



Scudder, S. H. 1877
[15 August 1877]
Date from Bolton

ART. XXIX.—THE FIRST DISCOVERED TRACES OF FOSSIL INSECTS IN THE AMERICAN TERTIARIES.

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Ten years have elapsed since I published the first results of a small collection of insects, found by Prof. William Denton in the Tertiary beds of White River.* With the possible exception of four insects, described in 1868 by Dr. Oswald Heer, from the Miocene of North Greenland,† they are the first insects found in the Tertiary strata of America. Since that time, many others have been found and a few described, but they have not lessened the interest with which these should be regarded. In the earlier volumes of this publication, the *Coleoptera* and *Physopoda* of Mr. Denton's collection have already been described,‡ and in this place we offer descriptions of the remainder, all of which will be fully illustrated in a general work on the fossil insects of the American Tertiaries, to be published by the Survey.

Some obscurity attaching to the precise locations at which the specimens were obtained, it may be well to remark that, since the issue by this Survey of the new drainage map of Colorado, it is possible to indicate them with better accuracy. Both localities are on the Lower White River; the lower, "Fossil Cañon", so near the mouth that, from the plateau above the cañon, one may see the valley of the Green River; this locality is, therefore, in Utah. The other locality, "Chagrin Valley", is about 60 miles farther up the river, and, therefore, is doubtless in Colorado. The former is on the northern, the latter on the southern side of the river. The larger part of the collection is from the upper locality.

Concerning the collection as a whole, there is little to add to what I have stated on former occasions. One or two corrections may, however, be made. There are no *Lepidoptera* in the collection (nor have I yet seen any from America), the supposed Noctuid proving to be one of the *Syrphidae*, badly preserved, and the possible Slug-caterpillar, a Dipterous larva; the "*Myrmica*" proves to be one of the *Formicidae*. There are also no *Orthoptera* in the collection. A more careful study shows that a single probable exception, *Dicranomyia stigmosa*, must be made to my former statement, that the insects of one locality are completely distinct from

* See Proc. Bost. Soc. Nat. Hist. x, 305-306, xi, 117-18; Amer. Nat. i, 56, vi, 665-68; Geol. Mag. v, 220-22.—Hollister, The Mines of Colorado, 373-357.

† Flora Fossilis Arctica, 129-130.

‡ See Bulletin, vol. i, 2d series, 221-223, vol. ii, 77-87.

those of the other. It is possible that better specimens may prove that the individuals from the two localities, which have here been combined, belong to distinct forms; but, at present, we see no valid reason for their separation.

Besides the insects mentioned under the families, but not referred to genera, the collection contains forty-six species. Of these, the *Diptera* claim twenty-five, or more than one-half. The proportion in specimens is still greater, since the species belonging to the other suborders are rarely represented by more than a single specimen. Nine different families of *Diptera* occur, six of them with more than one representative; and of these, so far as the perfect forms are concerned, the *Tipulidæ* and *Mycetophilidæ* are richest, including several genera which must be considered as new. It will be remarked that, while *Tipulidæ* are more abundant in this collection than any other family of insects, they are entirely absent from the collection made by Mr. George M. Dawson in the Tertiary beds at Quesnel, British Columbia,* while the latter collection contains more *Mycetophilidæ*, the next family, than Mr. Denton's.

The writer is greatly indebted to Professor Denton for permission to retain the collection for so long a period. Where no habitat for a species is mentioned, it is uncertain from which of the two localities it was taken.

HYMENOPTERA.

Family FORMICIDÆ.

Camponotus vetus.—A single specimen, very fairly preserved, lying upon the side; a remnant of one wing is left, and a faint indication of the antennæ, but the legs are wanting. The head has a flat summit, the upper half of the sides roundly protuberant, the lower half rather broad, and tapering but little; the thorax is long and moderately slender, compacted into a single mass, with a low arch, more than twice as long as high. The first segment of the abdomen increases rapidly in size posteriorly, and has a rounded knob above at its hinder end; the abdomen is long and slender, composed of five joints, the second the largest, gradually tapering to the pointed tip. It seems to agree better with *Camponotus* than with any other genus, but has a differently shaped head and first abdominal joint, and is smaller than the species of that genus, so that it is only placed here provisionally until other and better specimens are obtained. Length of body 3.75^{mm}; of thorax 1.15^{mm}; of abdomen 2^{mm}.

Liometopum pingue.—The single specimen representing this species is a male, as the number of abdominal segments show; but the wings are wanting. The insect is viewed from above. The head and thorax are slightly darker than the abdomen, but otherwise the whole body is uniformly fuscous, somewhat darker than the stone. The head is very small, subquadrate, slightly broader behind; and the posterior angles

* See my paper in the Report of Progress, 1875-76, Geol. Surv. Canada.

nearly rectangular; the anterior margin of the head is broadly and pretty regularly rounded, and the whole head is of about equal length and breadth. The thorax is very regularly ovate, broadest next the insertion of the front wings (traces of the origin of which can be seen), nearly twice as long as broad, rapidly tapering on the metathorax. The peduncle, as seen from above, is square, half as broad as the head, the hinder edge showing by its thickening that it was probably elevated at this point. The abdomen is plump, rounded ovate, scarcely less rounded posteriorly than in front, only one quarter longer than broad, broader than the thorax, composed of six segments, of which the first, third, and fourth are about equal in length, and the second half as long again. Length of whole body 7.5^{mm} ; of thorax 3^{mm} ; breadth of same 1.8^{mm} ; of peduncle 0.9^{mm} ; of abdomen 2.3^{mm} ; length of hind femora 4.3^{mm} ; breadth of same 0.36^{mm} . Fossil Cañon.

On account of the smallness of the head, I venture to place this insect in the genus *Liometopum*. It has the aspect of a *Hypoclinea*, but the head is only half as broad as the thorax.

Family ICHNEUMONIDÆ.

Ichneumon petrinus.—A fragmentary specimen, preserved on a dorsal aspect; parts of the front wings, the thorax, and basal half of the abdomen are preserved. The body is blackish and the wing-veins testaceous; the wing, excepting the fusco-testaceous stigma, is hyaline, covered sparsely with very delicate and moderately long hairs; the stigma is long and slender, the heavier main portion about two and a half times longer than broad, the slender basal extension as long again. Unfortunately, the wing is preserved only so far as, but not including, the areola, so that many characteristic parts are wanting; the second median and first subcostal cells are united, the vein separating them being present only below, where it is directed parallel to the principal longitudinal veins; the vein from which it springs is bent at an angle of about 70° , so that the part representing the first subcostal cell tapers rather rapidly in its apical half, while its basal half (if the cross-vein were continued) would be of the same size and shape as the second median cell or a parallelogram nearly twice as long as broad; the vein separating the first and second median cells is continued in a nearly direct line below; the third median cell is long and rather slender, with somewhat produced angles basally. The first segment of the depressed abdomen is fully half as long again as broad, increases a little and regularly in size toward the extremity, at its base is about half as broad as the extremity of the thorax, and at its tip less than half as broad as the broadest part of the thorax; the second segment is considerably larger, and also enlarges apically, but its length is indeterminate. Length of thorax 2.6^{mm} ; breadth of same 1.5^{mm} ; length of wing to tip of stigma 4.25^{mm} ; breadth of base of abdomen 0.5^{mm} . Chagrin Valley.

DIPTERA.

Family CULICIDÆ.

Culex proarvitus.—A poorly preserved specimen, in which only fragments of the legs can be seen, and the wings are so crumpled and folded as to prevent tracing the venation. What can be seen resembles the venation of the *Culicidæ*, and the veins and borders are heavily fringed with long hairs. The body is slender and the insect minute; the proboscis is about as long as the head and thorax combined, and the last joint of the equally long palpi is cuneate, the base rounded. Length of body 2.2^{mm}; of proboscis 0.9^{mm}. Fossil Cañon.

Corethra exita.—A specimen, viewed from above, with expanded wings, and destitute of legs, palpi, and all but the basal joints of the antennæ. The broad head, stout basal joint of antennæ, general form and size, with such of the venation of one wing as can be determined, indicate the genus; seven of the abdominal segments are very clearly marked, and the specimen appears to be a male. The body is slender; the head, thorax, and abdomen of equal width; the wings slender and of about equal length with the body. The fourth longitudinal vein runs in a nearly straight line over the basal half of its course, but is gently arched beyond; the fifth originates from the fourth in the middle of its straight portion, runs nearly parallel with it so long as it continues straight, and afterward diverges considerably; the first longitudinal vein appears to run to the tip of the wing. Length of body 4.25^{mm}; of wing 4.25^{mm}; breadth of latter 0.8^{mm}. Chagrin Valley.

Family CHIRONOMIDÆ.

Chironomus depletus.—A single mutilated specimen of this insect remains, and is doubtfully referred to *Chironomus*. The thorax is moderately robust, and the abdomen rather plump for a *Chironomus*. The antennæ are broken, and only the costal border of one of the fore wings can be seen; this shows that the second longitudinal vein terminates in the middle of the apical, and the first longitudinal apparently in the middle of the basal, half of the wing. The legs are moderately long, slender, the tibiæ finely spined, the spines arranged on the middle legs in a somewhat verticillate manner, and terminating with two or three long spurs; the femora are rather short, the tibiæ considerably longer, but not so long as the tarsi. Length of body 3^{mm}; of wing 2.3^{mm}; of fore femora 0.68^{mm}; of fore tibiæ 0.6^{mm}; of fore tarsi 1^{mm}; of middle tibiæ 1^{mm}; of middle tarsi 1.25^{mm}. Chagrin Valley.

Chironomus patens.—A single specimen, very well preserved, represents a species which is provisionally referred to *Chironomus*. Nearly all the parts are present, and the venation of one of the wings is nearly perfect, showing the structure of *Chironomidæ*, but differing apparently from any genus yet characterized. The antennæ are parted and bent, but apparently perfect; they seem to be fifteen-jointed, the joints square,

the apical no larger than the others, and all apparently furnished (as indicated at one point only) with a fringe of profuse, exceedingly delicate hairs, as long as the joints. The body is slender and the wings three times as long as broad; the costal vein runs only to the tip of the wing, and the margin beyond it is very faint; the first longitudinal vein runs uninterruptedly to the middle of the apical fourth of the wing; the second longitudinal nearly to the tip; the third longitudinal vein takes its rise from the second in the middle of the basal half of the wing, and parts widely from the second, leaving an unusual space devoid of neuration next the apex of the wing; the fourth arises from the third rather abruptly a little beyond its base, and has close beneath it the remnant of a vein or a fold in the wing; the next vein forks just beneath the origin of the fourth longitudinal vein, and leaves beneath it, next the posterior margin, a broad space without veins; the two basal cells are very short, and there appear to be no other transverse veins in the whole wing; all the veins are hirsute. The legs are long and slender, and covered with spinous hairs arranged in exact longitudinal rows, giving the legs a striped appearance under the microscope; the femora are rather short, and the tibiæ and tarsi of very unequal length, excepting on the hind legs; the tibiæ and all the joints of the tarsi are furnished apically with small spurs. Length of body 3^{mm}; antennæ 1^{mm}; wings 2.1^{mm}; fore femora 0.5(?)^{mm}; middle femora 0.6^{mm}; hind femora 0.8^{mm}; fore tibiæ 0.8^{mm}; middle tibiæ 0.9^{mm}; hind tibiæ 1.4^{mm}; fore tarsi 1.8^{mm}; middle tarsi 2.3^{mm}; hind tarsi 2.1^{mm}. Chagrin Valley.

An indeterminate species of this family, whose generic affinities cannot be discovered, from the entire absence of neuration in the wings and the loss of every other characteristic feature, presents a side view of the body with fragments of legs. The insect is minute, measuring but 2.75^{mm} long. It may possibly belong to the *Cecidomyiidae*. Chagrin Valley.

Another similar specimen, but distinct from the above, exhibits a dorsal aspect, and little besides the trunk is left. The thorax is comparatively stout, the head nearly as broad as the thorax, and the abdomen very slender and equal. The body is 3.25^{mm} long. Chagrin Valley.

A third indeterminate species probably belongs to this group, but the specimen is too indistinct to be of much value. It is a female. The antennæ are a little longer than the head; the head a little narrower than the abdomen, the latter tapering to a point. The costa of one wing is present, and the rather short and moderately stout legs of the opposite side. Length of body 1.8^{mm}; of middle femur 0.8^{mm}; of same tibiæ 0.5^{mm}. Fossil Cañon.

Family CECIDOMYIIDÆ.

Lasioptera recessa.—A single specimen of a minute fly, with the antennæ perfect, the body preserved on a side view, with parts of the legs and the wings folded together over the back, raised from the body. The head is moderately large, and appears to be a little narrower than

the thorax. The antennæ show fourteen joints, without counting the basal joint, and perhaps one or two more next the base, where the antennæ are parted; the joints are submoniliform, slightly broader than long, subequal; the last joint subconical, twice as long as broad. The wings show a principal vein, which strikes the costa about the middle, and apparently another, striking the costa half-way between this and the tip, a feature which does not accord with the structure of the *Cecidomyiæ* generally; but the wing at this point is very obscure, so that the appearance may be accidental. The legs are apparently about as long as the body, and rather slender. Length of body 1.4^{mm}; of antennæ 0.6^{mm}; wings 1^{mm}.

Lithomyza (λίθος, μόζω), nov. gen.

Ocelli present. Antennæ nine-jointed, scarcely longer than the thorax, the first joint cylindrical, the remainder submoniliform, ovate, about twice as long as broad, minutely and sparsely pubescent. Wings resembling those of *Anarete* in neuration, but differing considerably in shape, being broadest beyond the middle and tapering toward the base. The first longitudinal vein extends beyond the middle of the wing; the auxiliary vein runs close beside the first longitudinal vein, but only half as far, terminating independently; the second longitudinal vein extends to the tip of the wing, curving downward in the distal part of its course; the third longitudinal vein forks as in *Anarete*, but the independent or fourth longitudinal vein beneath it in *Anarete* is absent from *Lithomyza*. The tibiæ are destitute of spurs, but furnished with a posterior row of slight recumbent spines.

Lithomyza condita.—Represented by a single specimen in an unusually perfect condition, although somewhat indistinct. The joints of the antennæ are difficult to determine, but with little doubt are nine in number; although short, they are not so abbreviated as in *Anarete*, the joints being twice as long as broad; toward the tip, they grow smaller. The legs are long and bristly. The fork of the third longitudinal vein is at the centre of the wing, and nearer the base than the extremity of the first longitudinal vein. There is a faint indication of a transverse vein between the first and second longitudinal veins, about midway between the fork of the third longitudinal vein and its separation from the second. There is also a faint and very doubtful indication of an oblique cross-vein just beyond the transverse vein mentioned, running from the first longitudinal vein to the costa. Length of body 2.7^{mm}; of antennæ 0.75^{mm}; of wings 2^{mm}; fore legs 0.7(?)^{mm}; middle legs 2^{mm}; hind legs 2.4^{mm}; hind tibiæ 0.56^{mm}; hind tarsi 1.28^{mm}. Chagrin Valley.

Family TIPULIDÆ.

Dicranomyia stigmosa.—The neuration and the presence of a stigma in a fine, nearly perfect specimen of this species indicate a form closely

allied to *D. pubipennis*. O. S., but the absence of any pubescence at the tip of the wing at once distinguishes it from the recent species. At first, I supposed that it differed from other species of *Dicranomyia* in the absence of the auxiliary vein; but, after careful study, a faint trace of its apical portion was found in the same position relative to the origin of the second longitudinal vein as in *D. pubipennis*; as there, also, the first longitudinal vein curves downward to, and terminates on, the second longitudinal vein, directly opposite the cross-vein, uniting the discal cell with the third longitudinal vein, instead of on the costa; the subcostal cross-vein arises before the deflection of the first longitudinal, runs parallel with it until it curves, when it turns in the opposite direction to the costa. The discal cell is closed, but the cross-vein separating it from the second posterior cell is very faint, in which respect it agrees better with other *Dicranomyia* than with *D. pubipennis*. The stigma is confined to that part of the space between the first and second longitudinal veins which lies beyond the origin of the third longitudinal vein, but it also extends upward to the costa; it is nearly circular and faintly fuliginous. An oblique supernumerary vein runs obliquely to the centre of the stigma from a point in the first longitudinal vein directly above the origin of the third; that is, from the inner edge of the stigma. The outer and posterior margins of the wing are profusely fringed with very delicate hairs, longer than the thickness of the stout costal vein. The antennæ are fourteen-jointed, about twice as long as the head, the basal joints of the flagellum subglobular, the others obovate, the apical one more than twice as long as broad; they are delicately verticillate, the hairs being but half as long as the width of the joints. The male anal lobes are broadly obovate, deeply and abruptly excised externally at the base, so as to leave a sharp right angle outwardly and a narrow peduncle on the inner side. Together the lobes are broader than the tip of the abdomen, and each is about half as long again as broad. Length of body, including the lobes, 6.5^{mm}; antennæ 1.2^{mm}; wings 7.5; anal lobes of male 0.55^{mm}. Fossil Cañon.

A second specimen of what is apparently the same species, judging from the anal lobes, is somewhat stouter, but is destitute of all other appendages, excepting indeterminate fragments of the rostrum, so that no further knowledge of the species can be gained from it. The rostrum, however, would seem to be scarcely longer than the head. Chagrin Valley.

In another specimen, also a male, the body, one of the wings, and part of the legs of one side are preserved; the whole is much fainter than in the other specimens, but the auxiliary vein can be traced midway between the costal and first longitudinal veins throughout nearly its whole length. What is apparently the rostrum is a very little longer than the basal joint of the antennæ, and a very little shorter than the head. The character of the male appendices adds to the proof that this belongs to the same species as those previously mentioned, but the

stigma of the wing is lost by the incompleteness of the preservation. The legs are very slender and delicately hairy throughout, with no sign of spurs, although it should be remarked that the extremities of the tibiæ are not well preserved. Length of middle femora 5.25^{mm}; middle tibiæ 4.5^{mm}; hind femora 5.75^{mm}; hind tibiæ 5.5^{mm}. Chagrin Valley.

Another specimen is a female, with remnants of wings, having most of the veins scarcely traceable; enough of the right wing remains to be sure that it is this species, with which the size agrees. Fossil Cañon.

Still another is similarly preserved; but, on account of the partial folding of the wing, no stigma can be seen, and the first longitudinal vein seems to unite, or almost unite, with the second, so far from the branching of the latter, that I was at first inclined to separate it, but the difference proves to be very slight. The antennæ of this specimen are pretty well preserved, but so bent as not to allow of direct measurement; the size agrees well with other specimens, although it is slightly smaller than the second specimen mentioned, which, however, is rather larger than the average. The specimen is a female. Fossil Cañon.

A head preserved on the same stone as the last specimen probably also belongs to this species.

In the last specimen to be mentioned, we have the upper surface of an abdomen of a male *Dicranomyia*, apparently of this species, twisted so as to present a lateral view of the tip, showing the structure of the under surface of the appendices. The under inner edge is evidently thickened, and a slight hook projects a little beyond the broad lobe; as the lobe itself is preserved in a different view from what holds in the other specimens, and therefore has a slightly different contour, the specimen is judged to belong to this species only from the size of the abdomen and of its anal lobes. Chagrin Valley.

Dicranomyia primitiva.—Two specimens, a little smaller than *D. stigmosa*, but still more closely resembling *D. pubipennis*, together with a third, which is simply a body, to which is attached the costal outline of a wing, and near which lies a leg, represent the female of this species. The two first mentioned are rather faintly preserved, but permit the venation to be traced with certainty, though with difficulty, and with one of them a portion of a detached (middle or hind) leg may be seen. The neurulation of the wing differs from that of *D. stigmosa* in the shape of the discal cell, the inner border of which is straight, and strikes the incomplete fifth longitudinal vein exactly where the lower cross-vein strikes it, so that the two are continuous, and produce no break of direction in the fifth longitudinal vein. The auxiliary vein is not preserved, and there is no adventitious vein in the stigma, which otherwise is as in that species. The wing is not so slender as in *D. stigmosa*. Length of body 5.5^{mm}; wing 5.5–6^{mm}; femur 5^{mm}; tibia 5.75^{mm}; first two joints of tarsi 3.5^{mm}. The measurements of the leg are doubtful. Fossil Cañon.

Another poorly preserved specimen, which, by the structure of the

male forceps, is plainly to be referred to this genus, is judged, from its size, to belong to this species, none of the characteristic parts of the neuriation being preserved. The body is a very little smaller than in the females of this species, and the male forceps are ovate and rather large. Length of body without forceps 4.5^{mm}; forceps 0.35^{mm}; breadth of one of them 0.2^{mm}. On the same stone with this is a leg which probably belonged to it, though some distance from it; the length of the femur is 5^{mm}; tibia 4.5^{mm}; the tarsi are broken.

Dicranomyia rostrata.—A single specimen, larger than the other species of *Dicranomyia*, and about the size of *Tipula decrepita* Scudd., is provisionally referred to this genus. The head is very small, the thorax rather robust and very strongly arched, and the abdomen shows it to be a female. The antennal joints are fifteen in number, the basal one stout, the apical slender obovate, the others globular; the palpi are four-jointed, the last three joints equal, and together as long as the first, the whole rather longer than the head, and therefore rather long for a *Dicranomyia*. The legs are wanting, the single wing detached, broken at the base, and longitudinally folded. Such of the neuriation as can be disentangled agrees wholly with the peculiarities of this genus. Length of fragment of body, without head, 6^{mm}; breadth of head 0.5^{mm}; length of antennæ 2^{mm}; palpi 0.9^{mm}. Fossil Cañon.

A second specimen is referred to this species, but with some doubt, as it only consists of a trunk, with no appendages, excepting the male forceps. The specimen is slightly smaller than the female, as we should expect, and the plates at the extremity of the body differ from those of the other fossil species described in being of a regular, short, obovate form. Length of body, without forceps, 6.25^{mm}; of forceps 0.6^{mm}; width of same 0.28^{mm}. Fossil Cañon.

Spiladomyia (σπιλάζ, μυία), nov. gen.

This genus is founded upon a peculiar form of fly allied to *Dicranomyia*. The palpi are no longer than the head; the thorax is comparatively slender, the legs very long and slender, and the wings shaped much as in *Dicranomyia*, with a peculiar neuriation. The auxiliary vein terminates some way beyond the middle of the costal border; the first longitudinal vein terminates in the second, close to the tip of the wing; the second originates from the first beyond the middle of the wing, but some distance before the tip of the auxiliary vein; the third longitudinal vein originates from the second, near the middle of its course, beyond the tip of the auxiliary vein; a little distance beyond its origin, but much nearer the tip of the wing than usual, it is connected by a cross-vein with the fourth longitudinal vein; the first and second posterior cells are therefore very short; there is, then, but a single submarginal cell, three, or, if a very slight fork at the apex of the posterior branch of the fourth longitudinal vein be counted, four posterior cells, and no discal cell.

Spiladomyia simplex.—A single specimen and its reverse show nearly all the parts of the body, but all are faintly preserved, so as to be very difficult of study. The specimen is a female; nearly all the legs are preserved, and all but the base of the wings; the latter, however, trail along the abdomen, so that parts are obscured, and the neuration is exceedingly faint. The head is small, the eyes almost exactly circular, the palpi a little shorter than the head, the antennæ composed of cylindrical joints, a little longer than broad, the legs slender, with femora, tibiæ, and tarsi of nearly equal length, and the wings as long as the body. The anterior branch of the fourth longitudinal vein is abruptly bent at its base, so as nearly to connect with the cross-vein uniting it with the third longitudinal vein, and the first and second posterior cells are scarcely more than three times as long as broad. The third posterior cell is but very insignificant, as the posterior branch of the fourth longitudinal vein forks but slightly, and near its tip. The neuration of the lower part of the wing is uncertain. Length of body 7.5^{mm}; palpi 0.35^{mm}; fore femora 4.5^{mm}; middle femora 4.5^{mm}; hind femora 4.5^{mm}; fore tibiæ 4.65^{mm}; middle tibiæ 4.5^{mm}; hind tibiæ 4.5^{mm}; fore tarsi 4^{mm}; middle (or hind) tarsi 4.5^{mm}. Measurements of tarsi uncertain. C agrin Valley.

Pronophlebia (πρόων, φλέβιον), nov. gen.

This genus differs from all *Tipulidæ* known to me, in the early origin of the third longitudinal vein, which springs from the second almost immediately after its own separation from the first longitudinal vein, and some way before the tip of the auxiliary vein; the second longitudinal vein arises near the middle of the wing, and branches, the inner branch apparently forking near its tip. These characteristics readily serve to distinguish it from other *Tipulidæ*. The head is small, the antennæ long, very slender, and more than thirteen-jointed. They are too imperfect in the specimen studied to allow of any further statement. The palpi are not preserved, but the thorax is strongly arched, and the neuration indicates that the genus belongs to the *Tipulidæ brevipalpi*, and with other signs, that it is probably one of the *Limnophilina*, although the auxiliary cross-vein appears to be exactly opposite the origin of the second longitudinal vein. It is perhaps most nearly allied to *Trichocera*.

Pronophlebia rediviva.—The single specimen of this species is spread at full length, but the stone containing it is broken. The specimen is a male. The antennæ are considerably longer than the head and thorax together, and the joints are shaped and ornamented as shown in the figure of *Dolichopeza* in Walker's *Diptera Britannica*. The head is small, and the eyes so well preserved that they can be seen as in a living creature. The wings are very long and slender; the auxiliary vein terminates some distance beyond the middle of the wing; the first longitudinal vein about midway between that and the tip; the second longitudinal vein arises just within the middle of the wing, and the third longitudi-

nal vein less than half the distance from that to the tip of the auxiliary vein; the second longitudinal vein forks just beneath the tip of the auxiliary vein, its upper branch bends just beneath the tip of the first longitudinal, and its lower branch appears to fork just beyond the middle of its course. Cross-veins appear to divide the interspace between the second and third longitudinal veins (the second submarginal cell) into three equal parts; and there is certainly a cross-vein in the interspace between the fourth and fifth longitudinal veins (the second basal cell) directly opposite the origin of the third longitudinal vein. Length of body 9.25^{mm}; antennæ 2.6^{mm}; wings 9.25^{mm}.

Cyttaromyia (ὀψταροσ, μυία), nov. gen.

This genus of *Tipulidæ* differs somewhat remarkably from any known to me. It appears to belong among the *Tipulidæ brevipalpi*, the first longitudinal vein terminating in the second much in the manner of *Dicranomyia*, with which, however, this genus seems to have little else in common. Although the first longitudinal vein terminates in this way, no trapezoidal cell is formed near its extremity after the manner of the *Tipulidæ longipalpi*, but this portion is quite as in *Dicranomyia*. The position of the auxiliary vein is indeterminable from the fragment I have seen; but the "posterior intercalary vein" of Loew issues from the lower outer angle of the discal cell at a long distance from the great cross-vein, and indirect continuation of the fourth longitudinal vein. All these characteristics place it with the *Tipulidæ brevipalpi*; but the points wherein it differs from them, as indeed from all other *Tipulidæ*, are not a little extraordinary. Apparently, it has certain relations with the *Amalopina*, and has some resemblance to *Symplecta*, but it may be questioned whether it should not form a section by itself in the neighborhood of the *Ptychopterina*.

The first longitudinal vein terminates in the upper branch of the second at no great distance from the tip of the wing; at the same point, it is connected with the costæ by an oblique cross-vein, running in continuity with its terminal portion. *There are three submarginal cells and a secondary discal cell.* The large number of submarginal cells is due to the forking of the posterior branch of the second longitudinal vein, just as two submarginal cells are formed in *Anisomera* by the forking of the anterior branch of the same vein. The secondary discal cell is formed by the division of the third submarginal cell by a cross-vein, which unites with the elbow of the basal portion of the lower branchlet of the fork of the second submarginal vein, and leaves two cells beyond the supplementary discal cell, just as there are two cells (the first and second posterior) beyond the true discal cell; the latter lies directly below the secondary discal cell, but is twice as large as it. This is an anomaly quite unique, so far as I am aware, among the *Tipulidæ*.

Cyttaromyia fenestrata.—This species is represented by the portion of a wing and its reverse, containing a little more than the distal portion with nearly all the important part of the néuration. The striking pecu-

liarities of this have been pointed out in the description of the genus; but a few minor points, probably of specific value, may be added. The second longitudinal vein originates far back toward (perhaps before) the middle of the wing, and half-way to the tip forks abruptly, the anterior branch immediately arching over and running to a point just above the extreme tip of the wing; the space between this portion of its course and the first vein is infuscated, forming a stigma; the posterior branch forks half-way toward the tip, the upper branchlet being in almost direct continuity with the main branch, while the lower diverges suddenly from it and unites with the cross-vein from the third longitudinal vein, after which it runs parallel to the other branchlet; the third longitudinal vein springs from the posterior branch of the second directly after its origin. The first and second posterior cells are of the same length as the lower two submarginal cells, and the discal cell is of a similar length. The lower part of the wing is confused from folding, but there is a cross-vein uniting the fourth and fifth longitudinal veins next the inner extremity of the discal cell; the discal cell extends further by its own width toward the base of the wing than the secondary discal cell, and there is a slight appearance on the stone, as if the middle of the cross-vein forming the inner limit of the discal cell were united by a cross-vein to the second longitudinal vein shortly before it branches, thus forming a prediscal cell of irregular shape and about as long as broad. Length of fragment 5.5^{mm}; width of middle of wing 2^{mm}. Fossil Cañon.

Tipula decrepita.—A single specimen, poorly preserved, is to be referred to the genus *Tipula* (s. str.). The head is small, the antennal joints very slender, obovate, between two and three times as long as broad, the thorax well arched, and the abdomen indicating a female; the legs are wanting; both the wings are present, but poorly preserved, and one of them imperfect; even the perfect one is badly folded longitudinally, but the costal border is nearly uninjured, and indicates the generic affinities, from the peculiar nature of the venation toward the apex; instead of forming toward the termination of the first longitudinal vein a large stigma-like cell, the second longitudinal vein appears to form, with a slight vein springing from below, a long and exceedingly slender cell, above and outside of which the wing is slightly clouded. Length of body without head 6^{mm}; diameter of head 0.6^{mm}; length of wings 8.5^{mm}.

Tipula tecta.—A single specimen, preserved on a dorsal aspect, is of a larger size than the other *Tipulidae* from this locality; its precise relationship cannot be determined until other specimens are discovered, as it has no head nor legs, except a very slender fragment of a tibia; and the wings, being longitudinally folded and partially concealed by the body, along which they lie, show only that the neuration is not discordant with that of the crane-flies, with which its other features agree. The specimen is a female, with a slight, not greatly arched, thorax and full and plump, though still slender, abdomen, nearly as

broad in the middle as the thorax. Length of thorax 1.4^{mm} ; breadth of same 1.25^{mm} ; length of abdomen 4.75^{mm} ; breadth of same 1.15^{mm} ; length of wings 7^{mm} . Fossil Cañon.

Family MYCETOPHILIDÆ.

Mycetophila occultata.—A single poorly preserved specimen and its reverse present an upper view of the insect, with the wings folded over the back, the legs crowded together, and the antennæ lying beside the body. The antennæ are about as long as the head and thorax, the joints scarcely longer than broad, nearly cylindrical, scarcely at all moniliform. The legs are comparatively slender, hairy, and unarmed, not very long. The character of the venation shows the insect to belong to the *Mycetophilidæ*, but what genus is represented is somewhat obscure from doubt about the exact location of some of the veins; neither the auxiliary vein nor any of the basal veins above it can be seen, nor can the axillary be traced; judging from the other veins, it is probably allied to *Mycetophila*, although, in the possible presence of a second cross-vein uniting the cubital vein with the extremity of the radial, it should be referred to a distinct genus, probably allied to *Empheria* and *Tetragoneura*. The presence of such a vein being doubtful, we have preferred to point out its affinity to *Mycetophila*. The radial vein ends in the middle of the outer two-thirds of the costa, and at its tip a distinct stigma, nearly three times as long as broad, occupies the space between the radial and costal veins. The tip of the wing is broken on one specimen and obscured on the other, so that the length of the costal vein cannot be determined, although it appears to extend slightly beyond the tip of the cubital vein; the cubital is connected by the cross-vein to the radial but a short distance from its origin, and bends but little upward from the medial vein to reach it; the middle discal vein, on the contrary, bends downward considerably, and forks at a distance from the base, less than half-way from the median cross-vein to the tip of the radial vein, and an unusually broad space is left between its upper branch and the cubital vein, while the fork of the hind vein is nearer the base than the separation of the cubital from the medial vein. Length of body 3.5^{mm} ; antennæ 1.1^{mm} ; wings 3.5^{mm} ; tibiæ (of fore legs?) 0.75^{mm} ; tarsi (of same legs) 0.4^{mm} . Chagrin Valley.

Sackenia, nov. gen.

Body shaped much as in *Boletina*. Antennæ longer than the thorax, one-fourth slenderer at the apex than near the base, gently curved, 2+14-jointed. Legs very long and slender; femora and tibiæ of about equal length; tarsi a little longer than the tibiæ; the hind tibiæ and tarsi together a little longer than the abdomen; the tibiæ with one or two apical spurs beneath and spined throughout. Wings rather broad-ovate; the smaller veins at the extreme base obliterated in the specimen ex-

aminated; auxiliary vein terminating on the costa beyond the end of the basal third, the first longitudinal vein in the middle of the outer half; the second longitudinal vein is unusually curved downward at the tip, so as almost to reach the apex of the wing; the united third and fourth longitudinal veins part from the second very near the base of the wing or within the small transverse vein; they divide near the center of the wing and the fifth and sixth longitudinal as near the base as the third and fourth; the sixth longitudinal vein is straight, and appears to reach the margin of the wing.

The genus resembles *Boletina* more than any of the genera figured by Winnertz, but differs strikingly from it in the approximation to the base of the forking of the third and fourth, and of the fifth and sixth longitudinal veins. In this particular, it closely resembles the *Sciarinae*, but differs from them still more in the length of the auxiliary and first longitudinal veins, and in that the former reaches the costa. The costal vein does not appear to pass beyond the tip of the second longitudinal vein, but this point is obscure. I have dedicated their genus to the distinguished dipterologist Baron Osten Sacken, to whom I am indebted for many suggestions in the determination of these fossils.

Sackenia arcuata.—This species is represented by a single female specimen, more than usually well preserved. The body is pale testaceous, the wings wholly hyaline, but the veins faint testaceous; the antennæ are a little longer than the head and thorax together, very slender, of the color of the thorax; the basal joints are subglobular, slightly broader than long, the remainder twice as long as broad, and beyond the middle of the antennæ slightly moniliform. In the wings, the base of the hinder cell, using Winnertz's terminology, lies within the base of the upper discal cell, both being nearer the base of the wing than the middle transverse vein, while the base of the middle discal cell is far outside of either of these, near the centre of the wing. The costal vein appears to terminate where the cubital reaches the margin, and the axillary vein nearly or quite reaches the border. The legs are partly detached, and the basal portion of the front pair obscure, but, apparently, the front tarsi are about three times as long as the front tibiæ. Length of body 5.65^{mm}; antennæ 2^{mm}; wings 4.25^{mm}; hind femora 3^{mm}; hind tibiæ 2^{mm}; hind tarsi 2.4^{mm}; fore tarsi 2^{mm}. Chagrin Valley.

A second specimen of the same species is similarly preserved, but wants the wings. The legs, however, are better preserved, and show a pair of apical spurs to the tibiæ. The antennæ are imperfect, but the proboscis is seen. The length of the curved body is a little more than 5.5^{mm}. The legs are detached and confused, so that it is impossible to separate the middle and hind legs; one leg (a front leg, to judge from its length) has the following measurements: femur 1.2^{mm}; tibia 1.4^{mm}; tarsi 1.7^{mm}; another (probably a hind leg): femur 2.1(?)^{mm}; tibia 2.25^{mm}; tarsi 1.75^{mm}; another (probably the opposite of the same): tibia 2.25^{mm}; tarsi 1.75^{mm}. Apparently, all the tarsi are broken. The tibial spines,

both in this and the first mentioned specimen, are delicate, and a little more than half as long as the thickness of the tibiae.

Gnoriste dentoni.—A single specimen, a little broken, but otherwise in good preservation. The head and thorax are nearly black, the abdomen dark fusco-castaneous. Legs and base of antennæ fuscous. Wings rather narrower at tip than in the European *G. apicalis* Hoffm., hyaline, covered with microscopic hairs, with a very slight and increasing infuscation toward the apex, the veins testaceous, the costal and second and third longitudinal veins much heavier than the others, and the fifth longitudinal vein with its lower fork scarcely heavier than the veins about it. The extreme tip of both wings is broken, so that the extent of the costal vein cannot be seen; but, in the approach of the proximal end of the fork of the fifth longitudinal vein to the root of the wing, the species agrees with the American *G. megarhina* O. S. more than with the European species mentioned, for it lies scarcely further from the base than the transverse vein connecting the first and second longitudinal veins, and slightly nearer than the separation of the third and fourth longitudinal veins. Only the basal four joints of the antennæ are preserved; the basal joint is obconic, broadly rounded at the apex, nearly twice as long as broad, the other three cylindrical, the second nearly half as long again as broad, the third and fourth less than a third longer than broad. The legs are profusely covered with hairs, but the hinder pair appear to be spineless, except at the apex of the tibia and of each tarsal joint, where there are three or four slender and rather short spines; the claws are very small and delicate, strongly curved, and delicately pointed; the short tibiæ of the front legs, however, have at least a single row of fine distant spines on the upper (?) edge. Length of body 4.4^{mm}; first joint of antennæ 0.2^{mm}; second joint 0.125^{mm}; third and fourth joints each 0.11^{mm}; wings 4.5^{mm}; middle (?) tarsi 2.2^{mm}; first joint of same 1.1^{mm}; second 0.45^{mm}; third 0.28^{mm}; fourth 0.2^{mm}; fifth 0.17^{mm}; claws 0.038^{mm}. Fossil Cañon.

Family CYRTIDÆ.

Acrocera hirsuta.—A single very fragmentary specimen appears to belong in the neighborhood of *Acrocera*, but is too imperfect to mention with any certainty. The size of the insect, the small head, robust and coarsely haired thorax, stout and abbreviated abdomen, indicate a form resembling that of *Acrocera*, and the tibiæ appear to be destitute of spurs; but the legs are not very slender, and the venation of the fragment of the wing does not agree well with Westwood's figure of *A. globulus* Panz. in Walker's *Diptera Britannica*. There are, however, only a few longitudinal veins next the base, disconnected and faint, so that they afford very slight indication of the real character of the wings, and, the transverse veins being obliterated, nothing can be said of the basal cells. Length of body 4.5^{mm}; head 0.6^{mm}; height of same 1.3^{mm}; thorax and abdomen of about equal size. Fossil Cañon.

Family SYRPHIDÆ.

Eristalis lapideus.—A poorly preserved specimen, showing little that is characteristic, but which belongs near *Eristalis* or *Helophilus*. The body is preserved on a dorsal aspect, with wings partially expanded; the head is nearly wanting, the thorax without markings. The wings are distinct only on the basal half, and even here show no neuration at all beyond the general course of the principal veins at the very base; the alulæ, however, are very distinct, very large, their breadth (along the wing) fully equal to half the breadth of the thorax, dark, with obliquely transverse dark ridges, indicating that they were wrinkled in nature, much as in *Volucella* or *Oestrus*. Abdomen long, broadest in the middle of the basal half, beyond tapering considerably, the tip roundly pointed; apical half of basal joint black, forming a distinct transverse straight band; the number of abdominal joints appears to be five. Length of thorax 3.5^{mm}; breadth of same 3.25^{mm}; length of abdomen 6.5^{mm}; wings 12^{mm}; breadth of same 3.5^{mm}. Chagrin Valley.

Family MUSCIDÆ.

There are five species of Dipterous larvæ in the collection, all belonging to the *Muscidæ*, and representing at least two very different groups, each of which has more than one representative.

Musca ascarides.—First there is a species to which a considerable number of specimens belong, which may take the name here given. Some of the specimens are complete; others consist of emptied skins only. When contracted, the body is thick, especially on the anterior half, and about twice as long as broad, closely resembling the larva of a bot-fly. Both extremities are rounded, the anterior very broadly, while the posterior half tapers very regularly. In one specimen, which is not so much shrunken, the body is fusiform, and about three and a half times longer than broad; the head and hinder extremity tapering in a nearly equal degree. In the emptied skins, as in the others, it may be seen that the normal form is a blunt, squarely rounded head, behind which the body is nearly equal, and then tapers toward the tail. At the anterior extremity may be nearly always seen a portion of the mandibles, consisting of a pair of very slender rods or blades converging anteriorly and terminating in two attingent rounded lobes, attached to the inner edge of the blades. The anterior spiracles are seen in a single specimen as a simple, rounded, dark spot just outside the middle of either lateral half; the two lateral tracheal vessels may be seen in nearly all the specimens, and especially at the hinder extremity, and fragments of them are frequently scattered about on the stones; they are very large. The integument is generally rather dark, and more or less blotched, and covered profusely and almost uniformly with backward-directed hairs; these are short, tapering, and moderately stout, though minute. Length of contracted bodies 11.5^{mm};

breadth of same 6.25^{mm}; length of bodies not contracted 17.5^{mm}; breadth of same 5.75^{mm}; length of skins 25^{mm}; breadth of same 7.25^{mm}; length of blades of mandibles 3.25^{mm}; diameter of tracheæ 0.6^{mm}; of anterior spiracles 0.4^{mm}; distance of latter apart 2.75^{mm}. Chagrin Valley.

Musca bibosa.—Another species is represented by a single body, and one skin and its reverse, which seems to belong to the same. It is closely allied to *M. ascarides*, but differs from it in some essential features. When contracted, the body does not taper regularly from the middle of the front half to the tail, but the whole hinder half is much slenderer than the front, and toward the tip has nearly parallel sides, so that the body is flask-shaped, and about twice as long as broad. A similar, though not so abrupt, change of contour is seen in the skin. The structure of the mandibles and of the tracheæ may be seen to be the same as in the preceding species, but the integument is naked, being entirely destitute of any of the hairs which roughen the skin of *M. ascarides*. Length of contracted body 14^{mm}; breadth of same in front 7.5^{mm}; behind 3.75^{mm}; length of skin (a small one) 16^{mm}; greatest breadth of same 5.25^{mm}; length of mandible blade 2.75^{mm}; diameter of tracheæ 0.75^{mm}. Chagrin Valley.

A third species is represented by three or four contracted skins, which are too uncharacteristic to name, though it may be seen that they are distinct from the others. As preserved, they are almost black; the skin is much wrinkled and smooth; the body pretty regularly and bluntly obovate, nearly twice as long as broad; at the end of one, two colorless oval patches lie united, side by side, pressed against the extremity, and doubtless represent the head, and prove it to be different from the other species; it is, however, impossible to say what its affinities may be. Length of body 8.5^{mm}; breadth 4^{mm}. Chagrin Valley.

Musca hydropica.—A fourth species is represented by two bodies and a skin, which present an entirely different appearance from the preceding three species, but which may temporarily be given the same broad generic name. In this species, the form, even when contracted, is far more elongated than in the others; the body is nearly five times as long as broad, is broadest just behind the roundly pointed head, tapers rapidly toward it, but gently posteriorly to the middle, behind which it is equal. In the skin, the part of the body preserved is equal and very broad, excepting toward the head, where it rapidly narrows, the head being well rounded or slightly produced; the mouth-parts, instead of being withdrawn a little from the front extremity of the body, as in the species already described, lie at its very boundary, and the blades are parallel, instead of posteriorly divergent. The integument is covered rather profusely with very short, conical, tapering hairs, scarcely more than twice as long as their breadth at base. The larva is very distinctly banded with darker and lighter colors, as the empty skin shows, the posterior third of each segment being occupied by a very dark band, darkest on the dorsal surface, while a faint pale transverse line breaks

the anterior portion into two equal halves of the same width as the blackish band. Length of body 23^{mm}; greatest breadth of same 5^{mm}; breadth posteriorly 3^{mm}; breadth of skin 9.5^{mm}; length of segments on same 4^{mm}; length of mandible blades 3.5^{mm}. Chagrin Valley.

Musca vinculata.—There is still another species, allied to the last-mentioned, which may bear the name here proposed. It is represented only by part of emptied skins, all lying on the same stone, and which differ from the preceding species in being absolutely devoid of any hairs, and in having different and much fainter markings. The general color of the best-preserved specimen is a pale brown, and the markings are scarcely darker transverse bands, narrowing on the sides, but occupying nearly the entire length of a segment dorsally, and broken into equal parts by two transverse rows of very faint and minute pale dots. No specimen is sufficiently perfect to show the shape or the length, but the shape appears to be similar to that of *M. hydropica*, and the insect much smaller than it, for the breadth is 4.5^{mm}, and the length of one segment 2^{mm}. Chagrin Valley.

Nearly all of these species, and especially *Musca ascarides*, so closely resemble the larvæ of bot-flies, that I could scarcely persuade myself that they could not belong to the *Oestridæ*. The appendages of the skin, however, are much more delicate than is usual in *Oestridæ*, and are uniformly distributed over the surface or are altogether absent. The empty skins, too, have every appearance of belonging to the same insects as the complete bodies, and although these are not cast skins (in which case they would be proved natural inhabitants of the water), for they still contain the harder parts of the internal organs in many cases, but remains of partially decomposed larvæ, it would seem improbable that so large a number of Oestrid larvæ could be found, when the only way in which they could have reached their present condition would be through the droppings of animals affected by the bots standing in the water. Of course, the reference I have given them is only provisional.

Indeterminate remains of the imagines of three or four species of small *Muscidæ* also occur in the collection from both places.

Family HELOMYZIDÆ.

Heteromyza detecta.—A single specimen and a very poor reverse of it occur on the same stone with *Spiladomyia simplex*. Both wings and the thorax are preserved, with short fragments of moderately stout hairy legs. The venation is obscure, and the species referred provisionally to *Heteromyza* until better specimens decide more certainly to which of the groups of *Muscidæ* it belongs. The venation is very similar, so far as it can be determined, to *Het. senilis* Scudd. from the Tertiaries of British Columbia, but the former species is much smaller, and there is a peculiarity about it which is not quite clear: at the bend of the costa, in-

dicating the termination of the auxiliary vein, there is a short, distinct, oblique cross-vein nearly in continuation of the base of the costa, but bent slightly downward, which reaches the first longitudinal vein; the latter runs close to the costa and strikes it about midway between the tip of the auxiliary vein and the tip of the wing; the costa apparently runs exactly to the tip of the second longitudinal vein; the third and fourth longitudinal veins run parallel to each other to a very little way beyond the extremity of the auxiliary vein, where they are united by a short cross-vein, beyond which they both diverge from each other in opposing curves, equally turned aside from their former course; the third longitudinal vein runs to the tip of the wing; the fourth is united half-way to the border of the wing by a long oblique cross-vein, running at right angles to the fifth longitudinal vein. The extremity of the basal cells apparently lies about half-way from the base of the wing to the tip of the auxiliary vein, but this point is very obscure. Length of wing 1.65^{mm}; breadth of same 0.95^{mm}; length of thorax 0.75^{mm}; breadth of same 0.55^{mm}. Chagrin Valley.

COLEOPTERA.

Family CARABIDÆ.

Bembidium exoletum Scudd. Bull. Geol. Geogr. Surv. Terr. ii, 77-78.

Family DYTISCIDÆ.

Laccophilus sp.—The femur and tibia of the hind leg of a species allied to *L. maculosus* Germ. Fossil Cañon.

Family STAPHYLINIDÆ.

Gyrophæna saxicola Scudd. loc. cit. ii, 78. Chagrin Valley.

Leistotrophus patriarchicus Scudd. loc. cit. ii, 78-79.

Oxytelus pristinus Scudd. loc. cit. ii, 79. Chagrin Valley.

Family ELATERIDÆ.

Epiphanis deletus Scudd. loc. cit. ii, 80-81. Fossil Cañon.

Oxygonus mortuus Scudd. loc. cit. ii, 81. Fossil Cañon.

Family BRUCHIDÆ.

Bruchus anilis Scudd. loc. cit. ii, 82. Chagrin Valley.

Family CURCULIONIDÆ.

Entimus primordialis Scudd. loc. cit. ii, 84. Chagrin Valley.

HEMIPTERA.

Family FULGORIDÆ.

Aphana atava.—A single finely preserved specimen, giving the upper surface of the body, the displaced tegmina of one side, and a part of the middle leg of the opposite side, is referred provisionally to *Aphana*. It

plainly belongs to the true *Fulgorina*, and seems to agree better with *Aphana* than with any other genus concerning which information is at hand, but it is much smaller than the species of *Aphana* (as it is larger than those of *Pæocera*), and differs from it in the structure of the head and the brevity of the tegmina. The head is small, being scarcely more than one-third the width of the body, the eyes not prominent, the front scarcely angulated, and the vertex of about equal length and breadth; it is marked above with two longitudinal blackish stripes, and the thorax with a median, and, on either side, a broad lateral black stripe, all of them bordered by paler parts and the median marked with a median pale line. The front of the thorax is strongly and regularly convex, and the posterior border of the mesonotum is rectangular. The tegmina are about three times as long as broad, with nearly parallel borders, the tip roundly pointed. The apical fifth is filled with fine, closely parallel, longitudinal veinlets, extending from the tip of the radial vein to the inner border, forming an area of equal width throughout. The radial vein is parallel to the costa throughout. The ulnar veins originate almost exactly as in *Acraphia*, but the upper one does not fork before the middle of the wing, when it sends downward a single shoot, while the lower forks almost immediately, and again emits a vein beyond the middle of the wing. The wing itself is apparently diaphanous, but is mottled lightly with faint fuliginous along the costal border, and more heavily, but irregularly, with dark fuscous on the basal half of the wing, especially next the extreme base, and in a rather broad and straight but irregularly margined and oblique band, crossing the wing from just below the sutural angle equally backward and outward. Middle leg moderately stout; femur and tibia of equal width, straight, apparently with sharp edges. Abdomen full, rounded, broad, the extremity broadly rounded; it is dusky, especially beyond the base, the neighborhood of the spiracles darker, the fifth to the seventh segments with a medio-dorsal (or medio-ventral?) raised line marked in black. Length of body 9.5^{mm}; breadth of head 1.8^{mm}; of abdomen 5^{mm}; length of tegmina 10^{mm}; width of same 3.5^{mm}; length of femora (somewhat doubtful) 2^{mm}. Chagrin Valley.

Delphax senilis.—A fairly preserved specimen with spread wings, but with almost no characteristic sculpture. The head and exposed part of thorax are blackish; the rest of the body and the wings, especially the tegmina, dusky. The head is less than half as broad as the thorax, and short. The thorax is broad and rounded, and the body nearly equal, though enlarging slightly posteriorly. The tegmina are slightly narrower and considerably longer than the body, equal, and at the tip broadly rounded; they show no trace of neuration, but the preservation of the whole is perhaps too obscure to expect it. The wings are a little shorter than the tegmina, crumpled and folded, and show a few longitudinal veins, and others, which, from the nature of the preservation, cannot be traced. Legs and appendages of the head are wanting. Length of body 2^{mm}; tegmina 2.4^{mm}. Chagrin Valley (?).

Family TETTIGONIDÆ.

Tettigonia oblecta.—A single specimen, with the merest fragments of wings and no legs, but otherwise pretty perfect, belongs, with little doubt, to this family, although its generic affinities are uncertain. The head is not quite so broad as the body, bluntly angulated in front (at an angle of about 130°); the eyes are rather small, the beak stout and about as long as the head. The abdomen is moderately stout but long, tapering to a blunt tip; the segments eight in number, growing longer apically, the seventh being twice as long as the second. Length of body 7.6^{mm} ; breadth of same 2^{mm} ; length of rostrum 0.65^{mm} ; diameter of eyes 0.28^{mm} . Chagrin Valley.

Bythoscopus lapidescens.—A single specimen, broken at the edge of a stone, and so preserving only the abdomen and part of the wings. The abdomen is long and slender, composed of nine segments, the extremity indicating that it is a female. The wing (the tegmina appear to be entirely absent) reaches the tip of the abdomen, and the apical cells are from a third to nearly half as long as the wing, the upper the longer; the apex is produced but rounded. Probable length of body 5.5^{mm} ; length of fragment 3.5^{mm} ; breadth of abdomen 1.5^{mm} . Chagrin Valley.

Family LYGÆIDÆ.

Pachymerus petrensis.—A single specimen, of which most of the right half is destroyed, represents this species, which is placed here provisionally, principally because it appears to be closely related to fossil species put in this group by Heer. It seems to be a larva, and to belong either to the *Rhyparochromidæ* or the *Anthocoridæ* of the British Catalogue. The outline of the head is vague and broken, but the front is apparently bent at a right angle. The antennæ are about half as long as the body, four-jointed; the basal joint only about half as long again as broad, the others subequal, very slightly smaller at the base than at the apex, but otherwise equal, the second a very little the longest, the last pointed at the tip. Thorax and abdomen of about equal length, the former equally broad throughout (or nearly so); the fore and middle femora short and stout, about as long as their separation from each other. Abdomen expanding suddenly at the base, so that the second segment is broadest and apparently half as broad again as the thorax, beyond tapering rather rapidly to a rounded tip. This form of the abdomen does not appear consonant with *Pachymerus*. Length of body 3^{mm} ; antennæ 1.5^{mm} ; fore femora 0.35^{mm} . Fossil Cañon.

Family PHYSOPODA.

Melanothrips extincta Scudd. Bull. Geol. Geogr. Surv. Terr. i, ii, 221 Chagrin Valley.

Lithadothrips vetusta Scudd. loc. cit. i, ii, 222. Fossil Cañon.

Palæothrips fossilis Scudd. Geol. Mag. v, 221. Fossil Cañon.

NEUROPTERA.

Family PHRYGANIDÆ.

Phryganea aperta.—A single well-preserved specimen with its reverse; the wings are doubled beneath the body, and unfortunately are overlaid by the larva skin of a Dipterous insect, obliterating all the important parts of the neuration. The portion that remains resembles that of *Gæra*, but it is impossible to determine with any certainty, while the structure of the antennæ is more as in *Phryganea* proper. The head is detached from the body, and faint traces of the antennæ are preserved, but detached; a single pair of spurs show at the end of the tibiæ, and the spines of the under edge of the same tibiæ are alternately long and short. The abdomen is very well preserved on a side view. Length of body 8^{mm}; (portion of) antennæ 7^{mm}; tarsi 3.5^{mm}; wings 10^{mm}. Chagrin Valley.