



THE STRAWBERRY ALEYRODES (*A. PACKARDI*, N. SP.).

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LIFE-HISTORY AND DESCRIPTION OF THE STRAWBERRY ALEYRODES, ALEYRODES PACKARDI, N. SP.

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This species has hitherto been considered identical with *Aleyrodes vaporariorum*, the common greenhouse Aleyrodes of the tomato, cucumber, etc. A critical study of all the stages of both the greenhouse Aleyrodes and the strawberry Aleyrodes, made at the Entomological Laboratory of the Massachusetts Agricultural College, has resulted in finding structural differences between the two species in all the stages, except the egg and adult. These differences may be tabulated as follows:

A. vaporariorum, Westw.

A. Packardi, n. sp.

1st instar.	18 pairs of marginal spines.	16 pairs of marginal spines.
2nd instar.	1st and 3rd pairs of dorsal spines well developed, though variable in length.	All three pairs of dorsal spines minute.
3rd instar.	1st and 3rd pairs of dorsal spines well developed, though variable in length.	All three pairs of dorsal spines minute.
Pupa.	3rd pair of dorsal spines well developed, though variable in length. 5-18 (usually 8) wax rods arising well up on the dorsum in addition to a double submarginal series of wax rods.	All three pairs of dorsal spines minute; only a double submarginal series of wax rods present.

In the above table the spines on the cephalic region of the dorsum are designated as the *first* dorsal pair; those on the sides of the first or third (first instar) abdominal segment as the *second* dorsal pair; and those which occur one on each side of the vasiform orifice the *third* dorsal pair. (In the reproduction of the drawings the second pair of dorsal

spines of the first instar and the first pair of dorsal spines of the pupa were, unfortunately, omitted, see plate 2.)

I have never seen an *Aleyrodes vaporariorum* on a strawberry plant out of doors. Specimens of Aleyrodes from Kentucky were recently received through Prof. C. H. Fernald from Prof. Garman on strawberry leaves, and were found to be identical with the common strawberry Aleyrodes of this locality. Experiments thus far have shown that *Aleyrodes vaporariorum* when transferred in the first instar to a strawberry plant will live and develop all the characters of those which feed on the more natural food-plants of the species, while at three different times crawling larvæ of the strawberry Aleyrodes were transferred to fresh leaves of a growing tomato plant, and all died within a few days, apparently without taking any food. That the *Aleyrodes vaporariorum* does not naturally feed on the strawberry is shown by the fact that a strawberry plant in a pot remained for over six months in a greenhouse thickly infested with that species and less than half a dozen Aleyrodes matured on its leaves, upon which even the imagoes were very rarely observed resting. It does not seem strange that where the natural food-plants were so thickly infested an egg should occasionally be deposited on other plants.

Incidentally it might be mentioned that in this locality the strawberry Aleyrodes in all its stages, including the egg, averages a little larger in size than the greenhouse Aleyrodes (*Aleyrodes vaporariorum*).

Egg (Plate 2, Fig. 1).

The egg is irregularly oval, with one side more or less flattened; attached to the leaf by a short stalk, situated on the basal or more broadly-rounded end, usually a little to one side of the centre, toward the more rounded side. When freshly laid, the egg is pale green in colour, with a rounded orange-yellow body within, in a few days changing to a metallic bronze colour. The surface of the egg is unmarked. The length, exclusive of the stalk, is from .23 to .24 mm.; greatest width, from .08 to .095 mm. The stalk is from $\frac{1}{8}$ to $\frac{1}{4}$ the length of the egg.

The length of the egg stage depends upon the weather conditions. Those laid in late fall do not hatch until the following spring, while in the warm summer weather they hatch in about eight or ten days.

First Instar (Fig. 2).

In the first instar the general form is oval, the anterior end being the more broadly rounded, the sides of the thoracic region are approximately

parallel, the abdomen narrowing posteriorly. Immediately after hatching, the body is flat and thin, but just before the first moult it becomes well rounded above. The edge of the body consists of a thin, narrow, marginal rim, at the inner edge of which the body is abruptly thickened. From the under side of this thin rim many minute, glistening granules can be seen. The margin is entire, except for the attachments of the spines. On each side sixteen spines arise on or near the margin of the body. Excepting numbers two, seven and fourteen, counting from the anterior end, these are situated at nearly regular intervals. Number two arises a short distance from the margin on the under side of the body, quite close to the base of one; it is directed downward, curving toward its mate. These spines are best seen from below. Number seven is separated from numbers six and eight by greater intervals than occur between other adjacent spines. Number fourteen arises a little nearer fifteen than thirteen. Number sixteen is very long, varying in length from one-third to one-half the length of the body. Number fourteen is from one-third to one-half the length of sixteen. Numbers one to seven gradually decrease in length. Numbers seven to thirteen are about equal in length, being from one-eighth to one-tenth the length of number sixteen. Number fifteen is slightly longer than thirteen. A marginal secretion of wax appears soon after the young larva settles down. This usually becomes wide enough to cover all but the fifteenth and sixteenth pairs of spines. The segmentation of the abdomen is quite distinct, that of the thorax very indistinct, essentially as in the pupa-case. The vasiform orifice is about as wide as long, its form being somewhat similar to an equilateral triangle with rounded corners. The operculum is subelliptical in outline, flattened on the basal side. The lingula is spatulate in outline, bearing a number of longitudinal rows of minute setæ, and on the caudo-lateral margin two pairs of spines, the posterior pair being the longer. When the lingula is in its natural position, the last-mentioned spines do not reach to the apex of the orifice. The orifice is bounded laterally by chitinous thickenings, which bend toward one another, but do not unite at the posterior end of the orifice. Just inside the apex of the orifice is a small, glistening, crescent-shaped structure, which may be simply a chitinous thickening or an opening in the integument. There are two pairs of reddish-brown eyes, a dorsal and a ventral pair, situated nearly opposite each other, just mesad to the thin marginal rim, and about equidistant from the fourth and fifth marginal spines on their respective

sides of the body. There are at least two pairs of minute dorsal spines. One pair is situated one on each side of the third abdominal segment; another pair is situated one on each side of and anterior to the operculum. Each of these four spines arises from a minute papilla, which, however, in certain lights, appear like cylindrical cavities or pores. From a study of later instars, it seems possible that another still more minute pair of spines occurs on the cephalic region, but I have not thus far distinguished any such with certainty. The two pairs above located are not difficult to see with a one-sixth inch objective.

On the ventral side of the body the legs, antennæ and mouth-parts are well developed in this instar. Each leg (Fig. 3) consists of a coxa, trochanter, femur, tibia and tarsus. The entire length of the leg when straightened is about one-half the width of the body. The coxæ are short and stout, and near the base of each of the two posterior pairs on the inner side is a spine about twice as long as the diameter of the coxæ. Trochanters short, those of the anterior pair of legs are subcylindrical, about one-third as long as wide. Those of the two posterior pairs of legs appear to be hoof-shaped, and all six trochanters bear a short spine anteriorly. The femur is about twice as long as the coxa and trochanter together, subcylindrical in form, tapering toward its outer end. The tibia is a little longer than the femur, and more slender; in the two posterior pairs of legs, bearing on its outer side, near its base, a spine as long as the whole tibia itself. This extends obliquely outward, and is usually curved near its tip. Under high-power objectives and with favourable light the tibiæ are seen to bear a number of very minute spines. The tarsus is short and knobbed at the tip, with a stout curved spine one-half as long as that borne on the tibia, arising on the outer side near its base. Diagonal lines connecting the two anterior pairs of coxæ would intersect at about the centre of the base of a conical papilla—the rostrum—from an opening in the apex of which the mouth setæ protrude. The length of these setæ varies, but when bent backward they usually extend beyond the hind coxæ. In front of these mouth organs is a prostomial plate or shield, subovate in form, the broader end being anterior. It is truncate where it touches the base of the mouth papilla, slightly concave on the sides posteriorly, broadly rounded anteriorly, with two movable papillæ on the anterior margin, each of which bears a long spine, about equal in length to those on the coxæ of the two posterior pairs of legs. From the anterior two-thirds of this plate are separated two

lenticular side pieces by distinct sutures. On the ventral surface of the abdomen, underneath the operculum, is a pair of spines, one on each side, about equal in length to those which arise at the anterior end of the prostomial plate. These spines extend backward, reaching nearly to the caudal margin of the body. The segmentation below is not as distinct as on the dorsal surface. Each antenna arises on a line with the coxæ of the legs of its respective side of the body and about opposite the anterior margin of the prostomial plate. They consist of four segments: the basal segment is short and stout; the second segment is twice as long as the first and more slender, reaching about to the margin of the body when the antennæ are directed outward; the third segment is very short and with two or three apical spines; the fourth segment is twice as long as the second, bearing a small spine at about two-thirds the distance toward the tip, and another larger one at the tip.

The colour of the larva is pale green, semitransparent, with two internal orange-yellow bodies of irregular rounded form, situated one on each side in the basal abdominal region.

The length in this instar varies from .29 to .35 mm.; the greatest width, from .16 to .18 mm.

The young larva is capable of crawling as soon as it emerges from the egg. It may crawl a short distance before settling down, or it may settle down quite near its place of birth. It is seldom able to crawl over the larger ribs of a leaflet, being prevented by the thick hairs of the leaf. After settling down it soon loses the use of its legs, and in the course of a day or two the lateral wax secretion appears. The first moult takes place in about five or six days. Lateral growth of the body between the moults is not appreciable, increase in size seeming to result almost entirely from growth in thickness. This is true of all the immature stages. Preliminary to moulting, the skin appears to split around the anterior margin of the body. It is then gradually moved back, aided by up-and-down movements of the abdomen, and usually drops off entirely, sometimes, however, remaining attached to the leaf. Moulting appears to be a slow process, two or three hours or a whole day intervening before the insect is entirely freed from the skin, it seemingly flows out over the surface of the leaf, and immediately assumes the form and horizontal dimensions which continue throughout the instar.

Second Instar.

In this instar the form is more variable than in the first; broadly oval to elliptical, usually with a slight incurving on each side of the thoracic region. When oval, the anterior end is the more broadly rounded. The margin is finely crenulate, but there is no thin marginal rim as in the first instar. Immediately after moulting, the body is flat and thin, but before the next moult it becomes well rounded above. Three pairs of marginal spines are present: the first pair on the latero-cephalic region, one on each side; the second pair on caudo-lateral region, one on each side; and the third pair on the caudal margin. These probably represent spines number one, fourteen and sixteen, respectively, of the first instar. The third pair is a little more than one-tenth the length of the body, the second pair is about one-fourth the length of the third pair, and the first pair is even smaller than the second pair and may be difficult to distinguish. There are three pairs of minute dorsal spines: the first pair is on the cephalic region, one on each side of the middle; the second pair is on the first abdominal segment, one on each side; and the third pair is near the vasiform orifice, one on each side, opposite the operculum. These last are somewhat larger than the first and second pairs, which in some specimens may be difficult to distinguish. They are most readily seen immediately after the insect has moulted. A marginal wax secretion is present as in the first instar, appearing shortly after the moult. The segmentation of the abdomen is fairly distinct in the middle, that of the thorax more obscure. The vasiform orifice is relatively farther forward in this instar than in the preceding one. This is indicated by the comparatively greater distance from the apex of the orifice to the caudal margin of the body and by the fact that the spines on the dorsum, near the orifice, now lie opposite the operculum, instead of anterior to it, as in the first instar. The vasiform orifice is of about the same general form as in the first instar. The lingula is spatulate with two pairs of side lobes and one terminal lobe. On each side of the terminal lobe arises a seta or spine about one-half as long as the entire vasiform orifice. Between the two pairs of side lobes on each side a smaller spine arises. The upper surface of the lingula bears longitudinal rows of minute setae, as in the previous instar. When in its natural position, the lingula reaches nearly to the apex of the orifice. The chitinous ridges which bound the orifice laterally do not meet behind, though the intervening space between them is comparatively smaller than in the previous instar. The eyes are

proportionally smaller than before, and are now situated internally, instead of at the surface, as in the first instar. The eyes on each side are about on a line with and outside of the two dorsal spines which have been mentioned as present on the cephalic region. The vestigial legs and antennæ can be distinctly seen, their relative position being as before. The antennæ are directed directly backward, reaching a little over one-half the distance to the base of the fore legs. They are thick at the base, narrowing toward the apex, covered with numerous minute papillæ. Their segmentation is indistinct, sometimes two and sometimes three segments being evident. They are immovable in this as well as the following immature stages. The legs are short, similar to a truncated cone in form, transversely wrinkled, with no distinct segments, terminating in a rounded knob, which, perhaps, functions as an adhesive disc. A few minute spines occur near the bases of all three pairs of legs. The mouth-parts are as before. The pair of spines at the anterior margin of the prostomial plate is wanting in this instar, but the pair on the ventral surface under the operculum is present as in the first instar. The colour remains as in the first instar. The length varies from .41 to .45 mm.; the greatest width, from .22 to .26 mm.

The second moult takes place in from four to five days after the first.

Third Instar.

In this instar the form, marginal and dorsal spines, marginal wax secretion, rudimentary legs, ventral spines, eyes and colour of the body are as in the second instar. The vasiform orifice is longer than wide, in form resembling a triangle with rounded corners. Operculum nearly semicircular, reaching about one-half the distance to the apex of the orifice. Lingula essentially as in the second instar. The antennæ arise nearer to the bases of the fore legs than in previous instars. They are indistinctly segmented, thick at the base, tapering toward the tip, the basal two-thirds of each is directed directly inward toward the antenna of the opposite side, while the apical third is bent backward toward the base, the whole forming a figure not unlike the letter J.

The length varies from .56 to .62 mm.; the greatest width, from .32 to .38 mm.

The third moult takes place in about five or six days after the second.

PUPA* (Fig. 4).

The form of the pupa is broadly elliptical, the margin finely

*As is customary in describing species of this genus, the specific characters are derived from the pupa. The description of this stage is therefore made complete in itself, and is sufficient to distinguish this from all other described species.

crenulate ; when freshly moulted, flat and thin, without wax secretions. The bodies of the mature pupæ appear to be raised from the surface of the leaf by a vertical wax fringe, the height of the body then being about one-third of the width. The dorsum is rugose and nearly flat. There are two pairs of marginal spines : the first pair occurs on the caudo-lateral margin, and the second pair on the caudal margin. The second pair in length is between one-tenth and one-eighth the length of the body, and the first pair less than one-fourth the length of the second pair. These last are readily seen by clearing the pupa in xylol and mounting in xylol balsam, or by boiling the pupa-case in KOH and mounting in glycerine. The second pair curve upward and backward, diverging at the base, usually converging posteriorly. There are three pairs of minute dorsal spines as in the previous instars : the first pair is on the cephalic region ; the second pair, one on each side of the first abdominal segment ; and the third pair one on each side opposite the operculum of the vasiform orifice. Of the three pairs, the third pair is slightly the largest. The segmentation of the abdomen is fairly distinct in the middle ; that of the thorax less so. The vasiform orifice is longer than broad, in form similar to a triangle with rounded corners. The orifice is bounded laterally by chitinous ridges, which unite posteriorly, thus differing from previous instars. The operculum is hemielliptical (in the form of an ellipse cut through its shortest axis), reaching from the anterior margin of vasiform orifice to a little over one-half the distance toward the apex. The lingula has one apical lobe and three pairs of side lobes, and is densely covered with longitudinal rows of minute setæ. From the sides of the apical lobe from below arise two spines, one on each side, which extend caudad beyond the apex of the orifice, their length being a little less than one-half the greatest width of the operculum. A second pair, less than one-fifth as long as these, arises one on each side between the first and second side lobes. The anterior pair of side lobes is frequently hidden by the operculum. A shallow furrow extends caudad from the apex of the orifice to the margin of the body.

There is no lateral wax fringe in this instar. The dorsal wax secretion consists of a double submarginal series of glassy waxen rods. The rods of the inner series are never farther away from those of the outer series than the width of their bases. The outer series consists of from about sixty to one hundred (sixty-six to ninety-eight are the limits actually observed) rods of variable length, some being very short, while others are

three-quarters the width of the body in length. In mature pupæ the rods of the inner are usually longer than those of the outer series. These (the inner series) are usually directed upward, and curve inward over the dorsum of the body. Their length varies, rarely exceeding the width of the body. The rods of the inner series usually alternate with from two to five rods of the outer series, the average number of rods in the inner series being about twenty. Irregularities in the position of the wax rods are frequent; in fact, no two pupæ are exactly alike in this respect, but of the hundreds examined none have been found to arise farther mesad from the outer series than the width of their bases.

On the venter the legs are indistinct, most readily seen in specimens which have recently moulted. Each is short and thick like a truncated cone, with a rounded disc or knob at the tip. They are transversely wrinkled, and bear minute spines as in the two previous instars, and their relative position remains unchanged. The rostrum (a conical, fleshy papilla, from the apex of which the mouth setæ protrude) is situated on the middle line of the body, about one-third the distance from the cephalic to the caudal margin, and nearly equidistant from the bases of the four anterior legs. The antennæ now lie partly hidden in pockets situated one on each side, just outside of the anterior pair of legs. They are directed backward, and are straight, conical in form, the diameter of the base being about one-half the length. They appear to be transversely wrinkled near their apex; no other signs of segmentation are visible. There is a pair of spines situated on the ventral surface, one on each side, below the operculum of the vasiform orifice, as in previous instars.

Colour: greenish yellow; empty pupa-cases white. Internal organs in the basal abdominal region, one on each side, give to this part of the body a bright yellow colour, as in previous instars. No eyes can be distinguished when freshly moulted, but as the pupa matures, the imaginal eyes appear as two brownish spots in the cephalic region.

The length varies from .748 to .88 mm.; the greatest width, from .407 to .54 mm.

The imagoes appear in from twelve to sixteen days. Thus, the time which the insect spends in the immature stages, including the egg, is from four to five weeks.

ADULT.

♀. The length of the body of the adult female varies from 1.15 to 1.20 mm. The colour of head and thorax is pale yellowish buff;

abdomen pale lemon yellow ; tip of rostrum black ; legs, rostrum, except the tip, and the antennæ, are of same colour as head and thorax. The whole body, including appendages, is covered with a white, flour-like substance, which is absent at the time of emergence from the pupa-case, but appears in the course of an hour or two. This substance, presumably waxy, is soluble in ether and xylo, but insoluble in alcohol and water. The eyes are completely divided into an upper and a lower pair, both of which are reddish brown in colour. The upper pair is smaller and composed of smaller-sized facets than the lower pair. The antennæ consist of seven segments : first segment short and stout ; second segment three times as long as the first, club-shaped, stout, with a few slender spines near the apex ; third segment over twice the length of the second, and more slender ; segment four about one-fourth the length of the third and narrower than it, cylindrical at the base, slightly enlarged at the tip ; segment five one-half as long again as four, of the same form, but more elongate ; segment six slightly shorter than five, but longer than four, club-shaped, more slender ; segment seven is slightly shorter than six, spindle-shaped, with a small spine arising from a tubercle situated a little beyond the middle, and another smaller spine arising from the tip of the segment. All the segments of the antennæ, except the first two and the tip of the last, are ringed with chitinous ridges. The hind femur is about two-thirds the length of the tibia, the tarsus is about one-third the length of the tibia, and the second tarsal segment is about two-thirds the length of the first tarsal segment. Average length of the hind femur about .275 mm. ; of the tibia, about .38 mm. The trochanters of the posterior pair of legs are deeply grooved on the caudal side, and at the bottom of the cavity thus formed arises a single stout spine, which is directed upward and outward. The vasiform orifice is subcircular in outline. The operculum is concave on its caudal margin, and covers the anterior half of the orifice. The lingula is protruding, setose, gradually enlarging distally, and squarely truncate at caudal end. The fore and hind wings are each provided with a single unbranched median vein. The margin of the wings is beaded all round, each bead consisting of a minute globule, from the outer side of which two or three minute setæ arise. The length of the fore wings is about 1 mm. ; width, about .5 mm. The rostrum is three-jointed. Ovipositor ordinary, usually bent upwards when not in use.

♂. Average length about .90 mm. Proportionately smaller than female, otherwise differs only in the sexual organs.

I have named this insect in honour of Dr. A. S. Packard, who first called attention to its occurrence on strawberry plants at Amherst, Mass.

All stages described from numerous specimens. Types of pupæ and adults deposited in the collection of the Massachusetts Agricultural College.

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EXPLANATION OF PLATE 2.

(All Figs. greatly enlarged.)

Fig. 1.—Egg.

Fig. 2.—First instar.

Fig. 3.—Right hind leg, first instar.

Fig. 4.—Dorsum of the pupa.

AN ACKNOWLEDGMENT.

I desire, on behalf of the Entomological Society of Ontario, to publicly acknowledge its indebtedness to Mr. H. Bird, Rye, N. Y., for a series of recently-bred specimens of *Hydracia*, and his magnanimous liberality in so freely parting with such rare species for its benefit, that cost him so much patient labour, valuable time and industrious research to secure. The expertness he has attained in discovering the food-plants and obscure breeding habits of this difficult genus is remarkable; whilst the perfection of scale and colour in the specimens that leave his hands is indescribable, and must be seen to be fully realized.

J. ALSTON MOFFAT, Curator.

IN MEMORIAM—R. J. WEITH.

Born September 15th, 1847, in Wroutko, Prussia; died September 15th, 1902, in Elkhart, Indiana. A few words of biography, together with the sad intelligence of his death, have already appeared in these pages; but it seems fitting that the life of one who was well known to many entomologists in America and Europe as an accurate observer, an indefatigable worker, a valued correspondent, and a sincere friend, should receive more than a passing notice.

From his son, Mr. Louis E. Weith, I have obtained some further facts. At an early age he was apprenticed as a barber, and from the age of thirteen until a short time before his death he followed this business. It was while at school, prior to his thirteenth year, that he acquired that love for nature which was ever afterward the passion of his life.

At twenty-five he came to New York; thence he went to New Orleans, afterwards to Memphis, to Chicago, and then to South Bend, Indiana, where he was married. Thereafter he removed to Elkhart, where he resided until his death.

His knowledge of entomology and his skill as a field naturalist were obtained by the devotion of all his spare moments (which were all too few) to these ends. His chief subject of study was the parasitic Hymenoptera. Of his work in this field I will leave others to speak. During the last few years of his life he took up, with great enthusiasm and success, the study of the life-histories of Odonata, Plecoptera and Ephemeroptera; and it is of some of the qualities of the work he did in this field that I wish to speak. He began by collecting and contributing data for Williamson's Dragonflies of Indiana. My correspondence with him began when he, having learned that I was seeking to obtain the immature stages of a dragonfly of peculiar and restricted distribution that he had found near his home, wrote me, offering to find these stages for me, if I would direct his efforts. I gladly wrote the few suggestions necessary, and he found the specimens wanted. At my solicitation he recorded his observations of that time for the readers of this magazine, in Vol. XXXIII., pp. 252-254. During the summer of 1902 he studied with great diligence the life-histories of the Stoneflies and Mayflies of his own locality, and made here other important discoveries that still remain to be published.

His letters, which came thick and fast during the collecting season, for he was continually sending specimens, were marked by an impetuous desire to know where were the gaps in our knowledge, in order that he

might endeavour to fill some of them. Once he wrote me: "Would it not be well if older students would oftener publish notices of what observations are needed to clear up mysteries in the life-history of this or that species? There are those, like myself, who are interested in natural history and who have collected for many years, who have many good chances to observe important biological facts, but who have no means of knowing which of their observations are new. I have seen many things the knowledge of which would have saved professional entomologists much time; but, not knowing this at the time, and not wishing to print to be laughed at, I have let the observations slip. Had I not seen your note on unknown dragonfly nymphs in the CANADIAN ENTOMOLOGIST some time ago, the nymph of *Nannothemis* had probably not yet been found." And again: "I shall be glad to contribute my mite toward widening the scope of our knowledge of natural history." And again, when I had written him about some of Say's species of Perlidæ, unheard of since Say's day, he wrote: "I am anxious to find some of the missing ones."

His diligence and application were remarkable, and his care to keep his statements within the limits of his observations was most exemplary. He was the best type of unprofessional entomologist. He so loved nature, and trusted in the value of accurate knowledge of her ways, that he was willing—nay, happy—to work and to wait, to observe and to verify again and again, in order that he might be able to tell in the end the simple truth. American entomology was honored by his methods, and has lost one of her ablest field naturalists by his untimely death.

JAMES G. NEEDHAM, Lake Forest, Ill.

MALE WASP WITH FEMALE ANTENNÆ.

BY W. HAGUE HARRINGTON, F.R.S.C., OTTAWA.

Among some hymenoptera recently received from Mr. A. Gordon Leavitt, of St. John, N. B., is a very interesting male of *Thyreopus latipes*, Smith. The sexes of this genus are readily separated, as the males have the anterior legs remarkably modified; the tibiæ especially being developed in broad shields, or leaf-like expansions. The antennæ are simple in the female, but those of the male have the flagellum fusiform and compressed. In *T. latipes* the basal joints are broad, and the flagellum narrows from the second joint to the apex. Mr. Leavitt's specimen, taken at St. John, N.

B., on 29th June, 1901, was at once recognized as belonging to this species, and it was only on transferring the specimen to another box that it was seen to have simple antennæ instead of those so characteristic of the species to which it belongs. Examination with a lens established that they are the 12-jointed simple antennæ of a female. Indeed, the whole head approaches more closely that of a female than of a male. On comparing the head carefully with those of three males at hand, it is found to be less narrowed behind the eyes and somewhat flatter on the front. Such aberrations may not be uncommon, but have not been observed by me, and in a large proportion of the Hymenoptera the sexes are so alike in structure that similar modifications would not attract attention. *T. latipes* has a wide distribution through Canada and the United States, from the Atlantic to the Pacific, but the male only is known. In "The Crabroninæ of Boreal America," Trans. Am. Ent. Soc., XXII., 129, Fox says that *T. (Crabro) vicinus*, Cress., will probably be placed as the female of *latipes* eventually. I have not examples of this form, but the description of it supports such a view, and it is known only in the female sex. It is recorded by Fox from Colo., Nebr., Nev., Ariz., Cal., Oreg., Mont. and Wash. In Mr. Leavitt's specimen the scape of the antennæ is yellow, with a black line above, as in other males of *latipes*; in *vicinus* the scape is described as yellow, sometimes spotted behind with black.

THE COCCINELLID GENUS SMILIA, WEISE.

BY T. D. A. COCKERELL, E. LAS VEGAS, N. M.

The small Coccinellidæ commonly known as *Smilia* are among the more important natural enemies of the Coccidæ. The name *Smilia* properly belongs to a well-known genus of Homoptera, so in *Science Gossip*, 1900, p. 606, I proposed to call the Coccinellid genus *Epismilia*. I now learn from the *Index Zoologicus* that *Epismilia* was used in 1859 for a genus of Coelenterates. I therefore propose another name for *Smilia*, Weise, namely, MICROWEISEA. The North American species are *Microweisea misella* (Lec.), *M. marginata* (Lec.), *M. coccidivora* (Ashm.), *M. ovalis* (Lec.), *M. atronitens* (Casey), *M. minuta* (Casey), *M. planiceps* (Casey), *M. reversa* (Fall); all standing in our lists under *Smilia*.

Stictomela, Weise, from E. Africa, and *Platylæmus*, Weise, are also homonyms, and will have to be changed.

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND
PARASITIC WASPS, OR THE SUPERFAMILY
VESPOIDEA.

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U. S. NATIONAL MUSEUM.

(Paper No. 12.—Continued from Vol. XXXV., p. 8.)

FAMILY XXXVII.—Tiphidæ.

By most systematists this family is still classified with the *Scoliidæ*, although separated as a distinct family by the Swedish entomologist, C. G. Thomson, as early as 1874. I agree with Thomson, and believe these wasps form a distinct family, easily recognized by the characters made use of in my table of families.

The genus *Engycistus*, Fox, based upon *Myzine rufiventris*, Cresson, was classified by Cresson, Cameron and Fox with the *Scoliidæ*. Mr. Fox has kindly sent me specimens for examination, male and female, and I find them true Tiphids; they have nothing to do with the *Myzinidæ* or *Scoliidæ* as now restricted.

The genus *Pterombus*, Smith, still unknown to me in nature, also evidently belongs here.

Mr. Peter Cameron, in *Biologia Centrali-Americana*, has described a number of species under the genus *Epomidiopteron*, De Romand. Those of his species that I have recognized, however, do not belong to it, but belong to the genus *Paratiphia*, Sichel. *Epomidiopteron*, De Romand, is something quite different, and is apparently closely allied to *Engycistus*, Fox.

In habits the *Tiphidæ* agree with the *Scoliidæ*, being parasitic upon ground-inhabiting beetle larvæ. *Tiphia inornata*, Say, attacks our *Lachnosterna* larvæ, but it is widely distributed and must have other hosts.

Table of Genera.

1. Females.....	2.
Males.....	7.
2. Marginal cell <i>open</i> at apex.....	5.
Marginal cell <i>closed</i> at apex; first transverse cubitus complete, the first and second cubital cell separated.	
Cubitus in hind wings interstitial with the transverse median nervure, or originating <i>just</i> before it; three cubital cells in front wings.....	3.

- Cubitus in hind wings originating *before* the transverse median nervure.....5.
3. Hind femora *not* produced at apex beneath.....4.
Hind femora produced at apex beneath.
Hind tibiae very strongly *serrate* on the outer face..... Engycistus, Fox.
(Type *Myzine rufiventris*, Cress.)
4. Hind tibiae denticulate or tuberculate on outer face; the front tibiae produced into a long, acute spine at the middle..... Epomidiopteron, De Romand.
(Type *E. Julii*, De Romand.)
Hind tibiae *not* serrate on the outer face, the front tibiae normal, unarmed..... Pterombrus, Smith.
(Type *P. aenigma*, Smith.)
5. Front wings with *two* cubital cells..... 6.
Front wings with *three* cubital cells.
Cubitus more or less obliterated at its origin; second and third cubital cells each receiving a recurrent nervure, the first recurrent nervure strongly curved or angularly broken by a stump of a vein and received by the second cubital cell at its basal third; tegulae abnormally large; mandibles bidentate; claws cleft..... Paratiphia, Sichel.
(Type *P. albilabris*, Sichel)
6. First transverse cubitus entire, *not* angularly broken by a stump of a vein; middle tibiae with only *one* apical spur..... Tiphia, Fabricius.
(Type *T. femorata*, Fabr.)
7. First transverse cubitus entire, *not* obliterated at base, the first and second cubital cells distinctly separated..... 8.
First transverse cubitus obliterated at base, the first and second cubital cells more or less confluent..... 9.
8. Cubitus in hind wings interstitial with the transverse median nervure or originating just before it; hind tibiae serrate, the tarsi very long..... Engycistus, Fox.
Cubitus in hind wings originating a little *before* the transverse median nervure.
Hind tibiae denticulate or tuberculate on outer face..... Pterombrus, Smith.
Hind tibiae not serrate on outer face, the tarsi normal..... Epomidiopteron, De Romand.

9. Three cubital cells, the second not longer than the third Paratiphia, Sichel.
Two cubital cells, the second very transverse Tiphia, Fabricius.

FAMILY XXXVIII.—Cosilidæ.

This family is based upon the genus *Cosila*, Guérin, described in 1839 from Chile. The affinities are most perplexing, although apparently closely allied to the *Myzinida*, *Scoliide* and *Tiphiide*. The middle coxæ, however, are much closer together than in those families; the eyes in both sexes are *entire*, not emarginate within; the venation of the wings, too, is different, while the male genitalia is quite characteristic and totally different from that in the families mentioned. In having the eyes entire in both sexes, it agrees with the family *Tiphiide*, but may be easily separated by coxal characters, by venation and by the unarmed hypopygium of the males.

I have also placed in this family the genus *Fedtschenkia*, Saussure, unknown to me in nature. Both Saussure and André, however, place it with the *Mutillidæ*, and Mr. Ernest André has even gone so far as to make it the type of a subfamily—the *Fedtschenkiinae*. My reason for differing from these eminent authorities is that the female is *winged*, while all known females in the *Thynnidæ*, *Myrmosidæ* and *Mutillidæ* are always *wingless*, never winged. The abdomen in the male, too, is unarmed and totally unlike that in the *Mutillidæ* and allied families, a most important character, which, in my opinion, is sufficient to exclude it from any of those families.

Table of Genera.

1. Front wings with *two* cubital cells 2.
Front wings with *three* cubital cells 3.
2. First cubital cell about *thrice* as long as the second, receiving the first recurrent nervure at its apical third; pronotum shorter than the mesonotum; scutellum *with* lateral keels; metathorax striate, the sides toothed Nursea, Cameron.

(Type *N. carinata*, Cam.)

First cubital cell about *twice* as long as the second, receiving the first recurrent a little beyond its middle; submedian cell slightly shorter than the median; pronotum not shorter than the mesonotum; parapsidal furrows distinct; scutellum *without* lateral keels; metathorax not striate, but with a delicate median keel and keeled at sides, the spiracles small, rounded; abdomen fusiform, with a

- constriction between the first and second segments, the first segment trapezoidal, convex above, not longer than wide at apex. ♂ (♀ unknown)..... Sierolomorpha, Ashmead.
(Type *Sierola ambigua*, Ashm.)
3. Second and third cubital cells each receiving a recurrent nerve.... 4.
Second cubital receiving both recurrent nerves.
Claws cleft; marginal cell not separated from the costa at apex;
first joint of flagellum a little shorter than the second.
♂ Cosila, Guérin.
(Type *C. Chilensis*, Guér.)
4. Claws cleft, or with a tooth or lobe at base beneath..... 5.
Claws simple..... 6.
5. Claws with a tooth beneath; head large, quadrate or nearly, armed
with a tooth on each side beneath..... *Dicrogenium*, Stadelman.
(Type *Pristocerus rosmarus*, Stadelm.)
Claws usually cleft; head transverse, unarmed.
Claws not dilated into a rounded lobe at base; hind tibiae serrate;
marginal cell at apex rounded, separated from the costa and
usually with an appendage; cubitus in hind wings originating
before the transverse median nerve. ♀ Cosila, Sichel.
Claws dilated into a rounded lobe at base; hind tibiae with the
superior margin tuberculate, crenate and pilose or spined
between the tubercles; third cubital cell anteriorly not dilated.
Marginal cell at apex entire..... *Callosila*, Saussure.
(Type *Myzine signata*, Smith.)
Marginal cell at apex strongly truncate... *Colobosila*, Sichel.
(Type *C. fasciculata*, Sichel.)
6. Head not large, quadrate, quite differently shaped..... 7.
Head very large, quadrate; ocelli subtriangularly arranged; mandibles
short, stout, bidentate; antennae short, inserted on the anterior part
of the face, the scape stout; marginal cell hardly as long as the first
cubital cell, rounded at apex, the submedian cell much longer than
the median..... *Maurillus*, Smith.
(Type *M. australis*, Smith.)
7. Head subglobose, the ocelli close together in a triangle; mandibles
tridentate; antennae inserted close to the anterior margin of the
head, filiform, the scape longer than joints 2 and 3 united; marginal
cell long, subtruncate at apex; median and submedian cells equal;

cubitus in hind wings originating *beyond* the transverse median nervure..... Fedtschenkia, Saussure.

(Type *F. grossa*, Sauss.)

Head transverse, seen from in front longer than wide; the eyes large, occupying the whole side of the head, and extending from base of mandibles to vertex; mandibles bidentate, the outer tooth much longer than the inner; maxillary palpi 4-jointed, labial palpi 3-jointed; antennæ 12-jointed, rather long, the flagellum subclavate, inserted on the anterior margin of the head; pronotum considerably longer than the mesonotum, the latter with two widely separated furrows; scutellum fully one-third longer than the mesonotum; metathorax long, obliquely rounded off posteriorly; abdomen fusiform, a little longer than the head and thorax united, with a constriction between the first and second segments..... *Isotiphia*, Ashmead, gen. nov.

(Type *I. nigra*, Ashm.)

1. *Isotiphia nigra*, sp. nov. ♀.—Length 4 mm. Polished black, the head and the mesonotum with some sparse punctures, the metathorax rugulose; antennæ brownish, towards apex black; tips of tibiæ and tarsi testaceous; wings hyaline, with a fuscous cloud through the discoidal cells, and another through the second and third cubital cells and the disk of the wings.

Brazil: Santarem. One specimen.

FAMILY XXXIX.—Rhopalosomidæ.

The writer established this family in 1896. It was based upon *Rhopalosoma Poeyi*, Cresson, a most singular looking wasp, that, on account of its colour, the subemarginate eyes and the prominent ocelli, resembles an ichneumon-fly of the subfamily *Ophioninæ*. Mr. Cresson described it as a Braconid. It is, however, a true aculeate, and shows some affinity with the *Myrmosidæ* and *Mutillidæ*, through such genera as *Brachycistis*, *Tricholabioides*, *Photopsis*, *Magrettina*, etc.

The family was very fully discussed in my paper entitled "Rhopalosomidæ, a new family of fossorial wasps," published in the Proceedings of the Washington Entomological Society, Vol. III., 1896, pp. 303-9.

The only genus known may be recognized by the following characters:

Eyes emarginate within; antennæ long, slender, the joints of the flagellum long, cylindrical, each joint with two spurs at apex within; front wings with two oblong, closed cubital cells, the second receiving the recurrent

nervure a little before the middle; abdomen long, clavate, the petiole very long; legs long, the tibial spurs 1, 2, 2, very long and straight; tarsi long, the middle and hind tarsi with joints 2-4 broad and dilated, densely pubescent beneath, subemarginate and armed with some stiff spurs at apex; claws long, curved. Rhopalosoma, Cresson.
(Type R. Poeyi, Cr.)

TUTT'S "BRITISH LEPIDOPTERA" — A REPLY TO DR. DYAR.

It is in no spirit of carping criticism that I write in reply to Dr. Dyar's remarks on the 3rd volume of Mr. Tutt's *British Lepidoptera*. Far otherwise, for I have always considered myself as one of his disciples, as it was his and Dr. Chapman's stimulating work on Lepidopterous larvæ that first aroused my interest in this branch of entomology, and my chief object in the following remarks is a desire to arrive at a clearer understanding, in view of future work. Unfortunately, owing to the extremely limited time at my disposal, I am not nearly so well versed in the literature of my subject as I should be, it being a question of choosing between first-hand work, at the risk of repeating through ignorance of what another has already done, or acquiring a fuller knowledge of what other workers are doing. I have chosen the former, and this must be my excuse if I have missed some important work of Dr. Dyar's that has already settled some of the points I raise.

With regard to tubercle v of the Sphinges, I gladly acknowledge that the error which led Mr. Tutt astray was chiefly mine, as Mr. Tutt was in this instance largely relying on my notes. I am the more ready to take this action in that by so doing I find myself in company with Dr. Dyar himself, my mistake being, perhaps, somewhat analogous to the mistake so readily acknowledged by him with reference to his statement of the absence of tubercle iv. in the Saturniids ("Additional Notes on the Classification of Lepidopterous Larvæ," *Transactions of the New York Academy of Sciences*, 1894, Vol. XIV., p. 51). Tubercle v. on the abdominal segments of Sphingid larvæ is, normally, not only moved up to the level of the spiracle, but is, in addition, shifted forward until it is situated almost on the verge of the anterior edge of the segment, and it was owing to this unusual position and the fact of there being an accessory tubercle in this position in Lachneid larvæ which led me astray. Almost before the volume had left the binder's hands, an examination of some

notes I had made some time previously, but forgotten, with regard to the 1st instar of *Sesia* (*Macroglossa*) *stellatarum*, caused me to doubt the correctness of our conclusion, and the opportunity of examining larvæ of *Hemaris tityus* (*bombyliformis*) and *Hyles* (*Deilephila*) *euphorbiæ* in their first skins has proved to me that Dr. Dyar's view is undoubtedly correct. In its first instar, the larva of *Sesia stellatarum* has tubercle v. on the first abdominal segment below the level of the spiracle, although still at a higher level than iv. It is definitely situated on the lateral flange, which on this segment bends upwards towards the anterior margin. Much the same condition also obtains in the same segment in *Hemaris tityus*, v. being on the lateral flange in front of iv. and below the level of the spiracle; while in *Hyles euphorbiæ* iv. and v. on the first abdominal segment are consolidated at base, the two setæ being a very short distance apart and both rising from a small oval plate beneath the spiracle.

The next point raised is with regard to the union of tubercles iv. and v., or, more correctly speaking, their inclusion within the limits of a group of hairs on a raised skin area or wart beneath the spiracle, on the larva of *Lasiocampa quercus* and *Pachygastris trifolii*. This union or inclusion is a condition which, as Mr. Dyar himself has shown, is of not infrequent occurrence in some groups of Lepidoptera, and is met with in many different stages of development, e. g., from the condition obtaining in *Anthrocera* (*Zygæna*), where, in the second stadium, iv. and v., without becoming appreciably nearer together than they were in the 1st larval stage, are surrounded by an irregular group of secondary setæ, the whole group being situated on a slightly-raised skin area, to the definite sharply outlined and more or less raised wart, a condition such as obtains in Saturniids or certain larvæ of the Pterophorina. In at least one species of the latter group (I think *Marasmarcha phœoductyla* is an example) this inclusion of iv. and v. is beautifully demonstrated owing to the primary setæ having black bases, while the secondary setæ have pale ones. Now Dr. Dyar, without directly contradicting such an union or inclusion of iv. and v. within the limits of a single subspiracular wart in *Pachygastris trifolii*, calls it in question, and I would ask if he has examined the larva of this species in its first instar. Fortunately, I have by me specimens of this larva roughly mounted for the microscope, and I have carefully re-examined the same, and can find only the three many-haired warts mentioned near the spiracle, viz., iii. above it, the accessory perpendicular, and the subspiracular wart which I take to contain within its

limits the primary setæ iv. and v. I can find no trace of any small tubercles, single-haired or otherwise, in proximity to the spiracle or these warts. I may here remark that the 1st stage of *P. trifolii* shows a much more primitive condition than that of *L. quercus*, the warts being smaller and bearing fewer hairs, while the absence of any secondary hairs arising from the general skin surface obviates the difficulty of discriminating between primary and secondary characters that one finds in the last named species. Had I not examined the larva of *P. trifolii* I should not have written "iv. + v. almost post-spiracular" with regard to *L. quercus*, as without this key, any of the numerous secondary hairs in proximity to the spiracle might be taken for either iv. or v., or single hairs might have been chosen for both and the large wart designated as a secondary character. Unless, therefore, my eyesight is greatly at fault we must either consider iv. and v. to be included within the subspiracular wart of *P. trifolii*, and by analogy within that of *L. quercus*, or conclude that one of them has been lost; and, in view of what Dr. Dyar has said in regard to the possible loss of v. in the Sphinges and what we know as to the ready tendency of iv. and v. to become members of a common group of setæ in certain groups of larvæ, and the possibility of their becoming consolidated on a single segment of a larva of one species or tribe (see previous remarks *re Hyles (Deilephila) euphorbiae*), the line of least resistance is surely greatly in favour of the first-named conclusion. My slide showing a 1st stage larva of *P. trifolii* is at Dr. Dyar's disposal should he care to examine it.

On the question of whether the first stage of *Agria tau* is to be considered a specialized one, I must join issue with Dr. Dyar on two points: firstly, as regards the very restricted meaning attached by him to the words "Primitive first stage." This would bring the first skin larvæ of such species as *Stauropus fagi* and *Dicranura vinula* within the category of having a primitive or unspecialized first stadium. Even if it were possible to get a majority of entomologists to accept this sense, it would still be entirely at variance with the sense in which these words would be understood by biologists at large. Secondly, even if we accept the special meaning in which Dr. Dyar uses the term, the condition implied is *not* present in the 1st instar of *Agria tau*. Not only are the large horns identifiable with tubercle i. on the meso- and meta-thoracic segments and the transversely conjoined i.+i. belonging to the right and left sides of the 8th abdominal segment bear setæ on their lower lateral branches, besides those on the terminal forks, but the raised

bases of iii. and iv. are forked and bear *two* setæ and there are also additional secondary setæ rising from the general skin surface that are in no way associated with the primary tubercles. I have preserved but unmounted larvæ of this species in their 1st instar, and as with *P. trifolii* I shall be glad to forward them to Dr. Dyar if he desires to examine them.

There does not appear to be any issue between us with regard to *Dimorpha*, but I should like to enquire as to what is inferred by the remark "but it does not suggest the *Lachneidæ* nor *Liparidæ* proper." Are we to understand this as denoting a relationship between these two groups other than the general one in that both belong to the same order?

A. BACOT.

154 Lower Clapton Road, London N.E., England, Dec. 7th, 1902.

A NEW SPECIES OF HYPOLÆPUS, KIRBY.

BY J. CHESTER BRADLEY, PHILADELPHIA, PA.

Hypolæpus Viereckii, sp. nov.—Dark, abdomen white beneath, legs partly white, wings hyaline, nervures white at base. Length, 7–8 mm.

♀.—Head shining black; face below the insertion of the antennæ, a narrow band between the antennæ and the eyes, head above the eyes, and the temples, white; antennæ black, nine-jointed, third slightly arcuate, thicker and longer than the fourth, which is in turn longer than the fifth, and so on to the last. Thorax shining black, laterally in front of wings white; wings hyaline, nervures brown, whitish at base of wing; first transverse cubitus transparent, without colour, second submarginal cell receiving two recurrent nervures, lanceolate cell petiolate, only one marginal cell; legs dark brown, all coxæ and trochanters, tibiæ except tips and basal third of posterior femora, white; posterior tibiæ slightly enlarged, longitudinally sulcate, first joint of posterior tarsi as long as the other three combined, the last joint being especially short. Abdomen cylindrical, slightly angled laterally and more so dorso-medially; dorsal segments dark brown, ventral segments entirely white.

The paratypes have the second transverse cubital and the first recurrent nervures interstitial; the first transverse cubitus is often coloured, and the anterior two pairs of tarsi are often pale.

Habitat.—Westville, N. J., Sept. 12. Mr. H. L. Viereck, 7 specimens (♀). Type in the collection of the American Entomological Society. Paratypes in the collection of the Wagner Institute in this city, the collection of the U. S. Nat. Museum, and the author's collection.

A NEW DIASPID GENUS.

BY R. A. COOLEY, AGRICULTURAL COLLEGE, BOZEMAN, MONTANA.

In Professor T. D. A. Cockerell's "First Supplement to the Check-list of the Coccidæ" (published in the bulletin of the Illinois State Laboratory of Natural History, 1899), the following footnote occurs on page 398: "Phenacaspis, Cooley and Ckll., will be a new genus, to include *P. nyssæ*, *Chinensis*, *engeniæ*, etc., hitherto placed in *Chionaspis*. Mr. Cooley and the present writer agree that these forms have no generic relationship with genuine *Chionaspis* except through *Aulacaspis* and *Diaspis*. I leave Mr. Cooley to publish the generic characters, and classify the species."

The present paper gives the generic characters of Phenacaspis.

PHENACASPIS, gen. nov., Cooley and Ckll.

Scale of female elongated, with the exuviae at the anterior extremity, white. Scale of male much smaller than that of female; elongated, with the scales nearly parallel. With two longitudinal grooves on the dorsal surface, causing one or three carinae, which vary in prominence in different species. Pygidium with the terminal pair of lobes more or less sunken into the body, and having their inner edges serrate or crenate, and strongly divergent, leaving a distinct notch on the median line.

The colour and shape of the scales of the two sexes, together with the median notch of the pygidium, are the essential characters of the genus.

Since in Professor Cockerell's note *nyssæ* is the first species named, I suggest that this species be considered as the type of the genus.

CATALOGUE OF THE LEPIDOPTERA OF NORTH AMERICA.

The new Catalogue of the Lepidoptera of North America which I have prepared has been issued as Bulletin No. 52 of the United States National Museum. It comprises 740 pages. The edition is being distributed by the Smithsonian Institution, without charge. Those not receiving the publications of the National Museum regularly, and who are interested enough in entomology so that this publication would be of practical use to them, will be cheerfully recommended by me to receive a copy, on making application to the undersigned.

HARRISON G. DYAR, Washington, D. C.

BOOK NOTICE.

Species des Hyménopteres d'Europe et d'Algerie : Les Mutillides—Par Ernest André. A. Hermann, 6 et 12, Rue de la Sorbonne, Paris, France.

This work, representing the 8th volume of André's great work on the European Hymenoptera, begun in 1888 by Edmond André, is now completed by the publication of fascicle 81.

The volume before us is devoted to a consideration of the family *Mutillidae*, a large family of parasitic wasps living principally in the nests of bees and predaceous wasps, and is written by Ernest André, a brother of Edmond, contains nearly 500 pages, 25 plates, and gives full descriptions of all the *Mutillidae* occurring in Europe and Algiers; the first fascicle appeared in 1899.

After a brief preface and the definition of the family, Mr. André gives a good historical sketch of the family, which is based upon the genus *Mutilla*, Linné, established in 1758. From this sketch one may gain an excellent idea of the vagueness and confusion that existed among earlier authorities respecting genera, the great difference of opinion held by the more distinguished, and the slowness with which the modern and the more correct conception of a genus became established.

Mr. André devotes many pages to thoroughly defining the structural characters of these wasps, their life evolution and biology, and their geographical distribution. He finds that they are distributed over the entire world, and estimates that 1,600 species are known; of this number about half are found in America, the others being distributed in Europe, Africa, Asia and Australia.

After a good bibliography, in which 209 works and papers, treating on these wasps, are listed, he enters into a systematic account of the family, genera and species. He divides the family into four tribes: I., *Fedtschenkiinae*; II., *Apterygyninae*; III., *Methocinae*; and IV., *Mutillinae*. No one, probably, will object to Mr. André's groups; they are natural and well characterized. But most decidedly some will differ with him as to their rank and the position assigned them; I do.

In my opinion three of these tribes do not belong to the family *Mutillidae* (*sens. str.*); they differ too widely in many important characters to be included in the same family, although probably all are natural minor groups in other families. *Fedtschenkia* is winged in both sexes, and I have placed it in the family *Cosilidae*; the male has *not* the characteristic genitalia of a Mutillid. The *Apterygyninae* should be placed in the family

Myrmosidæ, the female having the thorax divided and the male having the hypopygium ending in an upward curved aculeus; while the *Methocinæ*, excluding the genus *Milluta*, which is a genuine Myrmosid, belong to the family *Thynnidæ*, and are the only representatives of the family found in Europe.

Milluta, André, only superficially resembles a genuine Methocine, and falls in naturally with many genera in the Myrmosidæ. In the supplement terminating the volume, Mr. André thinks the characters upon which my recently established genus *Magrettina* were based rather *specific* than *generic*, and makes it a synonym of *Milluta*, André. This, however, is merely an opinion, but coming from one who has done such excellent work in the Mutillidæ as Mr. André, has weight and should receive consideration. I must, however, differ from him. In my original diagnosis I called attention to the close relationship *Magrettina* had to *Milluta*, and still think it distinct. When my revised generic tables of the *Thynnidæ*, *Myrmosidæ* and *Mutillidæ* appear, in my classification of the Vespoidea, now in course of publication in the CANADIAN ENTOMOLOGIST, I feel convinced Mr. André will also think differently. I shall make use of characters that are generic, not specific, at least in my estimation.

In the opinion of Mr. André, *Alloneurion*, Ashmead, which was founded upon *Agama Kokpetica*, Radoszkowski, is based upon an accident of venation, and is absolutely not distinct from *Pseudophotopsis*, André. Who knows? All specimens I have seen have the venation alike in both wings!

Mr. André has subdivided the genus *Mutilla*, Linné, although he calls the divisions only subgenera; it is a move in the right direction, and is destined to be universally followed. On page 129 he tabulates 10 subgenera, as follows: *Ephutomma*, Ashm.; *Pseudophotopsis*, André; *Tricholaliodes*, Radosz.; *Myrmilla*, Wesm.; *Platymutilla*, André, n. g.; *Nanomutilla*, André, n. g.; *Mutilla*, Linné; *Cystomutilla*, André; *Dasymutilla*, Radosz.; and *Stenomutilla*, André. Each subgenus is then taken up in order, fully described in both sexes, when known, and followed by a table of the species. Full notes on distribution and habits accompany every description.

The work terminates with a methodical and synonymical catalogue of the species. In all 116 species have been recognized and fully described, besides many varieties. *Mutilla maura*, Linné, according to Mr. André, has 14 varieties; *M. rufipes*, Fabricius, has 9 varieties, and other species have a less number of varietal forms.

The very full tables and descriptions of all the European species, and the numerous plates, make the work invaluable to all students of the Hymenoptera. It is the best and most important work yet published on the family.

WILLIAM H. ASHMEAD.