form a superfamily, the Tingidæ another, the remaining three families another. This is very probably more correct, but it has this objection, viz.: that its adoption would obscure the much closer mutual relationship between these three "superfamilies" than between any of them and the Nepoideæ. Since proposing the above classification, I have acquired some specimens of *Urostylis*, which was previously unknown to me in nature. This genus seems to me to be a very aberrant Cimicid, and in some respects to be more allied to the Lygæidæ. At present I propose to establish eight families in the Cimicoideæ, viz.: Cimicidæ, Cydnidæ,* Urostylidæ, Aradidæ, Lygæidæ, Pyrrhocoridæ, Myodochidæ (=Geocoridæ) and Tingidæ. The Tessaratominæ lead to the Aradidæ, the Urostylidæ to the Lygæidæ. More study of nymphal characters in Cydnidæ and Urostylidæ is needed, indeed, in all the families.

My classification may stand for the present as follows :

Superfamily I.—CIMICOIDEÆ.

1. The articulation of the antennæ with the head, concealed from above. Ova deposited externally. Nymphs, in the last instar at least, with three orifices (on the 4th, 5th and 6th tergites), the first of which is sometimes paired. [Scutellum nearly always greatly developed.]. 2.

1a. Antennæ not thus concealed. Scutellum mediocre or small.......3.

2. Abdominal segments normal. Tibiæ not spiny........1. *Cimicidæ.*

2a. Only five sternites clearly seen (exclusive of genital segments). Tibiæ spinose..2. *Cydnidæ.*

3. Tarsi consisting of three segments ....4.

3a. Tarsi consisting of two segments ....7.

4. Antennæ with five segments ;† general habitus Cimicidiform [metamorphoses unknown]........................3. *Urostylidæ.*

*I am indebted to Dr. Bergroth for calling my attention to certain characters in this.

†I have now received a Chinese form with only four segments, which I shall describe as *Tessaromerus.*

4a. Antennæ with four segments ; general habitus not Cimicidiform . . . . 5.

5. Antennæ infraoral. Ova deposited externally . . . . 6.

5a. Antennæ almost always preoral. Membrane almost always with more than eight veins. Ova deposited externally. Nymphs with two orifices (on 5th and 6th tergites) . . . . 7. *Lygæidæ.*

6. Membrane with more than eight veins. Nymphs with three orifices . . . . 5. *Pyrrhocoridæ.*

6a. Membrane with five veins, or less. Nymphs with two or three orifices . . . . 6. *Myodochidæ* (= Geocoridæ.)

7. Tegmina neither cellulate nor reticulate. Nymphs with three orifices. Ova external . . . . 4. *Aradidæ.*

7a. Tegmina cellulate or reticulate. Ova inserted. Nymphs with two orifices (on 4th and 5th) . . . . 8. *Tingidæ.*

Superfamily II.—Nepoideæ.

1. Abdominal spiracles normal . . . . 2.

1a. Last pair of abdominal spiracles siphunculate . . . . 14. *Nepidæ.*

2. Adults with metasternal odoriferous orifices . . . . 3.

2a. Adults lacking the above, but with one median orifice on the fused metasternum and first abdominal sternite . . . . 11. *Gerridæ.*

3. No prosternal stridulating apparatus . . . . 4.

3a. Well-developed stridulating apparatus on the prosternum . . . . 5.

4. Four distinct labial segments. Membrane and coriaceous parts of the tegmina distinct, the former with numerous veins . . . . . . 9. *Nabidæ.*

4a. Three apparent labial segments, the true first annuliform. Tegmina entirely membranous, with few veins . . . . 10. *Enicocephalidæ.*

5. Fore femora more or less normal, with the tibiæ, never cancriform. Nymphs with three orifices. Ova external . . . . 12. *Reduviidæ.*

5a. Fore femora enormously dilated, with the tibiæ, cancriform. Nymphs with orifices on 5th and 6th tergites only. Ova external . . . . 13. *Macrocephalidæ* (= *Phymatidæ*).

Superfamily III.—Miroideæ.

This table is not satisfactory, owing to the fact that two families are known only in the apterous state.

1. Tegminal veins never areolately joined. Third segment of antennæ not thickened towards the base . . . . 2.

1a. Tegmina with the veins more or less areolately joined. Third segment of antennæ thickened towards the base... ....20. *Dipsocoridæ* (= *Ceratocombidæ*).

2. Macropterous forms with incomplete cuneus, but well-developed ocelli. Head produced horizontally in front. Ova laid externally. Nymphs with three orifices..................................3.

2a. Macropterous forms with complete cuneus, ocelli obscure. Head rarely produced horizontally. Nymphs with only a single orifice (on the 4th tergite). Ova inserted in the leaves or stems of plants ....19. *Miridæ*.

3. Rarely brachypterous. Clypeus elongate. Head not channelled beneath..................................15. *Anthocoridæ*.

3a. Always strongly brachypterous. Clypeus short or apparently absent. Head more or less channelled beneath ....4.

4. Not furnished with comb-like fringes, only scattered hairs. Eyes well developed................ ....5.

4a. Furnished with comb-like fringes. Eyes absent....17. *Polyctenidæ*.

5. Coxæ short, somewhat remote..................16. *Clinocoridæ*.

5a. Coxæ rather elongate, subcontiguous ....18. *Æpophilidæ*.

Superfamily IV.—NOTONECTOIDEÆ.

1. Antennæ free, and more or less conspicuous. Nymphs with odoriferous orifices .... 2.

1a. Antennæ concealed, usually in foveæ on the under side of the head. Nymphs lacking odoriferous orifices......................3.

2. First segment of antennæ reaching well beyond the apex of the head; membrane-cells lacking cross veins............21. *Acanthiidæ*.

2a. Second segment of antennæ not extending as far as the apex of the head; membrane-cells with cross-veining..........22. *Ochteridæ*.

3. Fore legs inserted on the disk of the fore margin of the prosternum.4.

3a. Fore legs inserted on the hind margin of the prosternum..........5.

4. Antennæ more or less simple. Legs not, or scarcely, simple. Wings not reticulate. Ova laid on leaves, etc., of water-plants.... ......23. *Naucoridæ* (including *Mononyx*, etc.).

4a. Antennæ highly modified. Legs strongly flattened. Wings more or less reticulate. Ova laid on the back of the male..24. *Belostomidæ*.

5. Labium composed of two segments at most. The forms swim on their bellies. Ova laid externally .... 25. *Corixidæ.*

5a. Labium free, composed of three or four segments. Forms swim on their backs. Ova inserted in stems, etc., of water-plants .... 26. *Notonectidæ.*

Considering, then, the nymphal characters, the number of segments in the tarsi, the condition of the tegmina, and of the stink-glands, etc., it seems to me that the only families that have any claims to be considered typical are the Cimicidæ, Pyrrhocoridæ, Myodochidæ, Nabidæ and Anthocoridæ.

The Anthocoridæ are undoubtedly the most generalized of the Pagiopoda, and are probably very ancient,* but I think that the Pagiopoda are less typical, as a whole, than the Trochalopoda. The Nabidæ have less highly-developed stink-glands, and, I think, are a development of some "Protomyodochidæ" in the direction of greater rapacity and agility. The ocellated ancestors of the Pyrrhocoridæ might almost as well, however, as the Cimicidæ,† be the most typical Heteroptera. It is the fact that certain Cimicid nymphs have the first orifice paired, that leads me to propose that place for them, and it will scarcely be questioned that it is much more likely that a paired gland should become coalesced, than that a single gland should be divided in such a case.

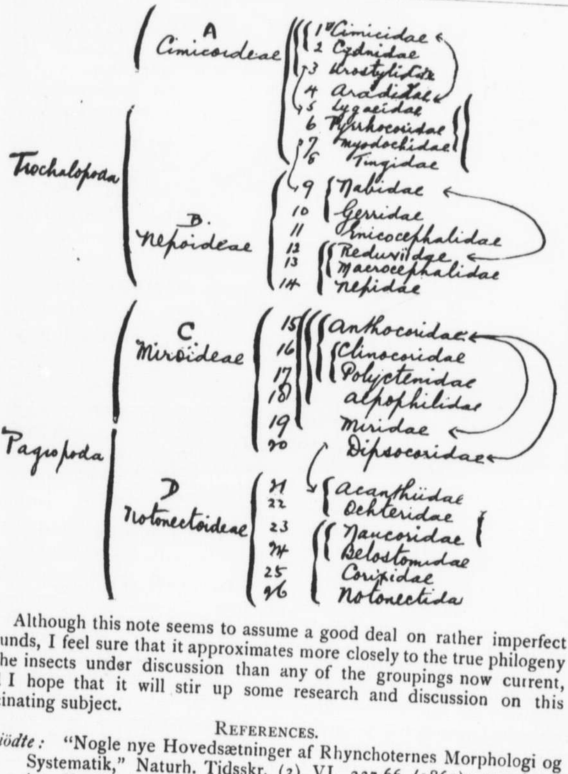
The Heteroptera are admittedly one of the most ancient and isolated groups of insects, but they were probably much more dominant in past times than to-day. I believe that the families which are usually regarded as the "highest" are really so, but are also at the same time nearest to the typical Heteropteron of the later Paleozoic times, when it had finally separated itself from the Homoptera, and a long time since from the other Insecta.

The subjoined table shows, in some sort, my views on the probable phylogemy of the Heteroptera, but a good deal of latitude must be given to the detailed lines of descent.

The following shows my opinion as to the general relationships of the 26 families :

*Reuter says : "J'ai commencé mon ouvrage par la famille des *Capsides* [Miridæ], parceque celle-ci me parait être la plus basse dans le système " (Act. Soc. Sci. Fenn., XIII, 6), but this was in 1878. See the P.S. at the end of this paper.

†In selecting "Cimicidæ," I refer specially only to the Cimicinæ (=Asopinæ). The other subfamilies are mostly much more recently developed.



Although this note seems to assume a good deal on rather imperfect grounds, I feel sure that it approximates more closely to the true philogeny of the insects under discussion than any of the groupings now current, and I hope that it will stir up some research and discussion on this fascinating subject.

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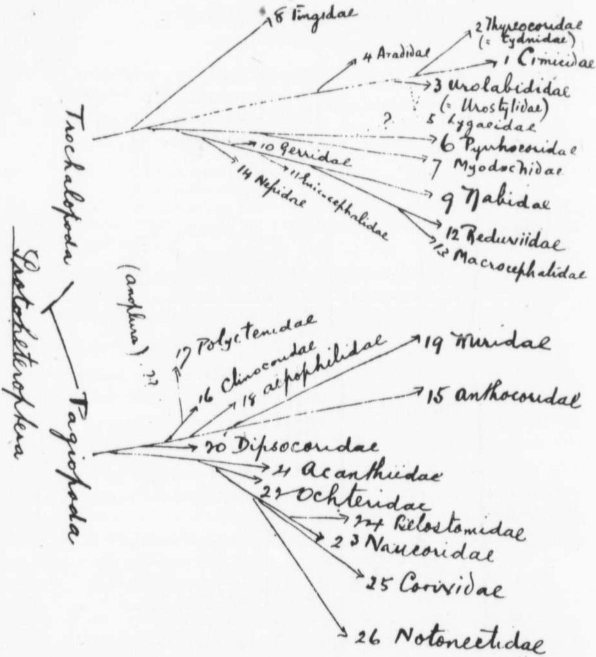

P. S.— Some time after I had sent the foregoing notes for publication, I received, through the kindness of the author, Reuter's "Bemerkungen über Nabiden," in Mém. Soc. Ent. Belg., XV, 87-130 (1908).

Reuter does not accept Schiödte's divisions of Trochalopoda and Pagiopoda, and apparently prefers to form the preliminary divisions of the Heteroptera upon the shape of the ova. He also merges the Nepoideæ in the Miroideæ, and considers that the Nabidæ are closely allied to the Acanthiidæ and Anthocoridæ He, however, admits that my placing of the Miridæ and Notonectidæ as terminal twigs is probably correct, and throws much light on previously obscure points.

As Dr. Reuter may perhaps rediscuss the whole question after the perusal of this contribution, I merely remark now that he has seemingly overlooked the important fact that in the Miroideæ the meso- and metapleura are composed of more than one piece each, while this is not the case in the Nepoideæ.

All through the above paper for "Cydnidæ" read "Thyreocoridæ," and for "Urostylidæ" read "Urolabididæ."

EMPHYTINÆ — NEW GENERA AND SPECIES AND SYNONYMICAL NOTES.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

The subfamily Emphytinæ as understood by the writer should be characterized as follows: the front wings with the first and second anal cells present and separate; the second anal cell strongly contracted at middle of the hind margin; the radial cross-vein present; the free part of R_5 always present; the radio-medial cross-vein usually present; the medio-cubital cross-vein and the free part of M_{3+4} parallel; the hind wings with the free part of R_4 and the transverse part of M_2 present or wanting; the antennæ with nine segments.

COCKERELLONIS, n. gen.—Front wings with the second abscissa of Cu distinctly longer than the free part of M_4; the free part of 2nd A perpendicular; the radial and the radio-medial cross-veins present; the hind wings with the cell R_{1+2} with a long appendage; the free part of R_4 and the transverse part of M_2 present; the posterior metatarsus shorter than the four following segments; the claws simple, without a tooth. Type, *Cockerellonis occidentalis*, MacG.

Cockerellonis occidentalis, n. sp.—Black, with the following parts reddish-yellow: the clypeus, the labrum, the mandibles except at apex, the inner margin of the eyes very narrowly, the tegulæ, the collar broadly, the wings at base and the costa, the apices of the costa, the trochanters in great part, the femora narrowly at base and apex, more pronounced on the anterior, the tibiæ except fuscous marks on the outside of the middle and posterior, the base of the tarsi, and the apex of the ventral abdominal segments; the clypeus deeply and broadly emarginate; the third segment of the antennæ one-third longer than the fourth; the ocellar basin well marked and deep; the frontal crest prominent and not interrupted; the vertical foveæ deep, diverging behind, puncture-like, and not reaching the occiput; the head and thorax smooth; the stigma brownish-black; the wings hyaline, slightly clouded, the veins black. Length, 6 mm.

Habitat.—Ruidosa Creek, New Mexico, 6,600 ft. elevation, July 1st, on fronds of *Pteris aquilina*, collected by Prof. E. O. Wooton, No. 8, received from Prof. T. D. A. Cockerell. This species was listed as *Taxonus (strongylogaster) occidentalis*, MacG., MS. by Prof. Cockerell in Trans. Kansas Acad. Sci. for 1898 (publ. 1899), page 212.

EPITAXONUS, n. gen.—Front wings with the second abscissa of Cu distinctly longer than the free part of M_4; the free part of 2nd A perpendicular; the hind wings with the cell R_{1+2} with an appendage at apex; the posterior metatarsus shorter than the four following segments together; the claws with a minute erect tooth at middle. Type, *Taxonus albidopictus*, Nort.

TAXONUS, Htg.—This genus was described by Hartig in Die Familien der Blattwespen und Holzwespen, Berlin, 1837. The following species were included: *Nitida*, Klg. (=*agrorum*, Fall); *stricta*, Klg.; *bicolor*, Klg., and coxalis, Htg. (=*equiseti*, Fall), and *agilis*, Klg. (=glabratus, Fall). So far as I have been able to determine, no type has been indicated for this genus, and in order that the same group of species may be retained in the genus, *equiseti*, Fall, should be taken as type.

Taxonus montanus, MacG.—The unique male type of this species on careful study and comparison proves to be the same as *Epitaxonus albidopictus*, Nort.

Taxonus floridanus, Prov.—This is a synonym of *Pseudosiobla robusta*, Kirby.

Taxonus unicinctus, Nort.—From a careful study of all the material at hand, I have come to the conclusion that *Taxonus unicinctus*, Nort.; *Strongylogaster pallicoxus*, Prov., and *Taxonus borealis*, MacG., are all one and the same species. Norton's name is the older and should be used; the species belongs in Ashmead's genus *Strongylogastroidea*.

MONOSTEGIA, Costa.—This genus, as near as it is possible for me to determine at this time, was proposed by Costa to include *luteola*, Klg. (=abdominalis, Fab.). Fabricius's species is readily separated from *Poecilostoma* by having the claws bifurcate at apex. The name *Monostegia* is used here in its original sense, and *abdominalis*, Fab., is taken as its type.

Monostegia Martini, n. sp.—Black, with the following parts rufous: the labrum, the collar broadly, the tegulæ, the metathorax, the abdomen, the legs, and the base of the wings; the second segment of the antennæ as long as the fourth and fifth together; the frontal ridge wanting and the antennal fovea and the ocellar basin united. Length, 7 mm.

Habitat.—Westfield, Mass., J. O. Martin collector.

PHRONTOSOMA, n. gen.—Front wings with the second abscissa of Cu subequal in length to the free part of M_4; the free part of 2nd A oblique; the hind wings with the cell R_{1+2} always with a distinct appendage at apex; the posterior metatarsus never longer than the four following segments; the claws cleft, with the inner lobe not more than one-half the length of the outer lobe. Type, *Phrontosoma atrum*, MacG.

Phrontosoma atrum, n. sp.—Body black, with the tegulæ, a fine line on the collar, and all the legs beyond the apical third of the femora, white; the apex of the posterior tibiæ and the tarsi infuscated; the antennal furrow below the lateral ocelli broad and coarsely punctured; the frontal ridge wanting and the antennal fovea and ocellar basin continuous; the third segment of the antennæ as long as the fourth and fifth together. Length, 6 mm.

Habitat.—Ames, Iowa. E. D. Ball, collector.

Phrontosoma Nortoni, MacG.—This species was described in the CANADIAN ENTOMOLOGIST, 1894, XXVI, 324, as a new species of *Caliroa*.

Phrontosoma Daeckei, n. sp.—Body black, with a rufous spot covering the collar and mesonotum; the tegulæ and legs beyond the apical third of the femora, white; the third segment of the antennæ as long as the fourth and fifth together; the frontal ridge distinct and unbroken, the antennal fovea and the ocellar basin therefore not continuous; the antennal fovea as large or larger than the ocellar basin, and extending through the hypoclypeal area; the triangular depression behind the anterior ocellus not extending to the antennal furrow. Length, 7 mm.

Habitat.—Glenside, Mtg. County, Penn. E. Daecke, collector.

Phrontosoma collaris, n. sp.—Body black, with a rufous spot covering the greater part of the prothorax and the mesonotum; the third segment of the antennæ hardly as long as the fourth and fifth segments together; the frontal ridge distinct and unbroken; the antennal fovea long and distinct; the ocellar basin almost wanting; the triangular depression behind the anterior ocellus distinct and extending to the antennal furrow. Length, 7 mm.

Habitat.—Ames, Iowa. E. D. Ball, collector.

Emphytus cinctipes, Nort.—Many writers since the time of Norton have considered this species as the same as the European *Emphytus cinctus*, Linn., while the coloration is practically identical, the form of the frontal area, the shape of the saw-guides, and the dentation of the saws is entirely different, and I believe that Norton's species should be recognized as distinct.

PARATAXONUS, n. gen.—Front wings with the radio-medial cross-vein always present; the second abscissa of Cu always shorter than the free part of M_4; the hind wings with both the free part of R_4 and the transverse part of M_2 wanting; the posterior metatarsus never longer than the four following segments together; the claws with a large erect tooth at middle. Type, *Taxonus multicolor*, Nort.

Polytaxonus, n. gen.—Front wings with the radio-medial cross-vein always present; the second abscissa of Cu always shorter than the free part of M_4; the hind wings with both the free part of R_4 and the transverse part of M_2 wanting; the posterior metatarsus never longer than the four following segments together; the claws appendiculately toothed at base. Type, *Taxonus robustus*, Prov.

ERIOCAMPA, Hartig.—American writers have erroneously referred the species of the genus *Caliroa*, Costa, to *Eriocampa*, and the American species that belong to *Eriocampa* to Stephens's genus *Sciapteryx*. So far as I am aware the genus *Sciapteryx* does not occur in America.

Sciapteryx punctum, Prov.—This is the female of *Dimorphopteryx pinguis*, Nort.

Eriocampa rotunda, Nort.—This is the female of *Eriocampa obesa*, Say. Say described his species as an *Allantus*, and his name should have precedence.

MONSOMA, n. gen.—Front wings with the radio-medial cross-vein always present; the second abscissa of Cu always shorter than the free part of M_4; the hind wings with the free part of R_4 wanting and the transverse part of M_2 present; the posterior metatarsus never longer than the four following segments together; the head and the thorax smooth, without punctures. Type, *Poecilostoma inferentia*.

Poecilostoma albosecta, Prov. — Specimens of this species and *Poecilostoma inferentia*, Nort., are taken in this region commonly and together on Alder. Although very differently coloured, they are identical in structural characteristics; there is but little doubt that they are the male and the female of the same species.

MACREMPHYTUS, n. gen.—Front wings with the radial cross-vein present and the radio-medial cross-vein wanting; the second abscissa of Cu almost obliterated by the migration of M_4+Cu_1 towards the medio cubital cross-vein; the hind wings with the cell R_{1+2} extending to the apex of the wing, with a slight appendage at apex; the free part of R_4 wanting, the transverse part of M_2 present; the posterior metatarsus distinctly longer than the four following segments; the claws cleft, the rays subequal. Type, *Harpiphorus varianus*, Nort.

This genus is erected to include the American species referred to the genus *Harpiphorus*. This genus contains a single European species, which is readily differentiated by having the second segment of the antennæ longer than the first. The length of the posterior metatarsus in

Macremphytus also prevents its confusion not only with *Harpiphorus*, but also with the genus *Emphytus* and the genera allied to it.

STRONGYLOGASTER, Dahlb.—Dahlbom in his "*Conspectus Tenthredinidum, Siricidum et Oryssinorum Scandinaviæ quas Hymenopterorum Familias*," published in the Kongl. Svenska, Vertens. Acad. Handlg. for the year 1835, gives a list of the species of Tenthredinoidea of the Scandinavian peninsula, in which he has introduced several new names, but has not appended any descriptions. The genus *Strongylogaster* is such an one. Dahlbom included under this name *filicis*, Klg.; *mixta*, Klg., and *cingulata*, Fab. *Mixta* is congeneric with *contigua*, Knw., which belongs to the genus *Thrinax*, Knw.; *contigua* should be taken as the type of this genus. Ashmead has made *filicis*, Klg., the type of *Polystichophagus*, Ashm. This leaves only *cingulata*, Fab., for *Strongylogaster*, which becomes type by elimination. This leaves the American species of *Strongylogaster* in which the free part of 2nd A is present to be provided for; they belong to Ashmead's genus *Strongylogastroidea*, of which *Strongylogaster apicalis*, Say, is type.

Strongylogastroidea spiculatus, n. sp.—Body black, with the following parts white; the clypeus, the labrum, the four apical segments of the antennæ, the tegulæ, a very narrow line on the collar, the posterior coxæ in great part, the trochanters, and the scutellum; with the following parts rufous: the head except the ocellar and postocular areas and the lower half of the antennal furrow, the prothorax at sides, the median lobe of the mesonotum, an irregular spot on the mesopleura, the abdomen except the saw-guides, the front and middle legs beyond the middle of the femora, and the posterior tibiæ and tarsi; the anterior ocellus is situated in front of a distinct angularly diverging ridge; the saw-guides with the upper margin straight, the lower margin semi-straight, roundly and obliquely truncated and pointed at apex. Length, 11 mm.

Habitat.—Ellenville, N. Y. Chester Young, collector.

Strongylogastroidea confusa, n. sp.—Body rufous, with the following parts white: a narrow line on the collar, the scutellum and postscutellum, the apices of the coxæ, and the trochanters; with the following parts black: a spot surrounding the ocelli, a small spot on the middle of the postocular area, the lateral lobes of the mesonotum, the prothorax in great part, the pectus and the bases of the coxæ; the saw-guides concave above, convex below, the apex almost squarely truncate. Length, 9 mm.

Habitat..—West Springfield, Mass. J. O. Martin, collector.

MEIGEN'S FIRST PAPER ON DIPTERA.

BY J. M. ALDRICH, MOSCOW, IDAHO.

Johann Wilhelm Meigen (1763–1845), was, says Schiner, "Incontestibly the first and greatest dipterologist of his time and all times." He had a good perception of generic characters, and had perhaps the first really comprehensive collection of European Diptera ever made upon which to exercise his talents. Added to these favouring conditions, he must also have had immense patience and tenacity to carry out through twenty years of almost continuous publication his monumental work. "Systematische Beschreibung der bekannten europäischen zweiflügligen Insekten."

Such being the prominence and reputation of Meigen, it is not surprising that considerable attention should be given to anything written by him. The paper from which many of his principal genera have been dated, and which most entomologists have supposed to be his earliest one, is entitled, "Versuch einer neuen Gattungs Eintheilung der europäischen zweiflügligen Insekten," and was published in Illiger's Magazin für Insektenkunde, Vol. II, pp. 259–281, in the year 1803. The article has a page of introduction by the editor, Illiger, calling attention to the fact that Meigen had already prepared a large amount of material for a comprehensive work on Diptera, and bespeaking for him the necessary financial support for its publication. The article itself contains no explanatory matter by Meigen, but merely gives short descriptions of 114 genera of Diptera, mostly new, with one or more typical or illustrative species mentioned in connection with most of them; a considerable number, however, have no species mentioned.

That Meigen had already published another paper with a similar scope is nowhere mentioned or suggested in the 1803 article, but has been known for many years. Hagen lists it in his "Bibliotheca Entomologica," although he had not seen it. It has been referred to once or twice in literature, but has remained practically unknown until recently; now, however, Mr. Fr. Hendel has published an extended article on it in the "Verhandlungen der kaiserlichen-königlichen zoologischen-botanischen Gesellschaft in Wien," 1908, 43–69. He quotes the generic descriptions in full and gives his ideas of their meaning. His own copy and the one in Osten Sacken's collection are the only ones known to Hendel. As Hagen mentions the paper as containing forty pages, it is evident that Hendel does not give it entire, but only the part which is important for nomenclature. Not having seen the original, I am obliged to follow Hendel's data in the discussion which follows.

The title of the paper is "Nouvelle classification des Mouches á deux Ailes (Diptera L.) d'après un plan tout nouveau," and the date is "Paris an VIII," that is, the eighth year of the French Revolution, or 1800.

The work contains no mention of specific names at all in connection with the generic descriptions. The latter are brief, and in most cases in rather general terms, such as the number of joints in the antennæ, presence or absence of ocelli and tibial spurs, whether the wings are folded or divaricate in repose, etc. It is not to be denied, however, that occasional decisive characters are found, but not in many genera.

Hendel had great difficulty, as he admits, in determining the meaning or application of these generic names, until he received from Bezzi the happy suggestion that the 1803 paper contains most of the same matter translated into German, hence a comparison of the two would reveal the identity of the earlier ones. Following this out Hendel was enabled to trace the connection, and thus he learned that Meigen had changed nearly all of his generic names in 1803 from those he proposed in 1800. For instance, Flabellifera became Ctenophora; Petaurista became Trichocera; Zelmira, Platyura; Fungivora, Mycetophila; Lycoria, Sciara; Helea, Ceratopogon; Tendipes, Chironomus; Eulalia, Odontomyia; Noeza, Hybos; Clythia, Platypeza, and many others.

A glance at the names mentioned will indicate that Meigen had in the interim adopted a new principle in the formation of generic names, changing from Latin or Latin-sounding words to those derived somewhat rigorously from Greek roots. It is possible that he was troubled with doubts as to whether any generic term would "stand" if not derived from Greek; at any rate, the nature of the changes indicates what was his purpose.

Now, a few words as to the effect upon nomenclature of this newly-opened chapter of entomological history. Mr. Hendel asserts that the older names, as ascertained by the method of comparing the German translation of the 1800 paper with the 1803 paper, must replace the latter *in toto*, taking as types those assigned in 1803. He says, "As the reader of the following pages will observe, the acceptance of the old names of Meigen will create a complete revolution in dipterological nomenclature; this is, indeed, to be regretted, but is unfortunately unavoidable. *Fiat justitia, pereat mundus!*"

I am so far from coinciding in my views with Mr. Hendel that I must confess that the simplicity of his position is absolutely laughable.

I do not approach the question with the idea that two sets of names stand before the bar of justice with exactly equal claims upon our decision. The case is more nearly analogous to one that has several times arisen within a generation in the United States, when some persons have endeavoured to claim valuable tracts of real estate on the basis of transfers from Indian tribes a century or so ago. Even if the original transaction had occurred as claimed, the contestants will find that every possible presumption will be used against them, and justly so, to avoid the great practical wrong and hardship of upsetting titles to real estate. So in this case we ought to have no hesitancy in admitting that our attitude is that no old names like these can create a "revolution" unless they exhaust every legal technicality that we can throw in their way. This is not an unfair position. It does not involve an ultra-conservatism, nor does it involve a disregard of proper or generally-accepted rules of nomenclature. It does involve some comprehension of the value of stability in nomenclature, a subject on which many entomologists might cogitate long with profit.

Mr. Hendel does not cite any rules of nomenclature to justify his acceptance of the 1800 names. I will cite one to show why they should not be accepted ; namely, article 25 of the International Code of 1904, which says, "The valid name of a genus or species can be only that name under which it was first designated on the condition (a) that this name was published and accompanied by an indication, or a definition, or a description ; and (b) that the author has applied the principles of binary nomenclature."

Following this rule, I note as applying to (a) above, that the names in 1800 were not accompanied by an indication, and the definition or description (these two are practically synonymous terms) were as admitted by Hendel unrecognizable (with possibly a few exceptions) until studied in the light of the 1803 paper ; they were therefore *nomina nuda*. Condition (a) was therefore not fulfilled in 1800. As to condition (b), if the author of a paper mentions only genera and no species, he does not apply a binary nomenclature.

Furthermore, Dr. Stiles gives as his individual rule (in his comments on the International Code, Hygienic Laboratory, Bull. 24, p. 27) : "12a Rule.—The following species are excluded from consideration in selecting the types of genera: (a) Species which were not included under the generic name at the time of its original publication." These names, therefore, have no types.

I should not deem the occasion to justify so lengthy a discussion on my part, but for the fact that Dr. Bezzi writes me that he is engaged on a research into the names proposed in Diptera prior to 1800, and that he has already found data sufficient to require the change of the great majority of names of the older genera now in use in the Diptera. A number of his conclusions have already been published. We seem to be entering upon a period of nomenclatural unrest, which may leave us as badly off in Diptera as we now are in Lepidoptera or Hemiptera, to say nothing of Orthoptera and a few others.

"Let justice be done, though the earth perish," says Mr. Hendel. But justice means nothing, except with reference to some person or thing. Justice to whom, or to what? Is it justice to Meigen to insist on the use of names that he himself discarded for better ones? Or is it justice to dipterology to overturn nomenclature to no purpose? The case before us is not Meigen versus some other ancient worthy, but Meigen versus Meigen. Justice to him has already been done, and it would be flagrant injustice to reopen the case.

PLATYSAMIA COLUMBIA NOKOMIS.

The handsome moth which occurs throughout Manitoba and the Northwest Provinces, and which has always been named in collections, *Samia columbia*, Smith, has such a different appearance from the Ontario form which seems to be the type, that I am of the opinion the name given by Dr. W. Brodie some years ago ought to be recognized. Dr. Henry Skinner has also examined this insect critically during the past summer, and agrees with me that Dr. Brodie's description which appeared in the Biological Review of Ontario for October, 1894, pp. 103–107, should be republished. This publication is not now available, and with Dr. Brodie's consent I send herewith an extract from his article on *Platysamia columbia nokomis*.—James Fletcher, Ottawa.

"Platysamia Columbia Nokomis.

"by wm. brodie.

"In the Canadian Entomologist, Vol. X, March, 1878, there is a very good coloured lithograph of the larva of *P. columbia*, by the late G. J. Bowles, and a short paper by the late F. B. Caulfield, giving a description of the larvæ. There is also on page 43 an article by C. H. Fernald, in which he gives several food-plants, a description of the egg, of the larvæ in the several stages of development, and some valuable general information. Up to this time very little had been published as to the geographical range of the species.

"In the spring of 1882 I received a parcel of *columbia* cocoons, collected by W. G. A. Brodie near Carberry, Manitoba. They were attached to twigs of the *Elæagnus argentea,* and I was informed the larvæ must have fed on the leaves of this shrub. When the imagoes emerged, they differed so much from Muskoka specimens that I fancied there must be a specific difference, and so I sent specimens of the moth and of the cocoons to the late Hy. Edwards. He did not know *E. argentea* as a food-plant of *P. columbia.* He remarked the difference between the northern form sent by me and the usual form, and thought, if permanent, it was at least sub-specific; and he suggested that it should be described and named.

"Early in 1883 I received a package of cocoons of *P. columbia* and of *T. polyphemus,* collected by W. G. A. Brodie near Pelly, N.-W. T. Only one imago emerged from this lot, from a *P. columbia* cocoon, and it differed so very much from the Manitoba form that I considered it a well-marked variety, being much less in size and of much brighter colours, and the boundaries of the colours much more distinct. All these facts and descriptions of the two forms were embodied in a paper which I read before a meeting of the Natural History Society of Toronto, and I also submitted type specimens of the two forms. For the Carberry form I proposed the name *P. columbia nokomis,* and for the Pelly form *P. columbia winonah.*

"It would appear that the *nokomis* type is generally distributed over the Province of Manitoba, and that the common food-plant is *Elæagnus argentea,* and that probably *Shepherdia argentea* (Wolf Willow) may also be a food-plant. I do not know the northern nor the western limit of *E. argentea,* but Mr. Jas. M. Milne, who was on the Government survey, has informed me that he has found the shrub on the eighth base line, which lies to the north of the South Saskatchewan, and as far west as the cactus hills, and there can be little doubt that the range of *P. columbia nokomis* is co-terminous with the range of this food-plant, *E. argentea.*

"The food-plants of the southern form *(P. Columbia)* in Ontario, Quebec and in the State of Maine, so far fairly well identified, are *Prunus virginiana, Prunus pennsylvanica, Nemopanthes canadensis, Kalmia angustifolia, Rhodora canadensis, Salix* sp., *Abies nigra, Larix americana*

None of these are allied botanically to *E. argentea*, but I think it most likely that the larvæ would take very kindly to the leaves of our common *Shepherdia canadensis*.

"On comparing a series of specimens of *columbia* with *columbia nokomis*—the Manitoba form—the difference is very obvious in the brighter colours and more sharply-defined colour areas. This difference may be in some measure from a difference of food, or from the much longer duration of daylight while the larvæ are feeding, or perhaps in part from the lower temperature in winter. And perhaps it may yet be shown that the North and Northwest Territorities are the normal habitat and *nokomis* the normal form of the species, differentiated ages ago from *cecropia* by climatical and other conditions, and that the now southern form is from degenerate stragglers from the north.

"The following points of difference may be noted between the *columbia nokomis* form and the *columbia* form, as represented by Ontario specimens, and as compared with Smith's description of *columbia*, parts of which are given in brackets. The standard of colour is Ridgeway's Nomenclature of Colours.

"Antennæ, central shaft, bright reddish-brown ; pectinations, darker (black) ; palpi, light liver-brown (dark maroon brown) ; dorsum of thorax, bright reddish liver-brown, with a posterior pure white band (dark maroon, with a short, gray band) ; under side of thorax, reddish liver-brown (black) ; legs, reddish brown, pile darker (black, slightly tinged with brownish) ; abdomen with alternate annulations, bright liver-brown and pure white (black and dirty white).

"Primaries above with a rather sharply-elbowed pure white line (grayish-white) ; the middle area of the wing is bright reddish liver-brown (dark brown), and contains a central ovate white spot (triangular) ; this bright coloured area is separated from the costa by a moderately wide longitudinal grayish stripe.

"Secondaries with a large white spot at the shoulder (small, dirty white) ; the central area bright reddish liver-brown (dark brown), having a central white spot, which varies from kidney form to curved pear form, and varying much in size, but always larger than the corresponding spot on the primaries ; but no sexual difference could be observed, either in the size or in the form, of these central white spots.

"The primaries beneath have the space from the shoulder to the median white cross band of a maroon-brown (black), and generally the under side of the wings of *columbia nokomis* is brighter coloured than that of *columbia*.

"As I have seen but one specimen of the *columbia winonah* type, little need be said about it. My specimen may have been representative of an extreme northern group, or it may have been only a strongly-marked specimen of *columbia nokomis*."

BOOK NOTICE.

Annotated Catalogue of Oriental Culicidæ. By E. Brunetti, Records of the Indian Museum, Vol. I, part 4, No. 25, pages 297 to 377, December, 1907, Calcutta.

The author begins by stating that his work is a compilation only, and that he has not especially studied mosquitoes. Nevertheless, he presents an original classification of Culicidæ, dividing them into four subfamilies, in reality but three, omitting the Corethrinæ, to conform to our conception of the group. The subfamilies are not defined, but an inspection of their contents indicates that the separation has been made on the basis of the relative lengths of the palpi in the two sexes, thus : palpi long in both sexes = Anophelinæ ; long in the ♂, short in the ♀ = Culicinæ; short in both sexes = Ædeomyinæ. Truly, the mosquitoes are an unfortunate group, since their primary divisions are still based on secondary sexual characters, such as we are no longer disposed to admit for genera even, and even so on modifications of the length of palpi, not in any structural difference of these plastic organs. It is a pity that this unscientific classification should still be perpetuated in the literature. Otherwise our author closely follows Theobald's classification, as, indeed, he must, no other author having covered the ground independently. References are given to every species, with a few notes and full localities, largely compiled, though we note a few original data. Two hundred and twenty-six species are listed, exclusive of the Corethrinæ. A number of species are mentioned which have been omitted by Theobald. Accompanying our copy is a sheet of "errata et addenda," dated March, 1908, with the following naive heading : "Il faut regarder ces notes comme des Additions en Manuscrit parce qu'elles ne sont pas actuellement publiées." Probably the sheet accompanies only the author's separates, but is nevertheless clearly "published," being printed and distributed and obtainable from the author.—Harrison G. Dyar.

Mailed October 2nd, 1908.