

BULLETIN
OF THE
BUFFALO SOCIETY OF NATURAL SCIENCES.

VOLUME V. NO. IV.

A LIST OF THE HEMIPTERA
Of Buffalo and Vicinity.

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The publication of faunal lists constitutes a very important element in the literature of entomology as in that of other branches of Natural History. They form the basis of our studies on the geographical distribution of the species and throw much light on the origin of our fauna and its relation to that of other countries and zöo-graphical regions.

But few local lists of the Hemiptera have as yet been published in this country hence the distribution of many of our species is still largely a matter of conjecture. Of the more important contributions of this character may be mentioned Dr. Harris' Catalogue of the insects of Massachusetts and Dr. Fitches' List of the Homopterous insects of the State of New York, published in 1851. Mr. Uhler's List of the Hemiptera from West of the Mississippi River can hardly be classed as a local list but it is extremely valuable for the copious notes on the distribution of many of the species then mentioned. From 1885 to 1891 M. L'Abbe Provancher published Vol. III of his Faune Entomologique du Canada; but, although a work of considerable magnitude, it has little value, owing to the many erroneous determinations it contains and its author's limited knowledge of this group of insects. Within the last few years several local lists of more or less value have appeared, devoted, in part at least, to the Hemip-

379. *T. querci*, Fitch.

A single specimen taken at Lancaster, July 24, 1889.

380. *T. rosæ*, Harris.

Very abundant and destructive on rose bushes, June to Sept. In a large number taken on the 8th of Sept. 1887, the females outnumbered the males as ten to one.

(NOTE: Seven other species of the typhlocybina have been taken within our territory which appear to be still undescribed.)

NOTE.

During the publication of this list one species has been added and two others determined so it now includes 381 species representing 195 genera. Of these 123 genera and 198 species belong to the suborder Heteroptera and 72 genera and 183 species to the Homoptera.

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Descriptions of some new North American Homopterous Insects

By E. P. VAN DUZEE, BUFFALO, N. Y.

1. IDIOCERUS, NERVATUS, n. sp.

Small, Pale green, sometimes paler and tinged with yellow beneath especially on the face. Pronotum in clearly marked examples showing three longitudinal pale vittæ. Basal angles of the scutellum with a blackish spot mostly covered by the pronotum which is there discolored. Elytra hyaline with the nervures very indistinct; the costal, and sometimes one of the discal, pale greenish. Wings hyaline, iridescent, with strong brown nervures which are visible through the elytra as oblique brown lines. Tergum and at times the femora tinged with yellow. Tibiæ and tarsi green with brown spines. Length 4-4½ mm.

The front is broader in this species than in *pallidus*, its nearest ally, with its sides more oblique and the apex of the clypeus less abruptly expanded. Two last ventral segments of the female of nearly equal length, the ultimate a very little subangularly advanced at the middle, the edge either side nearly rectilinear to the rounded lateral angles. Its form is thus very similar to that of *amæmus*. In the males the slender plates are much shorter than in *pallidus*, extending for only about two thirds the length of the pygofers.

N. Y., N. J., Mich. Described from one male and four female examples: One pair taken by me at Lancaster, N. Y. June 28th, 1889; a female taken in New York City by Mr. E. B. Southwick, another taken at Anglesea, N. J. May 28th, by Prof. J. B. Smith and one from Agricultural College Mich., received from Mr. G. C. Davis.

This species may be recognized by its small size, green color, the dusky basal angles of the scutellum, and the brown nervures of the wings which are plainly visible through the hyaline elytra. This may be the *Bythoscopus obsoletus* of Walker but it is impossible to decide without an examination of his type.

2. PLATYMETOPIUS LORICATUS n. sp.

Small. Dark brown varied with whitish, face entirely pale yellow. Last ventral segment of the male angularly excavated, valve broadly rounded behind. Length, 4 mm.

Vertex well produced, subacute, twice as long on the middle as next the eye, the edges before the eyes feebly convexly arquated, the hind edge almost angularly excavated. Front unusually narrow, the clypeus a little

expanded at apex. Plates of the male about as long as the valve, triangular, apex acute, the sides a little concavely arcuated and fringed with pale stiff bristles.

Color dark brown tinged with reddish, irrorated and reticulated with pale, vertex with a short white median line at tip and a few longitudinal yellowish dashes forming an angulated broken transverse band before the eyes. Pronotum with five obscure pale longitudinal vittæ. Scutellum paler, varied with yellow on the middle. Elytra spotted with yellowish along its sutural nervure, the costa broadly whitish and crossed by numerous oblique brown veinlets, the disc minutely reticulated with pale along the nervures and marked by about a dozen round white dots in the areoles a few of which are larger. Wings faintly enfumed, iridescent, with strong brown nervures. Face entirely yellow, the front very faintly clouded and minutely irrorated with paler and showing an obsolete pale angular mark at base. Breast and venter nearly black, pruinose, the disc of the plates pale. Femora edged and dotted with pale, the tibæ pale dotted with brown.

California. Described from four male examples received Mr. D. W. Coquillett. This is a smaller and darker species than *acutus* with the plates and valve much shorter and the face entirely pale yellow. *P. frontalis* has a shorter vertex, the outer margins of the cheeks are brown and the form of the genitalia is quite different.

3. **PLATYMETOPIUS FUSCIFRONS** n. sp.

Brown, finely irrorated with pale. Elytra white reticulated with brown, face entirely fulvous-brown minutely irrorated with pale, basal angles of the scutellum orange-fulvous. Vertex shorter and more obtuse than in the preceding species; hind edge but feebly arcuated between the eyes. Pronotum with an obscure slender pale median line. Scutellum tinged with fulvous and marked with an orange-fulvous spot, edged with fuscous, with the basal angles, the outer edge at base and the apex white. Elytra white the nervures and a few reticulations within the areoles, sometimes coalescing, brown; Costal area crossed by about ten oblique brown veinlets: commissural nervure yellowish.

Front broader than in the preceding species, the edges a little sinuated, clypeus contracted on the middle. Face brown, minutely dotted with paler, marked with a pale line behind the eyes and an angular mark on the base of the front. Pleural pieces pale brown more or less invaded with fuscous on their disc. Tergum blackish with a pale margin; venter brown irrorated with paler. Valve of the male large, sinuated on the sides, the apex broadly rounded. Plates broad and short, but slightly exceeding the valve, rounded at apex. Pygofers considerably surpassing the plates, obtuse. Last ventral segment of the female short, of nearly equal length, across its whole width, feebly sinuated on the middle, with an obsolete median keel below, pygofers stout, obtuse, a little exceeded by the oviduct. Length $4\frac{1}{2}$ mm.

Arizona. Described from one male and two female examples received from the Morrison Collection at Cornell University. These came labelled *P. albopunctatus*, Fitch, but that is a very distinct species inhabiting the United States east of the Rocky Mountains and now known as *P. frontalis*, Van D.

4. **ALLYGUS COSTOMACULATUS**, n. sp.

Form nearly of *Jassus jucundus*, Uhl. Cinerous; elytra irregularly inscribed and marked with four brown costal spots. Length 6 mm.

Head rather tumid, broadly rounded before. Vertex nearly flat, but little longer on the middle than next the eye. Front rather narrow, the sides but feebly arcuated. Clypeus but little expanded apically. Cheeks narrow, scarcely surpassing the loræ, outer angles rounded. Last ventral segment of the female feebly produced on the middle of the apical margin, outer angles rounded; pygofers slender, scarcely exceeded by the oviduct.

Color cinerous tinged with testaceous and clouded with the same color on the discal areoles of the elytra. Vertex whitish before, marked with two brown points at the tip and another above each ocellus; face testaceous; front with about six brown arcs and a brown basal line, sometimes obscure; two points on the disc of the cheeks and the antennal pits brown or blackish. Legs and beneath soiled white with some brown areas on the pleural pieces; two bands on the femora, the tips of the tarsal joints and a row of dots at the base of the tibial spines on the posterior pair, piceous. Abdomen testaceous, an irregular cloud on the base of the venter and the middle of the ultimate segment brown; disc of the tergum blackish either side of the middle. Pronotum irrorate with darker with a row of brown points on the anterior submargin. Elytra sparsely inscribed with brown pigment lines as in *Phlepsius* omitting most of the costal region; disc of the clavus with a brown oblique band, costa with four brown spots three of which are near the apex; nervures brown, the outer branch of the first sector bearing an elongated white spot just beyond the first costal brown point. Wings white iridescent, nervures heavy, brown.

Described from two females received from Prof. Herbert Osborn and labelled "Texas Aaron."

5. **DELTOCEPHALUS, FUSCINERVOSUS**, n. sp.

Form of *D. flavocostatus*. Brown, varied with pale and black, elytral areoles edged with fuscous. Length 3 mm.

Vertex $\frac{1}{2}$ longer at the middle than next the eye, apex obtuse, disc convex, pale yellowish, marked with a broad black transverse band before the eyes, behind which is a dot near the eye, a curved line nearer the middle and the impressed line dark brown and behind the polished apex are two approximate black points, Face black with a few short arcs, a broken median line on the front, the disc of the cheeks and loræ and the sides of the clypeus, pale tawny yellow. Pronotum with five abbreviated pale longitudinal vittæ, the lateral mere spots, and a few black points on the anterior submargin;

basal angles, median and transverse lines of the scutellum blackish. Elytra pale, the areoles bordered with fuscous and the transverse veinlets marked with white. Breast and abdomen deep black, the narrow edges of the abdominal segments and pleural pieces pale. Legs pale, anterior and intermediate femora twice banded with blackish, the posterior blackish without; tibiae with a row of black points at the base of the spines. Last ventral segment of the male long, hind edge concave; valve small, transverse, rounded behind; plates long, triangular covering the pygofer, more than three times the length of the valve, margins straight, fringed with stout bristles. Ultimate ventral segment of the female $\frac{1}{2}$ longer than the penultimate, narrowed posteriorly, the hind edge feebly excavated with a minute rounded median tooth, the obtuse lateral angles marked with a tawny spot; pygofer stout, equalling the oviduct, the narrow inner edge and the base of the stout spines pale.

California. Described from a single pair received from Mr. D. W. Coquillett labelled *Cicadula fuscinervosa*, Uhler, M. S. This little species agrees very closely both in color and ornamentation with *D. pulicarius*, Fallen. It seems to be subject to considerable variation in the extent of the black markings especially on the vertex but the form of the genitalia is distinctive.

6. DELTOCEPHALUS, CONCENTRICUS, n. sp.

Head much wider than the pronotum, very feebly angled before. Vertex rounded to the base of the front, but 1-6 longer on the middle than next the eye, disc quite strongly impressed. Sides of the clypeus rectilinear and nearly parallel. Cheeks wide, outer edge deeply excavated below the eye, Pronotum short. Valve of the male a little longer than the last ventral segment, triangular, the apex with a shallow excavation either side of an acute median tooth; plates broad-triangular, apex obtuse; pygofer long, armed with a heavy brush of stout spines at the apex. Length, 4 mm.

Color black, Head fulvous; anterior edge of the vertex with a pale transverse band bordered above and below by a heavy black line; disc with a transverse black spot not attaining the margin of the eyes. Face black; frontal arcs, sides of the clypeus at base with the apex of the front and the lower half of the loræ, yellow. Cheeks pale with a black cloud below the eyes. Pleural pieces, abdominal segments and the valve at base slenderly edged with yellow. Legs pale yellow; base of the anterior femora and its inferior edge, three bands on the intermediate and the posterior below, all the tibiae on their inner edge and tips of the tarsal joints, black; spines of the tibiae pale, those of the pygofer black. Pronotum whitish, fulvous on its anterior border, its disc and a few marks before fuscous. Scutellum fuscous, the margins of the apical field and two spots on the basal either side of the middle, fulvous. Elytra whitish tinged with fulvous on the costa; nervures concolorous; all the areoles bordered with fuscous, the apical enfumed.

Mountains of N. W. Colorado. Described from a single male example received from Prof. C. P. Gillette.

7. **ATHYSANUS GAMMAROIDES**, n. sp.

Female: Deep black; slender hind edge of the vertex, a transverse band between the ocelli, bisinuated above, and the apex of the ovipositor fulvous. Rostrum knees and spines of the posterior tibiæ pale. Length $3\frac{1}{2}$ mm.

Front convex in both diameters, its length and breadth equal; clypeus oblong, its sides parallel, base a little elevated, apex and sides depressed. Cheeks broad, strongly angled without where the surface is longitudinally striated. Vertex sloping and broadly rounded before, but little longer on the middle than next the eye. Pronotum broad and short, $\frac{1}{2}$ longer than the vertex, its surface strongly transversely rugose, and punctured on the anterior margin. Scutellum small, shorter than the pronotum, apex slender, acute, sides concavely arquated, surface closely punctured, with two discal impressions. Elytra short, coriaceous, roughly punctured and shagreened, together nearly square, their apex truncated, reaching onto the second abdominal segment. Abdomen tapering rapidly posteriorly and tipped with the long exerted oviduct. Last ventral segment short, feebly concave behind, the outer angles cut off obliquely.

Described from a single female example captured in Madison Co., Kansas, by my brother M. C. Van Duzee. Another female from Colorado was in a lot received from Prof. C. P. Gillette.

8. **EUTETTIX SOUTHWICKI**, n. sp.

Allied to *E. lurida*, but much smaller with the vertex more sloping and the pronotum more strongly concave behind. Length 4 mm.

Color deep fulvous-brown blotched with pale on the base of the vertex and the anterior margin of the pronotum. Cheeks loræ and clypeus tinged with yellow and duller in color; sutures and a cloud below the eye blackish; clypeus more than usually expanded at apex. Pronotum with an obscure pale median line and tinged with greenish on the disc as is also the base of the elytra. Apical margin of the scutellum yellow. Elytra bright smoky-fulvous, a little more embrowned at apex; nervures slender and nearly concolorous, those of the clavus marked with brown at apex. Wings smoky, highly iridescent, imparting a coppery tint to the closed elytra. Pectoral pieces blackish on their disc. Venter pale with three longitudinal more or less distinct bands not attaining the sixth segment, the median broader and carrying a yellow spot at base. Plates with a longitudinal line and tip dusky. Disc of the tergum more or less invaded with black. Legs pale with a row of fine black points on the edges of the femora and some larger dots at the base of the tibial spines. Valve broad and short, rounded behind; plates large, as in *lurida*, acute at apex, outer edge moderately arquated at base and a little concave near the tip.

New York. Described from two male examples taken near New York City by Dr. E. B. Southwick who has added much to our knowledge of the New York hemipterous fauna and to whom this species is respectfully dedicated. By its deep rich

brown color this is quite distinct from any other species yet described. Were it not for its small size it might be presumed to be the male of *marmorata*.

9. **EUTETTIX SLOSSONI**, n. sp.

Form and size of *lurida* to which it is closely allied. Face whitish tinged with fulvous on the clypeus and disc of the front; a dash below the lower angle of the eye, a point at the base of the antennæ and a broad transverse band on the base of the front, black, the latter bisected by a pale median longitudinal line. Eyes rufous. Vertex, pronotum and scutellum pale yellowish, an obscure interrupted band near the base of the pronotum and a few clouds on the basal field of the scutellum fulvous. Elytra whitish hyaline, nervures and broad basal and sutural margins fulvous, deepened in color next the commissural nervure and interrupted by the pale tips of the two claval nervures and a common large oval greenish-white commissural spot just anterior to the tip of the clavus; apical areoles embrowned. Wings hyaline, smoky at tip and somewhat iridescent. Below whitish, pectoral pieces and base of the venter with a large black spot. Tergum yellowish becoming fulvous posteriorly and banded with black on the third, fourth and fifth segments. Pygofers fulvous, nearly equalling the oviduct. Last ventral segment pale, posterior margin excavated either side of an obtuse median tooth almost exactly as in *lurida*. Length $5\frac{1}{2}$ mm.

Described from one female specimen captured at Charlotte Harbor, Florida, by Mrs. Annie Trumbull Slosson to whom I take pleasure in dedicating this interesting form. It is a typical *Eutettix* agreeing with *lurida* in most of its characters. The elytra are marked somewhat as in *marmorata* but it is smaller. The broad black bisected band on the apex of the head will distinguish this from all our other described species of *Eutettix*.

10. **SCAPHOIDEUS LUTEOLUS**, n. sp.

Form and size of *auronitens*. Dull fulvous-brown, brighter on the vertex and scutellum; apex of the head and base of the vertex whitish in the males, tinged with fulvous in the females; anterior edge of the head with about three concentric black lines, one above connecting the ocelli, another on the extreme edge and the other below at the base of the front. Below pale tawny yellow, tinged with fulvous on the face and marked with a few pale arcs toward the base of the front, apex of the scutellum paler, in the female whitish and calloused. Membrane of the elytra paler with a broad fuscous cloud at apex, the postnodal cell subhyaline, nervures fuscous heavily margined beyond the middle. Wings smoky with strong fuscous nervures. Posterior feet banded with fuscous at the tip of the tibia and base of the second tarsal joint. Abdomen in the male blackish, the segments narrowly edged with pale, last ventral segment and genital pieces pale, the former dusky at apex, tip of the pygofers blackish. The female has the abdomen concolorous with the breast with the seg-

ments narrowly edged with white and with a large black spot at the apex of the last ventral segment. Length 4 mm.

Valve of the male large, obtuse. Plates large, oval, tapering to a slender point, much surpassed by the narrow pygofers. Last ventral segment of the female long at the middle, the outer angles retreating; pygofers slender, surpassed by the thick oviduct.

Described from one female taken at Anglesea, N. J., on July 16th by Prof. J. B. Smith, and three males captured near New York City, by Mr. E. B. Southwick, on July 6th, and August 12th, 1891. In this species the female is more brightly colored than the male with a pale transverse band on the pronotum, and the males when fresh have a large pruinose patch on the middle of the costal margin as in *Acinopterus acuminatus*, *Xestocephalus tessellatus* and a few other species of Jassidæ.

II. SCAPHOIDEUS LOBATUS, n. sp.

Form of *immistus* nearly but with a shorter and broader vertex and longer pronotum, elytra fulvous becoming deep brown on the clavus where there is a lobate ivory-white commissural mark. Length 6 mm.

Vertex a little over one half the length of the pronotum. Front proportionately broader than in *immistus*. Color greyish testaceous, whitish above, Vertex faintly washed with brown omitting a white basal area; anterior edge white bordered behind by a wavy brown line; anterior submargin with a deep brown concentric line. Front pale brown with a few obsolete whitish arcs; temples showing a brown dot and a brown cloud covers the antennal depression and invades the cheek outwardly. Pronotum irrorated with brown, with three nearly obsolete longitudinal pale vittæ. Scutellum whitish with four brown marginal points, the basal angles fulvous. Beneath whitish, faintly clouded and marked with brown on the incisures of the connexivum. Tergum brown, the lateral margins and narrow edges of the segments pale. Apical one half of the tarsal joints of the hind feet and a row of dots at the base of the tibial spines, dark brown. Elytra fulvous with the nervures and numerous irregular veinlets or pigment-lines, more regular in the costal areole, dark brown; disc of some of the areoles and a cloud within the apex dark brown; clavus mostly ivory-white with a large irregular fulvous-brown cloud resting on the suture and becoming deep blackish-brown toward the pale commissural nervure where it is bisinuate; this, when the elytra are closed, leaves a white, more or less distinctly trilobate commissural mark which expands over the base of the clavus. Wings smoky, iridescent, with fuscous nervures. Valve of the male small, brown, Plates narrow, their slender recurved tips brown and fringed with long white hairs. Last ventral segment of the female long on the middle, its apical margin feebly sinuated and rapidly retreating either side, median line feebly keeled, extreme tip brown; pygofers brown, a little exceeded by the oviduct and armed with numerous brown bristles.

New York. Described from a fine pair taken at Lancaster, N. Y. and a number of examples of both sexes taken by Mr. E.

B. Southwick near New York city. This pretty species is most nearly related to *S. intricatus* Uhler, from which however it is quite distinct. A pair of the latter, which apparently is a rare species, was captured at Agricultural College, Mich., by Mr. G. C. Davis in Aug. and Sept.

12. **THAMNOTETTIX PERPUNCTATA**, n. sp.

Allied to *T. Fitchi* but smaller and more slender, very similar in color and ornamentation to *Deltocephalus nigrifrons* Forbes. Length $3\frac{1}{2}$ mm.

Vertex nearly flat, $\frac{1}{4}$ longer on the middle than next the eye, color pale yellow, greenish testaceous on the pronotum, vertex obsoletely clouded with fulvous near the eyes and behind the apex; four dots placed on the anterior edge superiorly, two on each temple and another on each ocellus; antennal pits, sutures of the face, a line on the middle of the clypeus expanded near the apex, and about six arcs on each side of the front, black. In typical examples the black frontal suture is continued around each compartment of the front connecting with more or less of the lateral arcs, or the front may be black with an interrupted median line and about five short arcs yellow. Cheeks with a brown discal cloud. Abdomen and breast black. Connexivum, margin of the tergum and sometimes the narrow edge of the propleura yellow; tips of the coxæ and the legs pale testaceous, the femora sometimes clouded with brown. Pronotum with about five pale vittæ sometimes nearly obsolete. Scutellum yellow, at times marked with a brown longitudinal vitta, impressed line black. Elytra pale, subhyaline, sometimes clouded toward the apex and on the tip of the clavus, nervures greenish white. Wings whitish hyaline, highly iridescent, nervures slender, brown. Ultimate ventral segment of the female a little concave behind, sometimes with a small median tooth; pygofer acute at apex, hardly exceeded by the stout oviduct. Valve of the male short and rounded, the plates triangular, constricted near their apex, edge but feebly arquated at base and fringed with long white bristles. In *D. nigrifrons* the plates are broader and more obtuse at apex, with the edges rectilinear or slightly convex and armed with shorter bristles.

This insect, though quite distinct generically from *Deltocephalus nigrifrons* is difficult to distinguish in its specific characters, the markings are almost identical and the form of the facial and genital pieces differ but little. *D. nigrifrons* is much the stouter insect and has a broader front and vertex, the latter more convex and obtuse before and marked with a transverse brown cloud before the middle in *nigrifrons*. *Th. Fitchi* is a larger insect with but four black spots on the anterior edge of the vertex.

New York, N. Carolina, Mississippi. Described from numerous individuals of both sexes received from Mr. Howard Ewart Weed, taken in Miss. The N. C. specimens were collected on

Mt. Balsam, near Asheville, in July, by Mr. J. W. Palmer, Jr. of Buffalo, N. Y. Mr. E. B. Southwick has sent me examples from the vicinity of New York city and I have taken it about Buffalo in August.

13. **THAMNOTETTIX AUREOLA**, n. sp.

Allied to *Th. flavocapitata* but larger with a more pointed vertex. Length 5 mm.

Vertex nearly $\frac{1}{2}$ longer on the middle than next the eye. Clypeus a little expanded toward its broadly rounded apex. Color pale whitish yellow, deeper on the abdomen; vertex fulvous; eyes rufous, pronotum and scutellum deep fulvous-brown; elytra subhyaline, washed with clear greenish yellow at base and bearing on the sutural margin a large ill-defined smoky patch, which may be extended along the suture to the tip and become broken by the turgid yellow apex of the outer claval nervures, nervures of the corium slender, yellowish. Tergum blackish on the disc; beneath and the feet immaculate. Valve obtuse, triangular, the sides a little concave; plates rather large, subacute, fringed with long white bristles, Wings faintly smoky-hyaline, iridescent, with brown nervures.

California. Described from a single male example received from Mr. D. W. Coquillett labelled *Thamnotettix aureola*, Uhl. It is a beautiful little species quite characteristic of this genus which seems to be well represented on the Pacific Coast.

TINOBREGMUS, n. g.

Allied to *Jassus*, Head narrow, short conical, obtuse. Vertex narrow, widened anteriorly, and expanded posteriorly behind the eyes, tumid before. Ocelli on the vertex near its apex. Front rather strongly elongated; temples very narrow. Eyes large, Clypeus large; Cheeks long and expanded below; loræ small and narrow. Pronotum short, wider than the head, the anterior and posterior margins subparallel scutellum very small, scarcely apparant. Elytra abbreviated, reaching the middle of the abdomen, first sector forked before its middle, the inner branch with one transverse nervure connecting it with the second sector, apical areoles five, the outer much larger and formed by the forking of the outer branch of the first sector. Wings rudimentary. Rostrum short, scarcely surpassing the elongated clypeus. Posterior tibiæ armed with numerous stout spines.

This genus is remarkable for its very small scutellum and its elongated face. The head is narrower than the pronotum and the eyes are angled behind leaving a triangular area either side at the base of the vertex. The pronotum is very short and the base of the front is reflected onto the apex of the vertex leaving the ocelli distinctly superior. This character and the elongated face seem to connect this genus with the *Tettigonida* near genus *Eucanthus* but its true position is probably near *Jassus*.

14. **TINOUREGNUM VITTATUS**, n. sp.

Form of *Liburnia vittatiformis* Uhler nearly; tawny yellow marked with darker. Length $6\frac{1}{2}$ mm.

Vertex twice as long as its least width, its disc slightly raised above the level of the eyes, shagreened and obliquely furrowed anteriorly, ocelli a little more distant from one another than from the eyes. Front feebly convex, closely punctured, its length three times the width at the extremities, sides moderately arcuated. Clypeus as broad as the apex of the front, slightly widened to the point of the cheek then narrowed to the broad apex which is excavated for two thirds of its width. Loræ narrower than the clypeus and about one-half its length. Cheeks about the breadth of the front, widest opposite the base of the clypeus, sides parallel above, surface distinctly wrinkled without. Pronotum shorter than the vertex, the sides rounded, ecarinate, disc obsolete transversely wrinkled. Pygofers large considerably exceeded by the stout oviduct. Last ventral segment long, feebly keeled, the hind edge subangularly produced on the middle. Hind tarsi elongated, first joint longest, second short.

Color pale tawny yellow. An arcuated spot behind each ocellus and the basal sutures of the front piceous; front marked with a broad longitudinal vitta on each side in which may be indications of transverse striæ; pronotum with six longitudinal vittæ, the middle pair fulvous, the others piceous. Elytra dusky-fulvous with heavy pale nervures and about four fuscous spots next the apex. Tergum mostly black at base, the four apical segments with an obscure transverse brown band across the middle of each and a common indistinct median line; genital segments piceous on the sides. Pectoral pieces mostly black which color may be extended over the coxæ and base of the venter.

Florida. Described from two female specimens received from Mr. C. W. Johnson of Philadelphia.

XESTOCEPHALUS, n. g.

Trans. Am. Ent. Soc. XIX, p. 298, Dec. 1889.

Form ovate, Head narrower than the pronotum tumid or subconical and rounded before, closely punctured, without rugæ, Vertex sloping, convex in both diameters, ocelli on the rounded anterior edge of the head, placed a little superiorly and distant from the eyes. Front very broad above, tapering rapidly to the broad and short clypeus. Cheeks wide; temples very narrow, antennæ crowded close against the eyes, basal joint rather long. Eyes subtriangular, a little excavated against the antennæ. Elytra almost coriaceous, more or less rugose or punctured, appendix wanting; inner branch of the outer sector united to the second sector by two transverse nervures; apical areoles five, the postnodal large, the second still larger; anti-apicals three, the outer small and narrow, the middle as large as both the others. Wings forming a narrow margin exterior to the costal nervure, the latter forked at the stigma, the outer branch evanescent, the inner united to the outer branch of the adjoining nervure by a transverse veinlet long before the apex; marginal vein extending only to the inner sector as in *Acocephalus*; the four apical nervures either attain the edge of the wing or they end blindly.

The three known species of this genus are shiny little creatures of a brown mottled aspect. The termination of the marginal nervure of the wing before the apex and the position of the ocelli will at once show their relationship with *Acocephalus*, from which genus their tumid punctured head will separate them. The ocelli are placed more inferiorly than is usual in the *Acocephalina* on account of the encroachment of the vertex onto the base of the front.

15. **XESTOCEPHALUS PULICARIUS**, n. sp.

Brown varied with pale yellowish, Vertex twice as long on the middle as next the eye, marked with a double pale median line which is deflected to either side just before the tip and runs parallel with the anterior edge to the outer angle of the eye. Sometimes this line forms a loop behind the ocellus where it may break and form a dot on the disc: Usually there is a dot at the basal angle of the eye, a line between the ocellus and eye and two concentric wavy lines on the base of the front; apex of the head fulvous. Pronotum marked with four dots on the anterior submargin, the outer angles, a dot adjoining and a few obscure marks on the disc. Basal field of the scutellum with two median pale vittæ, diverging posteriorly, apical field pale, dusky on the disc. Elytra brown marked with one or two whitish spots in each areol except the costal which is subhyaline nearly to its base. These spots frequently become confluent along the inner margin of the corium and at its apex. Face tawny yellow, more or less washed with brown especially on the front and loræ. Beneath and legs tawny, posterior tibiæ and base of the venter generally embrowned. Last ventral segment of the female emarginate at the middle leaving a feebly rounded lobe on either side; pygofers triangular, broad at base, the acute tip moderately exceeded by the stout oviduct, Ultimate ventral segment of the male nearly double the length of the penultimate, its posterior edge broadly excavated, Valve scarcely apparent, slightly arcuated behind; plates ligulate at base, tapering beyond the middle to the obtuse apex which is fringed with long, soft white hairs and armed along the inner edge with a few stout spines. Length $2\frac{1}{2}$ to 3 mm.

New York, Canada. This pretty little insect is sometimes abundant in August and Sept. about Buffalo in swampy pastures where *Carex vulpinoidea* grows. I have also taken it at Ridgeway Ont., and Mr. E. B. Southwick has sent me two examples captured near New York City in August. The markings of the vertex and pronotum are at times partially obliterated but the geminate median line on the vertex and the divergent vittæ on the base of the scutellum seem to be constant.

16. **XESTOCEPHALUS FULVOCAPITATUS**, n. sp.

A little larger than the preceding with the head clay-yellow or tinged with fulvous, generally immaculate except a brown spot on the loræ and a black cloud beneath the antennæ, sometimes the females exhibit an oblique brown dash on either side on the disc of the vertex. Pronotum and scutel-

lum pale brown or tawny yellow. In fully colored examples the former has a blotch behind the eyes and the basal angles of the latter are brown, frequently these marks are absent and the apex of the scutellum may be fulvous like the vertex. In this form the elytra are more distinctly marked than in *pulicarius*. On the corium are two semipellucid spots at base and about six at apex, more or less coalescent; an oval spot on the base of the anti-apical areoles and two more, sometimes forming a band before the middle, are whitish. Wings milky with the nervures at apex brown as in the preceding species. Abdomen brown with the convexum, edge of the tergum, apical half of the last ventral segment and narrow margin of the others, pale. Genital characters as in *pulicarius*. Length $3\frac{1}{2}$ mm.

New York. Of this species I have taken one male and four female examples at Lancaster, N. Y., in August and September in company with the preceding of which it may prove but a variety.

17. **XESTOCEPHALUS TESSELLATUS**, n. sp.

Pale testaceous. Vertex with dark-brown irrorations which become aggregated either side of the middle; ocelli placed on large pale dots; face brown irrorated with pale in the female, or pale and nearly immaculate in the male. Pronotum testaceous-brown, darker on the disc, irregularly irrorated with pale and marked with a blackish spot behind the inner angle of the eye. Scutellum pale brown, obsolete'y dotted with paler, the basal angles and sometimes a line between them partly covered by the pronotum, blackish; the apex pale. Elytra testaceous, the nervures alternated with dark brown and white; a mark on the base of the clavus, two quadrate spots on the costa including two dots between them, blackish; apex of the elytra paler marked with four large squarish, brown marginal spots. Wings white with pale brown nervures. Disc of the tergum, base of the venter and some clouds on the pleural pieces brown. Apical margin of the last ventral segment of the female feebly concave and minutely notched at the middle; pygofers proportionately a little shorter than in *pulicarius* and the plates of the male are more strongly narrowed from near the base to a slender point. Valve concealed. Length 4 mm.

Charlotte Harbor, Florida, Mrs. Annie Trumbull Slosson; Mississippi, Howard Ewatts Weed; Texas, "Aaron." Described from one male and four female specimens. This species is larger than the foregoing and may be distinguished by its irrorated vertex and pronotum, the blackish basal angles of the scutellum, the testaceous elytra marked with large marginal brown spots, and the varigated elytral nervures. Most of the specimens show a large oval white pruinose spot on the middle of the costal margin of the elytra, but this may be characteristic only of the breeding season.

The Pendulum and its Laws of Oscillation.

Read before the Buffalo Society of Natural Sciences, Feb. 12th,

By AUSTIN M. EDWARDS.

HISTORICAL.

History furnishes us with the information that Galileo, in 1542, while in the Cathedral at Pisa, observed the oscillations of a lamp which had been accidentally set in motion. He was struck with the apparent measured regularity of its vibrations and tested this observation by comparing these oscillations with his own pulse. Galileo there invented the simple pendulum as a means of measuring short intervals of time. But for many years the pendulum was used without the clock movement, and astronomers counted the oscillations performed in a given time to measure the periods of celestial phenomena.

THEORY.

In describing the pendulum, I will first begin with a theoretically perfect pendulum, which would consist of a heavy molecule suspended at the extremity of a perfectly flexible cord, and oscillating in a vacuum. This ideal pendulum, of course, could not exist, but to demonstrate the simple pendulum, we will use a small metal ball suspended by a silk thread; if this freely suspended ball is drawn from the vertical and allowed to oscillate, these oscillations will gradually diminish in extent, on account of the earth's attraction, producing what are called long and short arcs. The function of the clock movement proper, besides registering the time and number of oscillations on the dial, is to furnish to the pendulum the small amount of impulse that is necessary to carry the same in its excursion from the vertical line upwards, so it will return each time to the original point of starting, and thus overcome the influence of gravity, and add enough force in its descent towards the vertical to maintain a uniform arc of oscillation to the required number of degrees. The oscillations of the pendulum were thought and

affirmed by Galileo to be made in the same interval of time, whether the arcs were long or short.

That there is a difference, although very slight, between long and short arcs, where the distance passed over is not too great, is nevertheless true; and it was not until 1658 that Huyghens discovered and proved that long arcs required more time than short arcs to perform the oscillations of the same vibrating length of pendulum. I will add here, as the question is often asked, what constitutes the *length* of a pendulum. It is the distance from the point of suspension to the center of oscillation. This point is in theory very near the center of gravity of the pendulum; and it is described as being just below the gravity point. In order to describe the center of oscillation more clearly, I will make this simple illustration.

If a blow is struck with a club and the impingement takes place beyond the point of concussion, the blow is partially inflicted on the hand; and the same result is experienced if the impingement takes place between the hand and the point of concussion, only in a reversed manner. The full force of the blow is obtained only when the exact point of concussion meets the object. Now, it is true that the center of oscillation in the pendulum is identical with the point of concussion in the club, and the time producing qualities of a pendulum depend entirely on the above mentioned oscillating point.

LAWS.

I will first call your attention to the laws of motions controlling the simple pendulum, and will refer to the cycloidal pendulum later. First, the pendulum is a falling body, and is controlled by laws governing such a body, and when at rest points directly toward the center of the earth. Next, the square of the time of oscillation is directly as its length, and inversely as the earth's attraction.

For instance, a pendulum vibrating seconds at the level of the sea, in the latitude of New York city, would be 39.02 inches, and a pendulum vibrating two seconds in the same location would be the square (of the time) or two seconds, which squared would be four, multiplied by the length of the one second 39.02 pendulum, which is equal to 156.08 inches, something over 13 feet long. This rapid increase in length for a comparatively

small change in the time of oscillation has resulted in fixing two seconds as the limit for any precision pendulum, as beyond this point the instrumental errors would be increased in the same ratio and would be difficult to overcome. The great Westminster pendulum vibrates in two seconds, and is probably the most accurately compensated long pendulum in the world. The correction for errors of lateral and cubical dilatation, barometrical error, long and short arcs of oscillation are all reduced to a minimum.

As we have said so much about seconds, it might be in order to say there are two kinds, solar and sidereal, and they differ from each other in length.

The interval of time we call a second is reduced from the solar day, which is the time between two successive returns of the sun to the same meridian, and this interval divided into 86,400 parts. These solar days are not *equal*, but are made so by the daily equation of time added to or subtracted from the *apparent* solar day.

The sidereal day is the interval between two successive returns of a fixed star to the same meridian and is 3 minutes, 56.5 seconds shorter than the solar day, and this day divided into hours, minutes and seconds furnishes us with the sidereal seconds. The sidereal day represents the time of the rotation of the earth on its axis, and is the most accurate observation of time that can be made, as it requires no equation, and has not changed as much as one-hundredth part of a second in over two thousand years. Astronomers use astronomical clocks reading 24 hours on the dial, with pendulums vibrating sidereal seconds, and by this time only do they find and locate celestial bodies.

MUTUAL ATTRACTION.

Another law governing the pendulum is this: The action of gravity or the mutual attraction between bodies varies with their masses, and inversely as the square of their distances. Following from this, a pendulum will vibrate seconds only in a given place. Our standard of measurement is taken from a pendulum vibrating seconds in a vacuum at the level of the sea. It also follows that the further a pendulum is removed from the center of the earth the less it will be attracted in its descent toward the vertical. This explains why a pendulum loses on

being transferred from the sea level to the mountain, or from one of the earth's poles toward the equator, as the earth is a spheroid slightly flattened at the poles.

A very interesting experiment can be made to show the influence of mutual attraction between masses. Take two well-regulated astronomical clocks with seconds pendulums, place them side by side, and cause each pendulum to oscillate simultaneously on the same side of the vertical, the pendulums will oscillate to the right together, and to the left for a time together, then they will change so as to oscillate in opposite directions and will never depart from this motion. Another reason why a pendulum loses on being transferred to the equator, lies in the fact that the rotation of the earth gives rise to centrifugal force at its surface. This, being zero at the poles, gradually increases to a maximum at the equator; and, as it acts in opposition to the force of gravity, it counteracts a gradually increasing proportion of this force which shows in the time of oscillation. The rotation of the earth on its axis also has another effect upon the oscillation of the pendulum as you have just seen by the demonstration of the pendulum of Foucault by Prof. Kellicott. The error caused by the tendency of the pendulum to oscillate in one given plane is reduced to a minimum by the use of short arcs of oscillation, and is of very little importance in comparison with other errors.

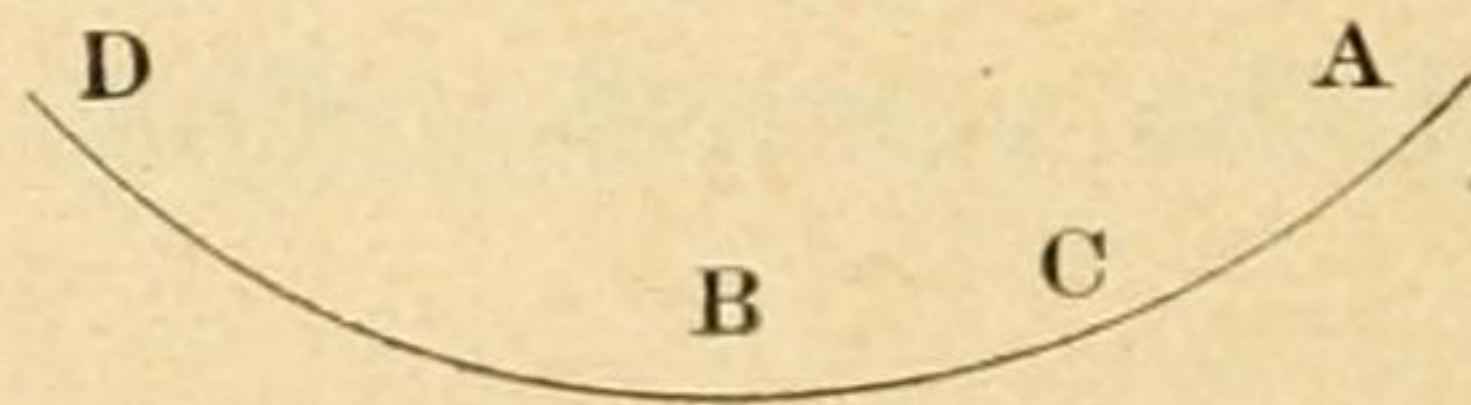
CYCLOIDAL PENDULUM.

The arcs of oscillation of any ordinary simple pendulum are a part of a circle with the point of suspension as a center.

Now, a pendulum producing isochronal oscillations; namely, producing *unequal arcs* in *equal* time is called *cycloidal* because the center of oscillation must describe a cycloidal path during each excursion on either side of the vertical line.

This curve is one of the most interesting of any known, both in respect to its geometrical properties and connection with falling bodies, and is described in this manner:

If a circle roll along a straight line on its own plane, a point on its circumference will describe a *curve* which is called a cycloid. The peculiar value of this curve in relation to the pendulum will be better shown by inverting a cycloid curve as we have here illustrated.



The time of a body descending from a point of rest A to the lowest point of the curve at B will be the same from whatever point it start. In other words a pendulum will fall from A to B in precisely the same time it would from C to B, which is about half the distance. Following from this, a cycloidal pendulum produces *unequal* arcs in *equal* time, or isochronism. The extreme mechanical difficulty of executing a pendulum that will describe a cycloidal path during each excursion has lead horologists to originate many ingenious devices to accomplish this end. This pendulum which I show you to-night is constructed so as to cause the center of oscillation to move in a cycloidal path by coming in contact with cycloid cheeks near its point of suspension, but the effects of moisture, friction, dilatation and adhesion of contact against these cheeks would in time give rise to errors as great as those sought to be overcome.

We therefore must make efforts in another direction.

The best method of to-day for producing isochronism is to cause the arc of oscillation to be as short as possible, and also have the suspension spring of a given length and given strength in proportion to the length and weight of the pendulum. Then we will only have to deal with the molecular arrangement of the spring which is constantly changing, but this error is very small and exceedingly regular.

(See Note "A", page 224.)

THE BAROMETRICAL ERROR.

A pendulum is effected by the density of the atmosphere, but to a degree that would only be of importance in a precision time piece; where all the errors are reduced to a minimum. An increase of density of the air is *equivalent* to reducing the action of *gravity*, while the inertia of the moving body remains the same. The rule is, that the velocity of the pendulum varies directly as the force of gravity, and inversely as the inertia and it follows then that an increase of density diminishes the velocity and shortens the time of oscillation, causing the clock to gain time. The barometrical error can be reduced to within three to four-tenths of a second in twenty-four hours for each inch rise or fall of the barometer. Short arcs of oscillation are also essential in reducing the barometrical error. An apparatus is sometimes attached to the pendulum to assist in reducing this error.

THE COMPENSATED PENDULUM.

Bodies increase in volume with an elevation of temperature and diminish when it falls. The pendulum then changes its dimensions with every variation of temperature, and the same is the case with all other parts of the machine.

The elongation of a body in any *one* direction by heat, is known as its *linear dilatation*, and its increase in *volume*; that is, in all three directions, is the cubical dilatation; this depends on its linear dilatation in length, breadth and thickness.

The result to be obtained in a pendulum by compensation is to so construct the same that the center of oscillation will always be in the same point. It is evident that heat lowers this point and cold raises it, and as we said before, that the time-producing qualities of the pendulum depend on this oscillating point and only by *compensation* is the desired effect obtained.

I will show you two of the best methods of producing compensation, and begin first by using two metals. The principle underlying this method is the unequal expansion of different metals in the same temperature. This furnishes us with the first step towards compensation.

Let us take a steel rod of the length arrived at by calculation, with a nut and screw on the lower end, resting on this nut is a brass collar with a groove cut in the top. Here is a rolled and drawn zinc tube of a calculated length and thickness in proportion to the main rod. This zinc tube is drawn on over the main rod and rests on the brass collar at the lower end and at the upper end of the zinc tube, and resting on the same is an iron collar, into which is firmly screwed an iron tube which is slipped on over the zinc tube, and at the lower end of this iron tube is attached the weight or bob. It will be seen that this main rod lengthens with heat, and as it lowers, the zinc tube which surrounds it lowers also but the upper end of the zinc being free and this metal possessing greater linear dilatation, moves upwards on the main rod and with it draws up the iron tube that surrounds the zinc and carries with it the weight or bob. The upward dilatation of the zinc tube is just sufficient to overcome the downward dilatation of the main rod, thus keeping the center of oscillation in the same point. In order to construct a compensated pendulum of this kind it is necessary

to have the proper proportions of one metal to the other, and besides this corrections are made from actual tests in different degrees of temperature.

The principal objection to this kind of compensation is that metals expand and contract by infinitesimal waves or jumps, probably owing to the molecular friction of the metals, and this is most apparent in zinc, owing to its crystalline formation and this metal is useless unless carefully drawn and prepared before using for the purpose in question.

THE MERCURIAL COMPENSATION.

This pendulum is constructed in the following manner. A steel rod of the calculated length and diameter is selected, and at its lower end is firmly attached a brass stirrup into which is placed and secured, from one to four glass jars containing mercury. If one jar is used, the volume must be sufficient to allow its *cubical dilatation* to raise the center of oscillation just as much as the *longitudinal dilatation* of the rod has *lowered this point*, and if four jars are used, their diameters shall be reduced to the point, that the four will contain the volume of the one jar, and be filled each to the same level as it rose in the single jar. This represents more exposed surface to the changing temperatures, and improves the *conductibility* of the *mercury*, causing the compensation to *respond more promptly to sudden* changes. The four jar compensation is the most difficult to construct, but when well made and carefully adjusted is exceedingly satisfactory, and has the preference in seconds pendulums when greater accuracy is required.

THE SEISMIC ERROR.

This uncontrollable error is caused by earth waves, and may occur at any time. One peculiarity is, that many hours elapse before this error shows in the time of the instrument. This error may not be suspected until compared by transit observations.

The time it takes to develop this error is probably due to the molecular disturbances and re-arranging of particles that is taking place in the mercury used for compensation. The most accurately compensated pendulums have been known to vary several seconds in a day. I remember while in Geneva in 1872 that twice in one summer the standard pendulum of the Cantonal

Observatory varied, once seven and one-half seconds, and at another time, five seconds in twenty-four hours; at that time it was not well understood what caused these sudden variations in a pendulum having a known daily equation. But later experiments have shown this error to be caused by seismic waves.

From the simple observation of the lamp swinging from the roof of the Cathedral at Pisa, more than three hundred and forty years ago has grown the thought included in the foregoing laws. The laws of inverse squares and mutual attraction as shown in the simple pendulum, the properties of the cycloid and cycloidal pendulum, the influence of the linear and cubical dilatation, the influence of atmospheric pressure on the pendulum, and the centrifugal force from the revolution of the earth on its axis, and by reducing all these errors to a minimum we are furnished with an instrument that performs its work with as much accuracy as any piece of mechanism ever produced by man.

NOTE A.

The length of the pendulum rod is just double the diameter of the generating circle. Now, from relations of parts of the cycloid, it is shown that the time of falling down the semi-cycloid, is to the time of fall through the diameter of the generating circle, as a quadrant is to a radius.

BULLETIN
OF THE
BUFFALO SOCIETY OF NATURAL SCIENCES.

VALUME V. NO. V.

A Preliminary Review
OF THE
North American Delphacidæ.

By E. P. VAN DUZEE.

Subfamily Delphacida embraces a large assemblage of small active insects, mostly inhabitants of grassy meadows and pastures, where at times they inflict considerable injury by puncturing the leaves and tender fruit of plants valuable to man. Although individually much smaller than the members of our other sub-families of the Fulgoridæ they abundantly compensate in numbers for what they lack in size. In most characters they approach very closely to the Cixiida but they can at once be distinguished from these as from all allied groups found in North America by the presence of a large movable spur at the apex of the posterior tibiæ, placed exteriorly to the base of the tarsi. They are strong leapers as their long powerful hind legs armed with numerous stout spines would indicate.

Most of our Delphacids, especially in genus *Liburnia*, occur in two more or less distinct forms: A macropterous or long-winged, and a brachypterous, or short-winged form. These terms are somewhat arbitrary as the developement of the elytra and wings may present almost any gradation from a mere

rudiment to a length equalling two or three times that of the abdomen. Frequently the long and short winged forms differ considerably in color and proportions, and the sexes are often very dissimilar.

Some of the most available characters for distinguishing the genera are the following:—The form of the antennæ, whether flattened or terete, and the proportionate length of the joints; the form of the front and vertex; the number of carinæ on the front, pronotum and scutellum; the point of forking of the median carina of the front, and the direction taken by those on the sides of the pronotum. In the large genus *Liburnia* excellent specific characters are found in the form of the genital segment of the male. When viewed from behind we distinguish the form of the aperture of the pygofer—The two pieces which, united above and below, form the wall of the genital segment. Dorsally these are notched to receive the anal tube and on the ventral aspect there is generally a sinus to receive the base of the stiles. These stiles are very variable in form in the different species but usually they are rather slender, curved outward more or less and convergent above toward the anal tube. The inferior wall of this anal tube is frequently produced in a more or less prominent incurved tooth on each side of the median suture. In the females the form of the pygofer varies somewhat as well as the proportions of the oviduct.

Thirty-two species and three genera are described as new in the present paper, making the number of species now recorded from North America, excluding known synonyms, fifty three, representing thirteen genera. Of these fifty three species eleven have not been positively identified by the writer and four were previously described from Europe.

No attempt has been made in the preparation of this paper to obtain all the material in this country that is available for study. Had this been done the number of species certainly would have been largely increased. But even in this fragmentary form it is hoped that these studies will be of some service as placing on a more systematic basis some of our more common forms. A large field for original work is open here to some student who has the time and perseverance to work out the affinities of these minute insects.

The following systematic list is appended better to exhibit the relationship between the species recorded in the ensuing pages:

Copicerus, Schwarz,
irroratus Schwarz,

Stenocranus, Fieb.

dorsalis (Fitch,)

lautus Van D.

palaetus Van D.

saccharivorus (Westw.)

Kelisia, Fieb.

axialis Van D.

crocea Van D.

Megamelus Fieb.

notulus (Germ.)

marginatus Van D.

piceus Van D.

Davisi Van D.

Pissonotus Van D.

marginatus Van D.

ater Van D.

delicatus Van D.

basalis Van D.

pallipes Van D.

aphidioides Van D.

dorsalis Van D.

brunneus Van D.

Dicranotropis Fieb.

maidis (Ashm.)

Phyllodinus Van D.

nervatus Van D.

Laccocara Van D.

vittipennis Van D.

zonata Van D.

? obesa Van D.

Stobera Stal,

tricarinata (Say,)

concinna Stal,

bifasciata (Prov.)

Liburnia Stal,

ornata (Stal,)

pellucida (Fall.)

arvensis (Fitch,)

furcata (Prov.)

consimilis Van D.

puella Van D.

Osborni Van D.

laminalis Van D.

lutulenta Van D.

Weedi Van D.

obscura (Boh.)

lateralis Van D.

Kilmani Van D.

campestris Van D.

lineatipes Van D.

occlusa Van D.

foveata Van D.

incerta Van D.

Gillettii Van D.

Achorotile Fieb.

albosignata (Dahlbg.)

Pentagramma Van D.

vittatifrons (Uhler)

Stiroma Fieb.

inconspicua Uhler,

Uncertain Species.

Delphax vittata Stal,

“ producta Walk.

“ luteivitta Walk.

“ unicolor Walk.

“ pictifrons Stal.

Analytical Key to the Genera.

Basal joint of the antennæ much longer than the second, laminate expanded. *Asiraca* and *Delphax* (sens strict)
(Note: These genera have not yet been recognized from North America.)

Basal joint of the antennæ little longer than the second joint or shorter. (2)

2. Antennæ, first joint and outer edge of the second, in part, broadly expanded. *Copicerus*.

Antennæ not broadly expanded, sometimes more or less flattened. (3)

3. Lateral carinæ of the pronotum reaching the hind edge or sometimes becoming obsolete a little within the margin. (4)

Lateral carinæ of the pronotum deflected outwardly behind the eyes, not touching the hind edge. (9)

4. Median carina of the front forked at the apex of the head, the lateral carinæ of the pronotum attaining the posterior edge. (6)

Median carina of the front forked some distance below its base, or if forked on the apex of the head the lateral carinæ of the pronotum become obsolete before reaching the hind edge. (5)

5. Median carina of the front forked near or somewhat above its middle, the two branches abruptly separated, then running parallel to near the apex of the head.

Dicranotropis.

Median carina of the front forked nearer the apex of the head, the two branches but slightly separated, sometimes scarcely distinguished. Face in our species crossed by a transverse piceous band covering most of the clypeus. Apex of the front usually pale. Scutellum in typical species small and the elytra in brachypterous examples polished with the nervures nearly obsolete. *Pissonotus* n. gen.

6. Front narrow, nearly linear, gradually a very little widened below. Vertex narrow, truncated at apex, produced about one third of its length before the eyes.

Stenocranus.

Front broader, sides not parallel, (7)

7. Front widest a little above the middle. Apex of the vertex rounded, produced a little before the eyes, the carinae becoming obsolete on the apex of the head.

Kelisia.

Front broadest below, generally much narrowed above between the eyes. Vertex square at tip, the frontal carinae continued strongly distinguished over the apex of the head. (8)

8. Vertex but little advanced before the eyes. Basal joint of the antennae in length subaequal to the second, flattened, obtriangular and oblique at apex; second joint flattish or nearly terete, papillate. Front narrow, sides nearly rectilinear, carinae very prominent. Cheeks broad-triangular. Elytral nervures setigerous punctate.

Stobera.

Vertex long, extended well before the eyes. Basal joint of the antennae shorter and more slender than the second, terete. Front distinctly widened below

Megamelus.

9. Front with one median carina. (10)

Front with two median carinae. (12)

10. Anterior and intermediate tibiae foliaceous. Insect short and stout.

Phyllodinus n. gen.

Anterior and intermediate tibiae slightly if at all expanded.

(11)

11. Front very broad, six sided, with a distinct median carina forked at the apex of the head, either side with one or two rows of pitted granules. Vertex broader than long. Pronotum short, emarginate behind, truncated before, lateral carinae following the contour of the eyes, papillate.

Laccocara n. gen.

Front considerably longer than broad, sometimes almost linear, median carina forked at or near the apex of the head. Vertex nearly square. Pronotum proportionately longer and less deeply emarginate behind.

Liburnia.

12. Frontal carinae not widely separated, forming a linear compartment. Scutellum tricarinate. Front, sides of the pronotum and abdominal segments pustulate.

Achorotile.

Frontal carinae widely divergent, forming an ovate compartment, broadest above and convex on the middle. Scutellum 5-carinate. Vertex five sided, rounded-conical before. Basal joint of the antennae about one fourth the length of the second.

Pentagramma n. gen.

GENUS COPICERUS, Schwarz.

Kong. Vet. Akad. Nya Handl. XXIII, p. 180, 1802.

Stal. Ann. Soc. Ent. Fr., Series 3, V, p. 337, 1858.

Hemip. Africana, IV, p. 175, 1866.

Jeralia, Walk. List of Homop., Supl., p. 85, 1858.

Holatus, Guer., Hist. de L'Isle de Cuba, Ins., p. 429, 1857.

COPICERUS IRRORATUS, Schwarz.

Kongl. Vet. Akad., Nya Handl., XXIII, p. 181, pl. 6, fig. 2a, 1802.

Jeralia singula, Walk., List of Homop., Supl. p. 85, 1858.

I have recently received an example of this southern form from Mr. Howard Ewerts Weed labeled "Agricultural College, Miss., Oct. 22nd 1894." Its conspicuous foliaceous antennae readily distinguish it and its allies from our other North American Delphacidae. The elytra of this specimen are whitish hyaline marked with setigerous brown dots. The commissural nervure is white, broadly interrupted with piceous on the middle, and on the corium is a very oblique piceous band from near the apex of the clavus to the outer angle, exterior to which is a brown cloud intersected by the white nervures. Wings subhyaline, clouded at apex, with strong brown nervures. The disc of the thorax is dull testaceous with the sides brown and the abdomen is deep testaceous or ferruginous broadly marked with black. The long black antennae are expanded on the superior edge only.

GENUS STENOCRANUS, Fieb.

Fieb. Verh. der Zool.-Bot. Ges. Wien, XVI, p. 519, 1866.

"Cicad. d'Europe, I, p. 83, 1875; II, pl. 7, 1876.

Mayr, Tabellen, I, p. 19, 1884.

Ashmead, Ent. Am., V, p. 27, 1889.

STENOCRANUS DORSALIS, (Fitch.)

Delphax dorsalis, Fitch Homop. N. Y. State Cab., p. 46, 1851. Reprint in Lintner's 9th. Rept., p. 386, 1893.

Walker, List of Homop., IV, p. 1136, 1852, (mention.)

Liburnia dorsalis, Van Duzee, Psyche V, p. 28, 1888.

Stenocranus dorsalis, Van Duzee, Psyche V, p. 390, 1890.

Osborn, Proc. Iowa Acad. Sci. I, pt. 2, p. 127, 1891.

Harrington, Ottawa Nat., VI, p. 31, 1892.

Van Duzee in Lintner's 9th. Rept. p. 410, 1893.

" Bul. Buf. Soc. Nat. Sci., V, p. 191, 1894.

Gillette & Baker, Hemip. of Colo., p. 69, 1895.

Delphax unipunctata, Prov., Nat. Can., IV, p. 319, 1872.

Prov., Pet. Faune Ent. du Can., III, p. 224, 1889.

This species seems to be common throughout the Northern and Eastern States and Canada and extends its range westward into Iowa and Colorado. Here it inhabits damp swampy spots overgrown with carices where it may be found in greatest abundance during August and September, and more rarely in May when the grass is fresh and green.

STENOCRANUS LAUTUS, n. sp.

Form and size of **dorsalis** nearly. Brownish fuscous marked with a conspicuous pale yellow vitta from the apex of the head to the tip of the clavus. Front and clypeus deep black with the carinae pale. Elytra fulvous brown with the costal and about the two outer apical areoles subhyaline; nervures brown. Inner areoles of the membrane deeper brown or fuscous, and a fuscous cloud may follow the first and second apical nervures. Abdomen black; the lateral margins, narrow edges of the ventral segments, and a medium vitta, pale. Legs slenderly lineated with brown. The deflexed edge of the pronotum with a brown line. Length 5 mm.

In most of its characters this species does not differ from **dorsalis**. It is, however, a little smaller, darker in color, the elytra are darker, especially on the inner half of the membrane, and the outer nervures of the membrane are conspicuously dark. The small apical areole formed by the forking of the second apical nervure is broader and shorter than in **dorsalis**, and the abdomen is darker in color.

S. dorsalis is of an almost uniform fulvous yellow color with a paler dorsal line, and the elytra are nearly transparent and marked with one straight longitudinal brown line at apex covering the fourth apical nervure. The wings in both species have a few brown nervures toward their apex.

From **palaetus** the present species may be distinguished by the smaller spur, the shorter basal joint of the antennae, and the markings of the elytra which are quite different.

New York, Virginia. Described from two male examples; One received from Dr. E. B. Southwick, taken near New York City; the other from the National Museum labeled "Virginia, Oct. 9th, 1881". The latter bears the name which I have adopted for this species. It was applied by Dr. P. R. Uhler but the description was never published.

STENOCRANUS PALAETUS, n. sp.

Form and size of **dorsalis**. Color fulvous yellow above, paler beneath; median line on the base of the vertex, disk of the pronotum between the lateral carinæ and apex of the scutellum, whitish. Frontal fovæ interruptedly black over the apex of the head from the base of the antennæ to the middle of the vertex; face crossed by a brown band below the antennæ, and another crosses the base of the clypeus and extends over the anterior coxæ and pleural pieces. Apex of the front and its median carina interruptedly pale. First joint of the antennæ a little shorter than the second, blackish, the base of the second with a piceous spot. Eyes black. Legs pale, the femora lineated and the tibiæ twice banded with brown.

Elytra subhyaline, nervures yellowish, the commissural white with a brown line before the apex of the clavus. Inner sector of the corium and the apical nervures, except the base of the two outer, fuscous; and a smoky cloud covers the amastomosis at the base of the middle apical areole and spreads feebly over the inner area of the membrane. Tergum brownish. Spur unusually large, foliaceous.

In this species the vertex is a little more strongly produced than in our northern **dorsalis**, the hind edge of the pronotum is not so deeply excavated, and the front is more widened apically.

Florida. Described from one female received from Mr. C. W. Johnson of Philadelphia.

? **STENOCRANUS SACCHARIVORUS**, (Westw.)

Delphax saccharivora, Westw. Mag. of Nat. Hist., VI, p. 413, 1833.

Hab. Granada, W. I. (Westw.)

From Prof. Westwood's description and drawings it seems quite likely that this insect is a **Stenocranus**. His correspondent reported it very destructive to sugar cane in the island of Granada.

GENUS KELISIA, Fieb.

Fieb., Ver. der Zool. Bot. Ges. Wien, XVI, p. 519, 1866.

" Cicad. d'Europe, I, p. 83, 1875; II, pl. 7, 1876.

Sahlbg., Cicadariæ, p. 416, 1871, (Subgenus of **Stenocranus**.)

Mayr, Tabellen, I, p. 18, 1884.

Ashmead, Ent. Am. V, p. 27, 1889.

KELISIA AXIALIS, n. sp.

Van Duzee, Bul. Buf. Soc. Nat. Sci. V, p. 191, 1894.

Form of **K. guttula**; Above piceous brown, beneath pale dull testaceous. A wide yellow vitta extends from near the apex of the vertex to the second dorsal segment of the abdomen. Elytra hyaline with an axial brown vitta. Length 4 m. m.

Vertex tinged with testaceous on the anterior margin; entire face testaceous, obscurely marked with darker on the front next the lateral carinæ; antennæ yellow, paler toward their tips; eyes rufous; pronotum dark brown from the dorsal vitta to below the lateral margins; meta-, and mesonotum

piceous brown with a broad median vitta extending onto the two basal segments of the tergum; lower surface and legs pale dull testaceous; mesonotum with a large brown spot; tarsal spines tipped with black; abdomen blackish brown, the sides of the venter varied with testaceous. Elytra hyaline, with a conspicuous brown vitta from the base to the extreme apex following the line of the second sector; first sector and the two first apical nervures white, the others brown or mostly so; apical nervures four, the interior forked.

This species may be distinguished from its european congeners by its glassy elytra marked with a conspicuous longitudinal vitta, by the uniformly testaceous inferior surface, and the absence of the black spots on the cheeks. Described from two examples representing both sexes, taken at Lancaster, N. Y. in August 1886.

KELISIA CROCEA, n. sp.

Stenocranus sp. Osborn, Proc. Iowa Acad. Sci., I, pt. 2, p. 127, 1891.

General appearance of **Stenocranus dorsalis** but smaller with a wider front. Length $4\frac{1}{2}$ m. m.

Female: Pale yellowish; a dorsal whitish vitta on the vertex pronotum and scutellum, and a similar one on the face, broadest on the apex of the front. Legs, pleural pieces and the margins of the abdomen paler. Elytra whitish hyaline, with distinct white setigerous nervures. Eyes brown.

Male: Color fulvous, at least in fully matured examples, with a paler dorsal vitta covering the middle of the vertex, pronotum and scutellum, in which is a white longitudinal line. Median carina on the front and a longitudinal vitta in each fova, whitish; pronotum paler; tergum usually black with the margins and an irregular spot on the disc fulvous; venter covered more or less by a blackish cloud; apex of the elytra with a fuscous cloud which is intensified toward the inner angle, and extended somewhat along the sutural margin. Eyes, claws and tip of the rostrum black.

Iowa. Described from 5♂ and 3♀ examples received from Prof. Herbert Osborn labeled "Ames, Iowa." In this species the front is broader than in **Stenocranus dorsalis**; the elytra want the distinct brown line along the second inner apical nervure; the lateral compartments of the front are whitish instead of black and the insect is somewhat smaller.

GENUS MEGAMELUS, Fieb.

Fieber, Verh. der Zool. Bot. Ges. Wien, XVI, p. 519, 1866.

" Cicad. d'Europe, I, p. 82, 1875; II, pl. 7, 1876.

Sahlberg, Cicadariae, p. 411, 1871.

Mayr Tabellen, I, p. 18, 1884.

Ashmead, Ent. Am., V. p. 26, 1889.

MEGAMELUS NOTULUS, (Germ.)

Delphax notula, Germar, Thom Archives II, p. 57, 1830.

Stal, Of. Vet. Akad. Forh., XI, p. 192, 1854.

Megamelus notulus, Fieb. Verh. der Zool. Bot. Ges. Wien, XVI, p. 519, pl. 8, fig. 2, 1866.

Fieb., Cicad. d'Europe, III, p. 9, 1878.

Sahlberg, Cicadariae, p. 412, 1971.

Liburnia notula, Edwd., Trans. Ent. Soc. London., 1886, p. 62.

Several specimens that correspond in every particular with material of **M. notulus** received from M. Lethierry were taken by me along Muskoka River near Bracebridge, Ont. in July 1888. I have not taken it further south nor has it been recorded from elsewhere in this country. It is evidently rare and probably northern in its range.

Note: Since this was written I have taken a pair among the hills at Colden, N. Y., Aug. 16, 1896. So its southern range must be extended at least to Western New York.

MEGAMELUS PICEUS, Van D.

Davis, Bul. 102 Mich. Ag. Exp. Station, p. 8, pl. 1, fig. 5, 1894. Reprint in Exp. Station Record, V, p. 792, 1894.

Van Duzee, Bul. Buff. Soc. Nat. Sci., V, p. 190, 1894.

Piceous-black; base of the vertex, keels and narrow hind edge of the pronotum, disk of the mesonotum, or at least its carinae, disk of the tergum, especially towards its base and apex, and the edge of the dorsal keel, the genital segments and sometimes the base of the venter, brownish yellow. Face pale shaded to brown above, clypeus deep black. Antennae, rostrum, tylus and legs pale soiled yellow, the latter lineated with brown. Elytra reaching to the second abdominal segment in the brachypterous form with the apex truncated, piceous-brown or even black, with the apical edge white, more or less broadly interrupted with black at the middle, nervures strong, granulated. In the macropterous form the elytra extend considerably beyond the tip of the abdomen, about as in **Liburnia pellucida**; they are smoky with pale granulated nervures, the exterior and interior of which are forked at about three fourths their length. Pygofers of the male cylindrical, on their ventral aspect cut out for about one half their length and carrying on the base of this incisure a wide and short projection extended into a short conical divergent tooth at each angle; beyond this are the incurved spine-like stiles included between the long slender ventral projections of the plates. Length $2\frac{1}{2}$ to 3 m. m.

New York and Michigan. Described from many examples of both sexes taken in Western New York on grass in low swampy meadows in August and September, and one female taken on celery at Kalamazoo, Mich., August 26th, 1893, by Mr. G. C. Davis.

This description was first published in connection with Mr. Davis' paper on Celery Insects cited above, and reprinted in the Experiment Station Record.

MEGAMELUS MARGINATUS, n. sp.

Yellowish testaceous above, paler beneath. Frontal fovæ with a slender black line next the white carinae; outer submargin of the cheeks, some marks on the pleural pieces, knees and tips of the tarsi dark brown or black. Venter and pronotum sometimes whitish with the sides of the scutellum yellowish. Abdomen black, the segments edged with fulvous, the apical

ventral segment brown at least on its disc. Eyes black with a fulvous border. Antennæ brown. Elytra whitish-subhyaline, nervures distinct, concolorous. Wings white the nervures brown at apex. In the females the median line of the oviduct and pygofers is testaceous, or pale yellow in one example. Length about $3\frac{1}{2}$ m. m.

In this species the front is rather wide especially in the female, and the black marginal line about the fovæ is quite characteristic.

New York and New Jersey. Described from several examples taken by Prof. J. B. Smith at Anglesea, N. J., May 28th, and near New York City and at Ravenswood, N. Y., Aug. 28th, 1890, by Mr. E. B. Southwick.

MEGAMELUS DAVISI, n. sp.

Near to **M. Piceous** but smaller and more slender.

Macropterous form: Piceous black. Vertex with the lateral carinæ at base and a lozenge-shaped mark on the disc anteriorly, including a black point, pale. Sides, carinæ, and narrow hind edge of the pronotum, and hind edge of the mesonotum, marked more or less with pale; the lateral carinæ of the mesonotum and sometimes the median, marked with fulvous. Face pale; front and clypeus with a black line on either side; a spot below the antennæ another anterior to, and a smaller one above the eye, brown. Basal joint of the antennæ with a brown spot beneath which may extend on to the base of the succeeding joint. Abdomen with some fulvous marks beneath and on the basal segments of the tergum. Breast pale, varied with piceous on the disc of the pleural pieces. Legs pale, tibiæ more or less distinctly twice-banded and the femora feebly lineated with brown; spur white, very large and foliaceous, oblong, obtuse and brownish at apex, its length less than twice its width. Elytra whitish, somewhat clouded on the clavus; nervures pale, distinct, the costal and commissural darker; base of the clavus and a line at its apex black.

Aperture of the pygofers of the male broad, the usual ventral sinus shallow, nearly filled by two stout teeth which become somewhat incurved at apex; the edges of the dorsal pieces touched with yellowish below the short anal tube.

A brachypterous male differs in being mostly pale beneath with the black longitudinal line on either side of the front and clypeus distinct; disc of the pro- and mesonotum between the lateral carinæ pale yellow with two black points behind the vertex. Tergum, excepting segments four and five, largely pale yellow. Elytra covering the second abdominal segment, truncated behind, black with pale nervures. The very young are whitish marked more or less with black on either side of the dorsum and with two brown lines on the front. Length to tip of the elytra $3\frac{1}{2}$ m. m.

Michigan. Received from Mr. G. C. Davis to whom this pretty species is dedicated and who reports it as abundant on water lilies. This is an interesting insect easily distinguishable from all its allies by its large foliaceous spurs at the base of the hind tarsi. It is intermediate in form and size between **M. piceous** and **M. marginatus** but in coloration it is much nearer **piceous** although the elytra are white and want the setigerous gran-

ules on the nervures. In this as in many of our other Delphacids the extent of the pale markings is quite variable in different individuals and the females are proportionately broader than the males.

Is not the large foliaceous spur in this species an adaptation of Nature to enable these insects to leap more readily from the surface of the water about which they make their home?

GENUS PISSONOTUS, n gen.

Head narrower than the pronotum; vertex hardly prominent before the eyes; front narrow above, much expanded below, the sides arcuated, median carina forked about one third its length below the apex of the head, the two branches subparallel closely approximated for most of their length. Thorax broad across the middle, convex, narrowed anteriorly; pronotum nearly straight across the hind edge, lateral carinae rather widely divergent at their apex a little incurved, hardly attaining the posterior edge.

This genus seems to be intermediate between **Megamelus** and **Dicranotropis**. **P. marginatus** and its allies are highly polished little insects, broadest across the base of the elytra which in the brachypterous examples are small, truncate behind, smooth and polished with the nervures nearly obsolete, and the scutellum is unusually small. **P. basalis** has a large scutellum and has much the appearance of a **Kormus**, but the lateral carinae do not follow the posterior curve of the eyes and the front is much wider below with its median carina distinctly forked some ways below the apex of the head. **P. aphidioides** and its allies are dull brown insects widest across the abdomen, at least in the brachypterous examples which alone are known to me, giving them a strong resemblance to some of the subterranean plantlice near **Rhizobius**. All the species have the apex of the front pale, and a broad black band crosses the clypeus and the anterior and intermediate coxae. Some of the species, especially **brunneus**, bear a strong resemblance to members of the genus **Dicranotropis**, and it may be necessary to modify that genus so as to include them when their winged forms are known. For the present these may be distinguished by having a broader front with the forks of its median carina closely approximated below the apex of the head. The brachypterous forms of **brunneus**, **aphidioides** and their allies have strong pale elytral nervures.

The type of this genus is **Pissonotus marginatus**.

I PISSONOTUS MARGINATUS, n. sp.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 190, 1894.

Vertex, pronotum and scutellum nearly equal in length, the former almost square, hardly prominent before the eyes, the latter unusually small with the edges nearly rectilinear and the apex but slightly produced. Elytra short, rarely covering the second abdominal segment, cut squarely off behind, almost coriaceous, shining, the nervures nearly obsolete. Abdomen of the female broadly ovate, in the males more slender. Aperature of the pygofer of the male rather broad, superior wall of the anal tube produced in long incurved tusk-like horns that are nearly parallel and rest with their tips against the indented ventral margin of the pygofer; stiles small, incon-

spicuous. Color piceous black, head rufous, clypeus black, posterior half of pronotum and broad hind edge of the elytra white. Scutellum and base of the elytra tinged with rufous; breast and legs, except the tibiæ and apex of the anterior and intermediate femora, pale; antennæ dusky. The male has the tip of the clypeus and front, antennæ, legs and breast soiled whitish yellow. The pale margin of the pronotum is very narrow. The vertex and base of the front are piceous and the elytra are paler, almost rufous. Length about $2\frac{1}{2}$ m. m.

Lancaster, N. Y. July and Sept. Described from a single pair. More recently, June 1896, I took a fine female of this species at Hamburgh, N. Y.

2 **PISSONOTUS ATER**, n. sp.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 190, 1894.

Form and size of **marginatus**. Deep pitchy black, highly polished, Elytra inclined to piceous-brown. Face piceous becoming more or less flavescent across the apex of the front and cheeks. Antennæ, legs, breast and disc of the venter soiled honey yellow, anterior and intermediate tibiæ and apex of the posterior coxæ embrowned. Length 3 m. m.

Near Buffalo, N. Y. Described from a single female example taken on Grand Island in Niagara River, Sept. 11th, 1892. This species agrees with **marginatus** in most of its characters and may prove to be but a black variety of that form.

Since the above description was prepared I have taken a pair of this species at Hamburgh, N. Y. on the 11th of July. To the characters given I can only add that the base of the tergum shows indications of the paler markings characteristic of the brown forms of this genus and the legs are more deeply colored approaching piceous on the knees. The male is deep black becoming a little pitchy on the elytra and head. The genital segment is long; aperture of the pygofer more strongly constricted a little below the middle and somewhat narrower than in **marginatus**, and the impressed portion of the ventral wall is slightly elevated at either angle and produced in a minute sharp tooth which is not noticeable in its ally.

In both sexes the elytra are highly polished with the nervures indicated by raised points, more conspicuous in the male, in which, also, the apex of the elytra is touched with white at either angle.

This is without doubt quite distinct from **marginatus**. It may be recognized by the narrower front with the median carina prominent for its whole length. In **marginatus** this carina becomes obsolete over the apex of the head.

3 **PISSONOTUS DELICATUS**, n. sp.

Form of **P. marginatus**, but smaller with the front a little narrower. Color pale honey-yellow; face marked with the usual piceous band which covers the base of the clypeus and crosses the anterior coxæ. Apical margin of the elytra white; apex of the front whitish; knees, tips of the tarsi, a streak on the outer surface of the anterior and intermediate tibiæ, and the extreme point of the oviduct dark brown. Length $2\frac{1}{2}$ m. m.

California. Described from a single female specimen received from Mr. D. W. Coquillett and captured near Los Angeles.

4 **PISSONOTUS BASALIS**, n. sp.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 190, 1894.

Macropterous form. Allied to **marginatus** but differs in having the scutellum much larger, about as in **Liburnia pellucida** which this species much resembles. It is however a much stouter insect than the latter and the hind edge of the pronotum is straight. Front narrower than in **P. marginatus**, the median carina distinct. Color piceous black, hind edge of the pronotum broadly white, extreme tip of the scutellum and narrow apex of the front yellowish; front, cheeks and vertex rufo-piceous, breast from the apex of the anterior coxæ to the base of the abdomen, and the coxæ, femora, and hind tibiæ honey-yellow; tarsi whitish at base, the base of the tergum obscurely marked with paler. Elytra and wings whitish-hyaline, smoky at base and slightly clouded at apex. Marginal nervure brown, the others nearly concolorous. Antennæ soiled honey-yellow. Length $3\frac{1}{2}$ m. m.

Described from one female taken at Lancaster, N. Y., July 4th, 1888.

A male from Columbus, Texas, in the National Museum collection apparently belongs to this species. It differs from the female described above in having the face piceous black with a white band across the apex of the front and cheeks, three or four transverse marks and two marginal dots on the basal half of the front, the narrow base of the vertex and a broad band on its apex including two dots, white. The base of the tergum is also marked with yellowish. Pygofers much inflexed below, the aperture broadly ovate, the margins angularly produced inwardly, on either side above the middle, forming a blunt tooth.

5 **PISSONOTUS PALLIPES**, n. sp.

Gillette & Baker, Hemip. of Colo., p. 69, 1895.

Allied to **basalis** but smaller and more slender. Head brownish fulvous; eyes, basal joint of the antennæ and base of the clypeus piceous, the latter polished. Pronotum piceous, the short median carina with a whitish mark, the lateral with a slender pale line. Scutellum piceous-black, the short abrupt tip whitish, the edges narrowly fulvous at base; carinæ paler in the female. Elytra whitish hyaline the marginal nervure and a cloud on the shoulder brown, discal nervures faintly yellowish. Abdomen piceous black, base of the vertex, edges of the genital pieces of the male and the margin of the plates in the female, paler or yellowish. Legs whitish, lined with brown, tips of the claws brown. Breast whitish marked with a broad piceous band which crosses the base of the coxæ and clypeus. Genital segment of the male long, the aperture rather narrow, the sides produced inferiorly in a rounded lobe slightly incurved over the base of the small stiles. Length about 3 m. m.

California, Colorado. Described from one pair received from Prof. C. P. Gillette, taken among the mountains of North Western Colorado, and two females taken near Los Angeles, California, by Mr. D. W. Coquillett. These latter differ from Prof. Gillette's specimens in having the head darker or almost piceous with a pale band adjoining the base of the clypeus, the base of the vertex also wants the whitish marks.

This species may be distinguished from **basalis** by the piceous pronotum marked with whitish on the carinae, the shorter scutellum with its abrupt white apex, and distinct carinae, and the more slender form of the insect

6 PISSONOTUS APHIDIOIDES n. sp.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 190, 1894.

Broad oval, widest across the abdomen. Elytra reaching onto the second abdominal segment, the nervures prominent. Color wood-brown inclined to yellowish on the legs and disc of the tergum; pleural pieces and sides of the abdomen obscurely marked with piceous; pronotum and usual transverse band on the face, whitish; the latter followed by a broad piceous band across the base of the clypeus and anterior coxæ. Cheeks marked with an oval black spot below the antennæ. Front with about three transverse pale lines two of which are nearer the base, the other may be reduced to two points adjoining the whitish apical band. Base of the scutellum irrorated more or less with whitish, tibiæ and tips of the tarsi brown. Elytra brown, sub-opaque, with paler nervures. In one example the vertex is white with the fovæ and a dot on either side at apex black, and the base of the tergal segments are brownish yellow. Length 3 to 3½ m. m.

New York. Described from two female examples, one taken at Salamanca, August 2nd, 1889, the other at Colden a few days earlier. The latter is a larger and darker specimen bearing a striking resemblance to some of our brown plant lice.

7 PISSONOTUS DORSALIS, n. sp.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 190, 1894.

Closely allied to the preceding. Dull yellowish brown, paler beneath; broad lateral margin of the tergum, some marks on the connexivum and the base and apex of the pygofers in the female, piceous or blackish. Clypeus deep black with some obscure spots opposite the pleural pieces indicating a transverse band; claws of the anterior and intermediate feet blackish, front paling toward the base of the clypeus, immaculate above. Disc of the tergum quite obviously tinged with yellow. In the male the front, vertex and elytra have a reddish cast with the apical margins of the latter whitish, the nervures concolorous. Aperture of the pygofers in the male broadest below the middle, the stiles short and curved, their slender acute points approximated above, their base surrounded by the long curved ventral prolongation of the outer superior angles of the pygofers. Length about 3 m. m.

New York. Described from one pair captured in July, at Lancaster and Colden. This species may be distinguished from the preceding by the paler yellowish dorsum, and the brown, almost immaculate, front.

8 PISSONOTUS BRUNNEUS, n. sp.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 190, 1894.

Allied to **P. aphidioides** but much smaller. Color piceous brown tinged with rufous on the front; breast soiled yellowish white, marked by the usual broad piceous band which crosses the clypeus and curving backward on either side covers the anterior and intermediate coxæ and terminates in a cloud on the post-pleura. Carinae paler than the adjacent surface, narrow

apical margin of the front and outer edge of the cheeks whitish. Elytra fuscous with prominent whitish nervures. Disc of the tergal segments sometimes paler and there may be a longitudinal row of pale spots, more or less continuous, on either side of the middle of the venter, edge of the plates and a line on the oviduct pale. Antennæ brown, the basal joint black. Eyes edged with pale. Length $2\frac{1}{2}$ m. m.

New York. Described from six female examples, four taken near Buffalo in September, and two from New York City taken by Mr. E. B. Southwick in June. One of the latter is unusually dark with the pale markings much reduced in extent and the legs black.

Superficially this insect resembles *Phyllodinus nervatus* but the head is narrower than the pronotum, the legs are not strongly flattened, the cheeks are narrower toward their apex and the lateral carinæ of the pronotum do not reach the hind margin.

GENUS DICRANOTROPIS, Fieb.

Fieber, Ver. der Zool. Bot. Ges. Wien, XVI, p. 521, 1866.

" Cicad. d'Europe, I, p. 91, 1875; II, pl. 8, 1876.

Sahlberg, Cicadariæ, p. 469, 1871.

Mayr, Tabellen, I, p. 21, 1884.

Edwards, Trans. Ent. Soc. Lond., 1886, p. 92.

Ashmead, Ent. An., V, p. 27, 1889.

DICRANOTROPIS MAIDIS, (Ashm.)

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

It is with some misgivings that I refer this species to *Dicranotropis*. The front is not at all narrowed toward the apex but the sides are sharp and parallel to a point opposite the lower angle of the eyes; here the median carina is forked, the two branches being well separated and a little divergent where they pass over the rounded apex of the head. The general color is fulvous brown becoming darker on the front, pleural pieces and femora. The abdomen is brown with the segments edged with pale and the carinæ above are paler. The elytra are more than twice the length of the body, whitish hyaline with yellowish nervures, those at the apex margined with smoky, especially toward the inner angle; and on the commissural nervure just before the apex of the clavus is a fuscous line.

Several specimens of this species were in the box received from the National Museum. They are from Florida and Columbus, Texas. Mr. Ashmead's description referred to above is quite accurate and full.

GENUS PHYLLODINUS, n. gen.

Form short and stout, square before. Head wider than the pronotum. Vertex quadrangular, a little wider than long, passage to the front strongly rounded. Front broad, base and apex nearly equal, the sides feebly convex; median carina forked opposite the middle of the eyes. Clypeus tricarinate. Cheeks narrow, broad at apex, the edges almost parallel below the inner angle of the eyes. Eyes large, transverse, deeply excavated below. Anten-

næ stout, the two basal joints about equal in length. Pronotum short, anterior edge straight between the eyes, posterior very feebly excavated, lateral carinæ following the contour of the eyes. Scutellum short. Elytra in brachypterous form with strong reticulated nervures. Anterior and intermediate feet with the posterior coxæ strongly flattened, the femora deeply sulcate within. Posterior tibiæ bispinose.

PHYLLODINUS NERVATA, n. sp.

Eurysa nervata, Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 191, 1894.

Form oblong, broad and short. Head wider than the pronotum, vertex nearly square, a little transverse, the edges nearly rectilinear, the anterior fova long-triangular, reaching over the rounded anterior edge of the head. Front oblong, a little expanded opposite the lower angle of the eyes; middle keel distinct for its whole length on the front but obsolete on the base of the clypeus. Pronotum shorter than the vertex, the fore and hind margins nearly straight and parallel, lateral carinæ much curved. Sides of the large scutellum concave, the lateral carinæ straight and oblique; near the basal angles. Elytra short and broad, covering the fifth abdominal segment, rounded behind. Pygofers of the male compressed laterally, the aperture narrow, forming a rounded pocket below to enclose the short slender curved stiles, which are approximated but do not quite touch at their tips. Wall of the anal aperture square and produced on the ventral aspect, the lower angles acute and nearly touching one another. Femora and tibiæ of the anterior and intermediate feet thick and broadly expanded. Length $2\frac{1}{2}$ to 3 m. m.

Color piceous brown. Vertex pale, a short anterior median line and a row of dots on either side brown; disc of the pronotum and its carinæ pale; scutellum pale with the basal angles and a double median line brown. Elytra subhyaline, smoky, with numerous heavy ramous white nervures. Front blackish with the carinæ and a double row of dots on either side pale. Carinæ of the clypeus in part, rostrum, excepting its tip, edges of the femora, and tips of the tibiæ, some marks on the pleural pieces, sternum and coxæ below, and the apical joint of the antennæ, pale. Disc of the tergum in the females tinged with reddish with a more or less complete double row of pale spots on either side. Tip of the genital pieces and the oblong plates at the base of the oviduct in the females whitish. Deflexed sides of the pronotum expanded into a large white plate at the base of the elytra.

New York and Canada. Not uncommon near Buffalo on damp weedy meadows in June. Also taken in Welland Co. Ont. and at Muskoka Lake in July. This is our largest northern Delphacid. Its square form and brown color with the strongly ramously veined elytra will distinguish it.

LACCOCERA, new genus.

Allied to **Delphacinus** and **Eurysa**. Head large, a little wider than the pronotum. Vertex nearly square or somewhat five-sided, a little surpassing the eyes before. Front broad, six-sided, distinctly angled between the eyes; apex but little narrower than the base; passage to the front strongly

angled; median carina distinct, forked at the apex of the head, the lateral compartments with a few large pustules. Pronotum short, deeply excavated behind; lateral carinae strongly curved behind the eyes, pustulate. Scutellum large, distinctly constricted before the apex; lateral carinae but feebly divergent posteriorly. Anterior and intermediate tibiae flattened, not foliaceous expanded; hind tibiae armed, the tarsi short.

This genus is, perhaps, nearer to *Eurysa* Fieb. but the carinae are more distinct, the passage from the front to the vertex is more acute, the pronotum is more deeply excavated behind, and the front, vertex and sides of the pronotum and abdomen are ornamented with large excavated pustules. It differs from *Phyllodinus* in the simple anterior and intermediate tibiae, the form of the front, the more deeply excavated hind edge of the pronotum, the smaller antennae with shorter basal joint, and the pustulated ornamentation which recalls *Achorotile*. *Laccocera obesa* is hardly characteristic of this genus and may not belong here. *Laccocera vittipennis* is the type.

LACCOCERA VITTIPENNIS, n. sp.

Delphacinus, Gillette & Baker, Hemip. of Colo., p. 69, 1895.

Head a little broader than the pronotum, blunt before; vertex nearly square, very slightly angled before, the hind edge rectilinear between the eyes; apical foveae oblong, rounded before and behind. Front parallel above, tapering rapidly below; median carina strong and distinct throughout, each compartment with about seven pustules, two near the apex, two at base, and three smaller ones along the outer margin above the middle. Pronotum shorter than the vertex; deeply and angularly excavated behind, lateral carinae strongly curved, extending over onto the deflected sides and marked by a row of small pustules. Scutellum large, lateral carinae but slightly divergent. Length 4 m. m.

Color: Head pale yellowish; cheeks, clypeus and outer margins of the front, black, carinae and pustules pale; outer apical angles of the vertex with a row of shallow pustules which contain each a black dot. Pronotum whitish, with a dusky cloud below the eye divided by the lateral carina. Scutellum bright fulvous, outer compartments black, edged behind with fulvous; the median carina sometimes pale. Elytra much exceeding the abdomen in length; whitish vitreous with a broad smoky vitta on either margin at apex, the inner prolonged as a fainter stripe along the sutural margin of the corium to the base; nervures slender, brown. Wings white with brown nervures. Breast yellowish; coxae and legs black, edges of the femora and the anterior and intermediate tibiae, the basal joint of the hind tarsi and the posterior tibiae yellow. Abdomen black, inner margins of the plates of the female whitish, edge of the oviduct and disc of the pygofer fulvous. The front is sometimes blackish to the base, and the pleural pieces may be more or less invaded with black; antennae black.

The male has the head and pronotum soiled whitish with the clypeus and apex of the front blackish; antennae pale; cheeks and legs fulvous; coxae and disc of the pleural pieces black. Elytra smoky at base becoming vitreous toward the apex with strong brown nervures. Aperture of the

pygofers nearly square above and below, suddenly expanded about the middle at the tips of the long curved dorsal hooks; styles broad, approximate at base, curved outward and becoming nearly parallel and pointed above.

New Hampshire, Colorado. Described from three female examples taken on Mt. Washington by Mrs. Annie Trumbull Slosson, and one pair from the mountains of North West Colorado, collected by Prof. C. P. Gillette. One of the females from Mt. Washington is more clearly marked than the others; the pronotum and scutellum are white on the middle marked with black on the sides and the breast is black, otherwise it does not differ from typical specimens.

LACCOCERA ZONATUS, n. sp.

Delphacinus zonatus, Gillette & Baker, Hemip. of Colo., p. 69, 1895.

Brachypterous Male. Deep shining black. Front, vertex pronotum and scutellum tawny yellow or whitish; face fulvous; feet light orange, the tarsi paler tipped with brown; tergum marked with a transverse band on the second and third segments which may invade the base of the fourth. Elytra short, truncated behind, reaching onto the second abdominal segment, nervures simple, strong. Apex of the ample pygofers broad below with a transverse oblong excavation bounded by an incurved tooth on either side. Styles approximate at base, quite widely spreading, reaching about half way to the anal tube the ventral wall of which is broadly expanded and produced at the outer angles into a long acute tusk-like fulvous tooth.

Macropterous female: Soiled yellowish white; an oblong spot on either side of the base of the scutellum, a cloud on the pleural pieces, the lineations of the femora and the metanotum, brown. Tergum black, a large spot on the basal disc, a row of about four pustules on either side of the middle on each segment and their narrow edges pale. Elytra and wings well developed, vitreous with strong brown nervures. Length $2\frac{1}{2}$ to $3\frac{1}{2}$ m. m.

In both sexes the head is very large, wider than the thorax; the eyes are large overlapping the pronotum for one half their length. Vertex cut squarely off behind, anteriorly extending for nearly one half its length before the eyes and but little produced at the middle, the edge almost rounded before, carinae distinct, forming a large triangle with its apex at the tip of the head, the contained fovæ strongly marked. Front broad, but little narrowed at apex, the middle carinae distinct. Pronotum angularly excavated behind for one half its length. On the front are three pairs of pustules, one pair placed near the middle of the outer edge and smaller; a row of pustules follows the curved pronotal carinae and there is another below the carinated outer edge of the front, and a smaller pair occupy the outer angle of the vertex.

Colorado. Described from a single pair received from Prof. C. P. Gillette.

Since the above was written one macropterous and ten brachypterous males have been received from Prof. Gillette. The former differs from the

brachypterous form only in having a blackish oblong spot within the basal angles of the scutellum. The elytra are long as in the female but of a pale smoky brown with darker nervures.

LACCOCERA ? OBESA, n. sp.

Delphacinus obesa, Gillette & Baker, Hemip. of Colorado, p. 69, 1895.

Macropterous female: Allied to **vittipennis** but broader and stouter with the head narrower than the thorax, the eyes smaller and the elytra shorter and broader at apex.

Vertex nearly square, broadly rounded before, not obviously five angled; basal fovæ shorter than in **zonatus**, more as in genus **Delphax**, reaching only to the middle, before forming two middle keels which run nearly parallel over the apex of the head and unite abruptly to form the middle keel of the front. These carinæ form three oblong nearly equal compartments on the apical half of the vertex. Hind edge of the pronotum broadly sinuately excavated across the middle, including a slight median emargination; the fore and hind margins nearly parallel.

Color soiled yellowish white, fulvous on the scutellum. Eyes, clypeus, its carinæ excepted, and the disc of the pleural pieces blackish. Tergum marked as in the female of **zonatus**. Venter fulvous dotted with brown; oviduct brown, shorter than the pygofer, the latter pale with a brown dot at the inner apical angle. Length $3\frac{1}{2}$ m. m.

Colorado. Described from a single female specimen received from Prof. C. P. Gillette. This is a stouter species than **zonatus** with which it agrees closely in color and markings. It has the same arrangement of pustules on the head and pronotum, but the carinæ on the vertex are differently placed.

GENUS STOBERA, Stal.

Berliner Ent. Zeits., III, p. 327, 1859.

“Caput thorace nonnihil angustius, truncatum; vertice transverso; fronte elongata, subparallela, marginibus carinatis, medio carina percurrente, basi ipsa furcata instructa; genis obliquis, triangularibus, haud parallelis; clypeo tricarinato. Antennæ compressæ, capiti transverso cum oculis vix æquilongæ, articulo ultimo penultimo longiore. Thorax brevis, postice late emarginatus, tricarinatus, carinis lateralibus posterius leviter divergentibus. Tegmina abdomen multo superantia. Tibiæ posticæ bispinosæ. **Amblycoti** affine genus.”

The above is a copy of Stal's description. The characters given below were prepared by me before I had discovered that this genus had already been defined.

Allied to **Conomelus** Fieb. Head considerably narrower than the pronotum. Vertex short, the carinæ sharp and prominent over the apex of the head. Front narrow, ligulate, but little or not at all narrowed at base, sides nearly rectilinear, carinæ prominent. Cheeks broad triangular, the outer edge a little reflexed. Clypeus long, acutely triangular, distinctly tricarinate. Antennæ stout, reaching onto the base of the clypeus; first

joint broadly flattened, narrowed to the base, the apex oblique; second joint larger, subterete, nearly as wide as the first; its surface, except at base and the outer edge of the first joint coarsely papillated. Pronotum deeply excavated behind, strongly carinated, the lateral carinae distinctly incurved at apex. Sides of the scutellum strongly concave, the apex prominent, large. Elytral nervures setigerous-punctate.

This genus is near **Conomelus** Fieb. but differs in the form of the front: the antennae have the same shape but are more flattened, and the carinae are more prominent. The lateral carinae of the pronotum apparently fork behind, sending one branch to the posterior edge and another behind the eye as in **Liburnia**. Certainly this is the case in our common **tricarinata**, Say.

STOBERA TRICARINATA, (Say.)

Delphax tricarinatus, Say. Jl. Acad. Nat. Sciences. Phila. IV, p. 337, 1825. Complete Writings, II, p. 225.

Uhler, Bul. U. S. Geol. & Geog. Surv., II, p. 352, 1876.

Van Duzee, Psyche, V, p. 389, 1890.

Osborn, Proc. Iowa Acad. Sci., I, pt. II, p. 127, 1892.

Conomelus tricarinatus, Van Duzee, Bul. Buf. Soc. Nat. Sci., V., p. 191, 1894.

Gillette & Baker, Hemip. of Colo., p. 69, 1895.

Color pale yellowish white, vertex and scutellum fulvous, apex of the head with a brown band between the eyes and invading the base of the front. A broad black band crosses the apex of the front and cheeks and a more slender one the base of the clypeus. Apex of the clypeus, femora below and the coxae dotted and the tibiae twice banded with black. Antennae and outer edge of the scutellum dusky. Disc of the tergum and ventral segments black. Elytra whitish hyaline, nervures, the marginal excepted, with black setigerous dots. Base of the clavus, an oblique band before the middle, another across the base of the apical areoles which is deflected so as to cover the inner half of the membrane, and a triangular spot on the outer apical angle, brown. Where the apical nervures terminate in the brown cloud they are marked by a white spot one of which is larger. Length about 4 m. m.

This is a widely distributed species in North America occurring from Quebec to Mississippi and California. In Western New York it is occasionally taken in damp situations from May to August. I have also taken it near Ridgeway, Ont. and have received specimens from New Jersey, (Smith), Mississippi (H. E. Weed), Kansas, (Snow), Colorado, (Gillette), Iowa, (Osborn), California, (Coquillett), and Virginia, Oct. 3d and 23d, Columbus, Tex., June 6th, (U. S. Natl. Mus.), Mr. Uhler records it from Illinois, Nebraska and Missouri, and Say's specimens were from Missouri. In the mountains of Colorado and California a shorter winged form seems to predominate. The extent of the dark markings is subject to some variation in this species.

STOBERA CONCINNA, Stal.

Delphax concinna, Stal, Of. Vet. Akad. Forh. XI, p. 246, 1854.

Stobera concinna, Stal, Berl. Ent. Zeits., III, p. 327, 1859.

“Fusco-testacea (♂), vel pallida (♀); fascia lata frontis genarumque, maculis marginalibus abdominis parvis, pedibusque pallidis, his nigro-anulatis; tegminibus vitreis, fascia obliqua ante medium, fasciis 2 opposite obliquis, una mox pone medium, altera prope apicem, ad commissuram conjunctis, fuis; venis fusco-punctatis. Long. cum tegm. 4½ millim. Patria: Mexico.”

This probably is not distinct from the preceding but I refrain from uniting them at present on account of Stal's note appended to his later description which reads: “Adset in Museo Berolinensis species e Pennsylvania **S. concinnæ** maxime affinis et similis.” Assuming this note to refer to **tricarinata**, which is more than probable, it is evident that Dr. Stal considered this a distinct but closely allied species. So that it seems advisable to retain both names until the question can be settled by the study of a wider range of material than is now at my disposal.

STOBERA BIFASCIATA, (Prov.)

Delphax bifasciata, Prov., Pet. Faune Ent. du Can., III, p. 337, 1890.

This is without doubt but a slightly immature form of **tricarinata**. Were it not for Provancher's remark—“son front est blanchatre” I would not hesitate for a moment to place it as a synonym of that species. I have seen unquestionable specimens of **tricarinata** that agree with his description in every respect except the pale front.

GENUS LIBURNIA, Stal.

Stal, Hemipt. Africana IV, pp. 176 and 179, 1866.

Sahlberg, Cicadariæ p. 422, 1871.

Fieber, Cicad. d'Europe I, p. 89, 1875; II, pl. 8, 1876.

Edwards, Trans. Ent. Soc. Lond., 1886, p. 51.

Delphax, Fieber Ver. der Zool. Bot. Ges. Wien, XVI, p. 520, 1866.

Amyot & Serv., Hemipt. p. 512, 1843. (in part)

Berg, Hemipt. Argent. p. 223, 1879.

Mayr, Tabellen I, p. 20, 1884.

Ashmead, Ent. Am. V, p. 26, 1889.

Prov., Pet. Faune Ent. du Can. III, p. 223, 1889.

Stal in 1866 first restricted the genus **Delphax** to **clavicornis** and its allies, on the ground, apparently, that **clavicornis** was the first species described by Fabricius under this generic name and therefore should be considered the type; thus making **Delphax** synonymous with **Asiraca** and displacing the latter generic name. Many European Hemipterists still retain the name **Delphax** for the present genus. But **Delphax** has long been em-

ployed so loosely for most any species of this family that a desire for greater precision would seem to call for the use of Dr. Stal's name even if it were not fully justified by the rules of nomenclature as now most generally understood and adopted. Certainly no exception should be made in this case for the sake of perpetuating Fabricius' name by its application to the larger genus.

LIBURNIA ORNATA, (Stal.)

Delphax ornata, Stal, Berliner Ent. Zeits. VI, p. 315, 1862.

Liburnia ornata, Osborn, Proc. Iowa, Acad. Sci., I, pt. 2, p. 127, 1891.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 191, 1894.

Fulvous-brown, brighter above; vertex, pronotum and scutellum with a white median line which is bordered by a slender black line forming a continuation of the black frontal fovæ over the apex of the head. Frontal carinæ heavy, white. A longitudinal line behind the eye, the pleural pieces and the abdomen black, the latter with some fulvous spots on the margins, and the hind edges of the ventral segments may be pale. Elytra whitish hyaline; a large spot near the base of the corium and a broad V shaped band beyond the middle having its apex on the inner edge near the tip of the clavus, brown. Nervures on the apical half brown and brown-margined, on the base dotted, concolorous on the brown basal spot. Front and clypeus narrow, ligulate. Vertex rectangular, scarcely prominent before the eyes. Length 4 m. m.

This is a widely distributed and pretty species recalling by its ornamentation **Stobera tricarinata**. Stal records it from South Carolina and New York. Prof. Herbert Osborn has taken it in Iowa in September. Mr. H. E. Weed has sent me specimens from Mississippi and Mr. W. J. Palmer, Jr. of Buffalo has taken it in the mountains of North Carolina in July. About Buffalo it is rare. I have taken one specimen here on grass in June.

LIBURNIA PELLUCIDA, (Fab.)

Fulgora pellucida, Fab. Ent. Syst., IV, p. 7, 1792.

Delphax pellucida, Fab. Syst. Rhyng., p. 84, 1803.

Germar, Mag. der Ent., III, p. 212, 1818.

Burm., Handb. der Ent. II, 1, p. 150, 1835.

Stal, Of. Vet. Akad. Forh., XI, p. 193, 1854.

Fieb. Verh. der Zool. Bot. Ges. Wien, XVI, tafl. 8, fig. 20, 1866.

Liburnia pellucida, Fieb. Cat. der Cicad. p. 5, 1871.

Fieb. Cicad. d'Europe IV, p. 4, 1876.

Sahlberg, Cicadariae p. 436, 1871.

Harrington, Ottawa Nat., VI, p. 31, 1892.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 191, 1894.

Macropterous males: Color black; carinæ of the head broadly white; pronotum white clouded anteriorly between the carinæ, or the surface may be more or less obscured with blackish; scutellum shining black edged with

fulvous; antennæ pale; connexivum and narrow margin of the ventral segments and pleural pieces whitish. Elytra fuliginous; forks of the first and second sectors nearly equal; nervures sparingly punctate; pale at base. Legs pale, femora and outer face of the tibiæ more or less embrowned, Pygofers broad, aperture transverse, narrowed dorsally, ventral notch broad, moderately deep; stiles rather slender, acute, very widely divergent, almost horizontal; the pygofers edged with white.

In the brachypterous males the disc of the scutellum is sometimes pale and the pale markings on the abdomen are more extended.

The brachypterous females are pale brownish yellow, deeper colored on the scutellum and venter; pronotum whitish; tergum and venter sometimes marked with black.

This insect is apparently indigenous to all the northern countries of the globe. It is found throughout Europe, extending its range in the north from Scandinavia through Russia and Siberia to Kamshatcha, and on this continent has been reported from Alaska, British America, Canada and the Eastern United States generally. About Buffalo it is our most abundant Delphacid, occurring through the entire season, frequently in large numbers.

Delphax arvensis Fitch is probably only the female of this species **Delphax furcata** Prov. seems to differ in being larger and having a black oviduct. It may be distinct. A few references for these names follow:

LIBURNIA AVENSIS, (Fitch.)

Delphax arvensis, Fitch, Homop. N. Y. State Cab., p. 46, 1851.

Reprint in Lintner's 9th Rept., p. 386, 1893.

It seems impossible to positively identify this form. Several examples of what I formerly placed under **arvensis** have been taken about Buffalo from May to Oct. These I now believe to be the macropterous females of **pellucida**. They are of a pale soiled yellow color, the elytra are tinged with fulvous with strong fulvous nervures. In some examples there are a few black marks beneath and the front may be more or less obscured.

LIBURNIA FURCATA, (Prov.)

Delphax furcata, Prov. Nat. Canadien, IV, p. 320, 1872.

Prov. Pet. Faune Ent du Can., III, p. 225, 1889.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 191, 1894.

A larger form closely allied to the preceding I placed under this name in my list of the Hemiptera of Buffalo. It agrees with Provancher's description in the size but wants the brown oviduct, This name should, perhaps, be placed as a synonym of the foregoing.

LIBURNIA DETECTA, n. sp.

Macropterous form: Broad and stout Color soiled whitish; basal angles of the scutellum and beneath, especially in the female, quite strongly tinged with yellow. Face black; a longitudinal line in the middle of each

compartment of the front and a shorter one on the cheeks fulvous, carinae white; basal foveae of the vertex pale, base of the scutellum, disc of the pleural pieces, some marks on the base of the vertex in the male, and the claws, blackish. The black on the base of the scutellum is mostly covered by the pronotum but on either side it is extended backward as a black line next to the patagia. Tergum black, the broad margins and a transverse band near the apex whitish in the male, fulvous in the female. Elytra whitish, nervures concolorous, the marginal heavy and brown around the apex; the inner apical areoles with a faint longitudinal fuscous cloud. Tips of the last segment of the connexivum black in the female. Length, male $3\frac{1}{2}$, female 4 m. m.

The genital characters of the male are similar to those of *pellucida*; stiles quite broad, widely divergent, their apex rounded and a little twisted. All the pieces black except the edge of the anal tube.

New York. Described from one pair received from Mr. E. B. Southwick, taken in New York City.

LIBURNIA CONSIMILIS, n. sp.

Gillette & Baker, Hemip. of Colo., p. 69, 1895.

Form and aspect of *L. pellucida*. Black; all the carinae, the broad posterior margin of the pronotum, feet, mostly, and the narrow margins of the abdominal and pleural pieces, white; elytra faintly fuliginous, nervures brown. Length 4 m. m.

Macropterous male: Compared with the male of *pellucida* the vertex is a little longer, the basal foveae distinctly longer, the apical smaller and the posterior margin of the vertex more distinctly emarginate. The front is proportionately a little broader than in that species, the lateral carinae are more distinctly arcuated, the apical joint of the antennae is smaller, the pronotum is shorter, the hind edge a little more deeply excavated and the apex of the scutellum is broader and shorter.

Color black; carinae of the head and pronotum narrowly white, tegulae and broad margin of the pronotum white; edge of the scutellum touched with fulvous on its middle; connexivum and narrow margin of the ventral segments and pleural pieces whitish; legs brown, base and apex of the femora tip of the tibiae and the tarsi soiled white, the latter tipped with black. Elytra extending one half their length beyond the abdomen, very faintly smoky, nervures brown; wings white, nervures brown.

Genital segment of the male long; aperture similar in form to that of *pellucida* but smaller with the styles narrower and less widely spreading, ventral notch of the pygofer small.

I have given a comparative description of this species as best suited to distinguish it from the closely allied *pellucida* with which it might very readily be confounded, the form of the male genitalia is however very different, the insect is broader and has a wider front and vertex, and the male and female scarcely differ in color. The latter has the femora pale lineated with brown and the elytra are darker with stronger nervures.

California and Colorado. Described from three males from near Los Angeles, Calif. received from Mr. D. W. Coquillett under the name of *Delphax consimilis*, Uhler, M. S. and one pair taken in the mountains of north west Colorado by Prof. C. P. Gillette.

LIBURNIA, PUELLA, n. sp.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 191, 1894.

Aspect of the male of *L. pellucida* but smaller with a double piceous mark at the tip of the clavus.

Macropterous form. Male: Black; carinae of the head and the posterior half of the pronotum white; tip of the scutellum, broad margins of the propleurae, antennae, legs, connexivum and narrow margins of the ventral segments, yellowish testaceous, the latter sometimes white. Elytra pellucid white, tip of the clavus and the marginal nervure of the membrane blackish; discal nervures pale brown, finely granulated.

Vertex longer and narrower than in *pellucida*; front narrower, the sides parallel below the eyes where the width is hardly greater than at the center of the eye. Aperture of the pygofers almost circular, a little arcuated below; stiles widened and converging above, the outer angles extended upward and backward toward the anal aperture. Length $2\frac{1}{2}$ m. m.

In the female the yellowish markings are more extended, the front is slightly widened toward the clypeus with its carinae yellowish instead of white; the pronotum is black with the carinae and narrow posterior margin pale yellow, otherwise like the male. Pygofers long and narrow, parallel; plates narrow, arcuated within, covering the pygofers to the base of the broad oviduct. Length 3 m. m.

New York, New Jersey, Mississippi, Iowa. Described from numerous individuals of both sexes. About Buffalo this species is rare but it becomes more abundant southwardly where it seems to replace *pellucida*.

LIBURNIA OSEORNI, n. sp.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 191, 1894.

Macropterous form. Resembles *L. ornata*, Stal in form and size. Color soiled whitish tinged with yellow beneath; scutellum bright fulvous. Elytra white, subhyaline, nervures pale at base, becoming fuscous at apex. Wings white with slender brown nervures. Eyes, ocelli and tips of the tarsi and rostrum black. Length 3 to 4 m. m.

The male has a conspicuous oblong longitudinal black spot within the basal angles of the scutellum and a whitish median carina. The disc of the pleural pieces and the abdomen, its margins and a part of the basal and genital segments excepted, are also black, and the front has a darker border within the lateral carinae. In the female the color of the abdomen and breast is bright fulvous like the scutellum and sometimes the metanotum and disc of the tergum is blackish.

Apex of the pygofers in the male nearly circular; their surface below exposed by the strongly angled last ventral segment; stiles hook-shaped, approximate at base then curved outward and upward, their apices twisted and parallel and attaining the anal aperture either side of a ventral arcuation. Pygofers of the female oblong, oviduct stout, brownish, considerably exceeded by the anal tube.

This is a very clearly marked and pretty species of which seventeen specimens are now before me, all macropterous. Ocean Co. New Jersey in May, Prof. J. B. Smith; Agricultural College, Mich. G. C. Davis; Fairfax and Ames, Iowa, Prof. Herbert Osborn, to whom this species is respectfully dedicated. Also taken by me at Lancaster, N. Y. in August 1880.

LIBURNIA LAMINALIS, n. sp.

Macropterous female: Color bright fulvous yellow; above marked with a broad brown band behind the eyes which covers the sides of the pronotum and the basal angles of the scutellum to the lateral carinæ. On the pronotum this brown color may be deepened to black anteriorly within the curve of the lateral carinæ. Face brown, varied with paler and clouded with blackish next to the outer margin of the cheeks, on the base of the clypeus and the base and apex of the front. Color paler beneath becoming soiled whitish on the legs and venter; mesopleura with a round black spot; edges of the ventral segments and their stomata brown; tergum black, the lateral edges and more or less of the apical segment yellowish. Elytra whitish hyaline, the nervures brown, conspicuous, the costal beyond the stigmata heavy and blackish. Anal tube black. Outer edges of the tibiæ with a brown line. Oviduct short, not attaining the apex of the pygofers.

Macropterous male; Colors paler becoming soiled whitish on the pronotum. The face is more strongly colored or almost blackish and the base of the tergum bears a pale band. Pygofers white with a large black spot on each side; stiles and anal tube deep black, the former large, projecting and very conspicuous, with the rounded apex rather broad and obtusely angled within. Length about $3\frac{1}{4}$ m. m.

In most of its characters this species agrees very closely with **Osborni** but the stiles of the male are much larger and more conspicuous and their apex is more extended and oblique, and viewed from below they are less divergent. The female of **Osborni** has the pronotum immaculate. The basal angles of the scutellum are marked with black in the male only. The front in **laminalis** is narrower, but very little wider toward the base and distinctly arcuated at the apex of the head between the eyes. In **Osborni** the front is one half wider than in the present species with the sides quite distinctly arcuated and but slightly contracted at the tip of the head and the mesopleural spot is larger and more diffuse.

Mississippi. Described from one male and two female examples received from Mr. Howard Ewerts Weed. The females were labeled "Sept. 1892."

LIBURNIA LUTULENTA, n. sp.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 191, 1894.

Brachypterous form; Dull testaceous brown, more or less obscured on the pro- and mesonotum, elytra, and edges of the pectoral pieces, especially in the male; postpectus with a large fuscous spot; facial carinae brown-margined; abdomen darker, in the male tinged with rufous, the segments edged with fuscous; femora obscurely lineated with brown; tip of the tarsi and rostrum blackish; antennal setae black.

Vertex quadrate, feebly rounded before, carinae obtuse, evanescent on the forehead, fovae each with a round impressed dot. Front rather broad, narrowed between the eyes and more feebly toward the truncated apex. Pronotum shorter than in **lineatipes** and rounded anteriorly, not apparently squared as in that species. Fork of the outer sector of the elytra about twice the length of that of the inner. Pygofers of the male short, aperture subtriangular, the sides rounded, hardly notched above, ventral notch feeble; stiles narrow, claw-like, approximate at base, slightly divergent above and acute at apex. In the female the genital pieces differ from those of **lineatipes** only in being proportionately a little narrower throughout. Length 2 m. m.

New York. Described from six male and eight female examples, taken at Buffalo, May 4th to July 10th and Portage Falls, May 30th.

This insect approaches **L. obscurella**, Boh. but it is only about one half the size of that species and the form of the front and the characters of the male genitalia are quite different. It is also allied to **L. lineatipes**. It is not uncommon in spring on grass in damp situations.

LIBURNIA WEEDI, n. sp.

Macropterous male: Form rather broad and stout. Color soiled brownish testaceous, a little darker on the front and scutellum. Eyes, ocelli and abdomen black, the hind angle of each segment of the latter yellow. Elytra twice the length of the abdomen, whitish hyaline with heavy brown nervures. Genital segment long, aperture nearly round but forming a small notch below; stiles concentric with the outer rim of the aperture, widened and slightly bifurcated above. The genital characters are very obscure in this specimen and are not satisfactorily made out here. Length about $3\frac{1}{2}$ m. m.

Mississippi. Described from a single male example received from Mr. Howard Ewerts Weed. This is an obscurely marked species but quite distinct from any other known to me. It has much the color and general aspect of the smaller northern **lutulenta**.

LIBURNIA OBSCURELLA, (Boh.)

Delphax obscurella, Bohem., Vet. Akad. Handl., 1847, p. 53.

Stal, Of. Vet. Akad. Forh., XI, p. 195, 1854.

Fieb., Verh. der Zool. Bot. Ges. Wien, XVI, tab. VIII, fig. 29, 1866.

Mayr, Tabellen, I, p. 21, 1884. (mention)

Liburnia obscurella, Fieb. Cicad. d'Europe, IV, p. 20, 1876.

Sahlberg, Cicadariae, p. 443, 1871.

Edwards, Trans. Ent. Soc. London, 1886, p. 80.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 191, 1894.

Several examples of this plainly colored little insect from Western New York have fallen into my sweep-net as the following dates will show:—Colden, July; Concord and Portage Falls, May. It much resembles our common **lutulenta** but may be distinguished by its larger size, (full $2\frac{1}{2}$ m.m. to the tip of the abdomen), its narrow front with black fovæ, and the elongated apical fova of the vertex which brings the fork of the median carina well on to the base of the front.

LIBURNIA LATERALIS, n. sp.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 191, 1894.

Brachypterous form: Vertex, length and breadth subaequal, carinae prominent and acute on the forehead, basal fovæ short and shallow, hardly distinct; apical fova elongated, extending over the apex of the head. Front rather narrow, sides straight and parallel below the eyes, contracted above. Clypeus slightly tumid and blackish at base with pale carinae. Elytra attaining the penultimate segment of the abdomen, narrowed to the rounded apex, forks of the first and second sectors about equal, middle apical areole much the largest. Length 2 to $2\frac{1}{2}$ m. m.

Male. Dull pale yellow, obscured on the sides of the pro- and mesonotum, front and abdomen ochreous; plates and a rather broad vitta on the tergum either side of the middle black; feet whitish with a slender brown line exteriorly. Pygofers, viewed from the side, with a prominent tooth above, below which the edge is cut out almost to the corner of the last abdominal segment; viewed from behind the aperture of the pygofers is oval, slightly wider above, with a broad black transverse band below the anal tube; stiles broad, rounded at the apex, slightly concave on the inner margin, reaching the rim of the anal tube just below the prominent lateral teeth.

Female. Dull yellowish brown; front dusky with a row of pale dots between the carinae; a large spot at the base of the hind legs and the margins of the abdominal segments, especially towards the sides, black. Elytra fulvous brown, the extreme edge paler, within which is a dusky line. Pygofers long, a little narrowed at the apex, ventral margin of the anal tube feebly concave; plates white.

New York. Described from one male and three female examples taken at Lancaster on August 24th and September 10th, 1889. Another female was captured at Colden, N. Y., August 16, 1896.

LIBURNIA KILMANI, n. sp.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 191, 1894.

Brachypterous form. Vertex quadrangular, carinae obtuse, distinct on the forehead, basal fovæ short, dividing carina nearly obsolete; apical fova

long, extending well on to the base of the front. Front wide at the apex, contracted between the eyes, sides almost parallel in the male, in the female widened to below the middle. Antennæ short, reaching the base of the clypeus. Pronotum rather deeply concave behind. Elytra reaching the middle of the abdomen in the female, equalling the abdomen in the male, fork of the first sector longer than that of the second. Length, male 2 m. m., female 3 m. m.

Male: Dull brownish yellow, obscured behind the eyes and on the face, with a clearer dorsal vitta from the vertex to the tip of the abdomen. Abdomen black, connexivum, two apical segments mostly, and the dorsal vitta yellow. Elytra shining black with a narrow pale margin; thighs lineated with brown, the pectoral pieces obscurely spotted with the same color. Pygofers short, truncated, viewed from behind broad, subtriangular, dorsal notch deep, rounded, reaching the ultimate dorsal segment, ventral notch shallow; stiles narrow, pointed, widely divergent, adjoining the ventral margin lying almost horizontal.

The female differs from the male in being of a duller color with the black markings paler and less extended. The venter is sometimes entirely pale or touched with brown on either side. Oviduct black. Apex of the pygofers truncated, their inner angle slightly exceeded by the stout oviduct; plates rather short and broad.

Macropterous form: Elytra reaching for one third of their length beyond the abdomen; first sector widely forked somewhat nearer the base than the second; apical areoles seven, very irregular; nervures punctate. Wings whitish hyaline, nervures fuscous, the second white at base.

New York. Described from one male and six female examples taken near Buffalo from June 18th to July 31st. In form and ornamentation this insect recalls genus *Dicranotropis* to which it is further allied by the elongated apical fova of the vertex which extends well on to the base of the front, where, however it is very narrow, but it can hardly be placed in that genus.

In dedicating this neat little Delphacid to my friend Mr. A. H. Kilman of Ridgeway, Ont. I desire, in a measure at least, to express my appreciation as well of his scientific zeal as of his generosity in placing at my disposal the many valuable Hemiptera captured by him in Southern Ontario.

LIBURNIA CAMPESTRIS, n. sp.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 191, 1894.

Brachypterous form. Male: Vertex nearly square, passage to the front well rounded, carinæ feeble, especially on the forehead, fovæ sometimes obscure; front rather broad, oblong, scarcely contracted between the eyes, sides feebly convex, apical margin straight; antennæ stout; apex of the scutellum abruptly subacute. Elytra narrowed and rounded at the apex, reaching to the ultimate dorsal segment, the sectors equally forked. Pygofers viewed from behind broad, rounded below, truncated above, sides a little produced on the middle, the depressed margins rather wide below the

anal tube; dorsal notch broad, reaching the ultimate tergal segment, ventral very shallow. Stiles divergent at base, parallel and somewhat expanded above, apex truncated, hardly attaining the anal tube. Color pale yellow; eyes, antennal setæ, the basal angles of the scutellum and a large pleural spot at the base of the posterior and intermediate feet black. Abdomen fulvous or rufous, tergum with a black basal area on each side of variable extent, or black with the margins, dorsal line and hind edge of the two basal segments rufous, venter rarely blackish. Pygofers pale, stiles black.

In the female the abdomen is larger and the elytra are shorter than in the male. The oviduct scarcely reaches the inner angle of the pygofers. Color a uniform dull fulvous, paler on the abdomen and legs; antennal setæ and tips of the tarsal spines black; oviduct obscured.

Macropterous male: Elytra extending one half their length beyond the abdomen, hyaline, nervures pale at base becoming brown toward their apex; apical nervures six, the second and third contiguous at base. Colors rather clearer than in the brachypterous form. Length, male 2 m. m., female $2\frac{1}{2}$ m. m.

New York, Ontario. Described from numerous examples of both sexes; Buffalo and vicinity, May to August, Portage Falls, May 31st; Ridgeway and Muskoka, Ont. about August 1st. Mississippi, H. E. Weed; New Hampshire, C. E. Weed; Michigan, Davis. Here this pretty little species abounds in dry pastures especially where the grass is thin and parched during the heat of summer.

LIBURNIA LINEATIPES, n. sp.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 191, 1894.

Brachyterous form. Male: Vertex almost square, carinæ sharp, fovæ distinct. Front rather broad, apex feebly concave, sides a little rounded, the lateral carinæ obscurely continued across the base, above which the median carinæ is divided on the vertex, below it is continued to the apex of the clypeus. Pronotum and scutellum minutely rugose; carinæ distinct, on the former the lateral carinæ approach the hind edge where they become obsolete, median carina of the scutellum abbreviated posteriorly. Elytra short, opaque, subquadrate, reaching but little beyond the middle of the abdomen, nervures strong, the apical areoles hardly indicated. Basal joint of the hind tarsi distinctly longer than the two following. Last ventral segment deeply concave on its hind margin; pygofers with a deep notch below; aperture ovate, rather small. Stiles large, slightly widened before their conical apex, divergent above toward the anal tube and curved to correspond with the sides of the aperture to which they approximate, strongly ciliated. Color deep black; narrow edge of the frontal carinæ, last joint of the antennæ, inferior margin of the eye, pectoral pieces, edge of the connexivum, two basal segments of the tergum excepting a large discal spot, and the legs, fulvous or dull honey yellow; femora before with two longitudinal brown lines, behind with a dusky cloud; tibiæ with a brown line before; anterior and intermediate coxæ and the apical tarsal joint and a large spot on the post-pectus black.

Female: Entirely pale brownish yellow inclining to fulvous on the abdomen. Frontal carinæ margined with brown, tip of the rostrum and antennal joints dusky. Legs marked as in the male. Pygofers broad and short, subquadrate, their apical sinus rather deep; oviduct broad at base, black and slightly exceeding the inner angle of the pygofers. Length, male 2 m. m.; female, 2½ m. m.

I believe I have correctly placed the sexes of this species although I have never found them pairing. Though very different in color the form and markings are the same and they have always been taken in company.

New York, Ontario. Described from eight male and seven female examples taken near Muskoka Lake, Ont. about the first of August 1888 and a single pair captured at Lancaster, N. Y. early in July. This species can hardly be compared with any european species known to me.

LIBURNIA OCCLUSA, n. sp.

Small; black; front broad, oval. Length, male 1¾, female 2½ m. m. Brachypterous form. Vertex large, nearly square, separated from the front by an obtusely carinated edge; carinæ prominent. Front broad, oval, truncated at the clypeus, width two thirds the length, carinæ distinct. Pronotum and scutellum thickly punctured, with an impressed point in each discal compartment, hind margin feebly angularly concave, apex of the scutellum obtuse, not abrupt, transversely rugose. Elytra hardly passing the middle of the abdomen, the two sectors about equally forked, abdomen with a dorsal carina; hind tibiæ bispinose.

Male: Black; carinæ of the head, narrow edge of the dorsal abdominal segments, apical half of the second joint of the antennæ, knees and tips of the tibiæ and tarsal joints, pale. Pygofers slightly contracted apically, ventral notch deep, narrow, dorsal broad, reaching to the ultimate dorsal segment; aperture rather narrow, subtriangular, the incurved margins broad below, fringed with long pale hairs. Stiles narrow, lanceolate, subacute and slightly fringed at apex, but little divergent above; ventral aspect of the anal tube produced each side in an obscure tooth.

Female: Piceous black; all the carinæ, apical half of the second antennal joint, calloused base of the front, disc of the frontal compartments, knees, tips of the tibiæ and the posterior tarsi their apex excepted, soiled white or fulvous. Pygofers broad and short, oviduct attaining the apex of their inner margin.

One macropterous female which seems to belong here has the scutellum large, convex, finely punctured on the sides, with the lateral carinæ obsolete and the apex somewhat abrupt. The elytra are a little longer than the abdomen, whitish hyaline, with strong piceous nervures, the fork of the first sector longer than that of the second.

Los Angeles, Calif. Described from one male and two female examples received from Mr. D. W. Coquillett (Nos. 191 and 192.) This little species is closely allied to *L. lineatipes* but aside from the male genital characters,

which are quite distinct, it differs in having a broader front and proportionately larger vertex, the legs are differently colored, the size is much smaller and the female resembles the male in color instead of being pallid as in that species.

LIBURNIA FOVEATA, n. sp.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 192, 1894.

Pale yellowish, pleural pieces carrying a blackish spot and the femora lineated with brown, the front narrow, black with white carinæ. Length $2\frac{1}{2}$ m. m.

Front rather narrow, contracted between the eyes, the sides straight below. Hind margin of the pronotum deeply concave. Scutellum short with an abrupt tip. Color soiled yellowish; front black with white carinæ; vertex with a black puncture in each fova; antennæ with a black point on the base of the second joint exteriorly; rostrum reaching the apex of the intermediate coxæ, pale with a black tip; disc of the coxæ and a spot on the pleural pieces blackish. Pro- and mesonotum entirely pale in the female, in the male the pronotum has a black line on the anterior margin behind the eyes and a cloud within the posterior angle, and the mesonotum has a black point exterior to the lateral carinæ. Abdomen of the male black, genital segment, a dorsal line widened behind and the connexivum whitish, the two basal segments of the tergum yellow with a black median spot. Abdomen of the female pale, more or less broadly clouded with blackish on the venter and sides of the tergum, the connexivum and a dorsal band pale, or at times the abdomen may be entirely pale. Legs pale, lineated with brown, apical tarsal joint black. Elytra narrowed apically, reaching nearly to the end of the abdomen, fork of the first sector slightly longer than that of the second, nervures obscurely granulated.

Genital characters. Male: Pygofers viewed from behind nearly circular, marked with a blackish transverse cloud; dorsal notch deep, partially enclosing the anal tube, ventral notch wide and moderately deep; stiles black, rather broad, nearly straight, suddenly narrowed at the apex, almost reaching the teeth of the anal tube, not widely divergent; anal tube produced in a blunt tooth at each lower corner. Female: Pygofers long, sides parallel, apex not very oblique, oviduct narrow, not attaining the inner apical angle of the pygofers.

New York, Ontario. Described from two male and eight female examples taken at Portage Falls, N. Y., May 30th 1888 and Muskoka Lake, Ont. in July of the same year.

In the form of the male genitalia this species approaches the European **L. distincta** as illustrated by Fieber, (Grundz. der Delph. tafl. 8, fig. 23) but the stiles are less divergent and the teeth of the anal tube are shorter. In color these species are very distinct.

A single macropterous female which I have placed here differs from the female of **pellucida** in having a longer and narrower vertex, a narrower front with the sides straight below the eyes, the pronotum also is angularly excavated behind and the front is deep black ornamented with the white carinæ, and a black spot is always present at the base of the posterior feet.

LIBURNIA (?) INCERTA, n. sp.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 192, 1894.

Allied to **L. Bohemani** of Europe. Form and color of **lutulenta** nearly. Short and stout; frontal carina forked opposite the lower angle of the eyes. Length: Male 2, female 3 m. m.

Male: Dark testaceous brown; front obscurely rufo-piceous, tergum darker brown, the middle of the segments at base yellowish; pectoral pieces and legs soiled yellow. Aperture of the pygofers broad below, the stiles acuminate, widely divergent and curved at apex, lower edge of the anal tube forming a pair of acute incurved teeth which are approximate and gibbous at base.

Female larger; tawny or honey yellow, paler beneath; tip of the rostrum and oviduct black.

New York. Described from a single pair taken from a meadow near Buffalo on the 14th of June 1893. The forking of the frontal carina near the middle of the face recalls genus **Pissonotus** and the male is colored much as is that of **P. brunneus** but it is a much stouter little insect and the carinae of the pronotum are curved behind the eyes.

LIBURNIA GILLETTI, n. sp.

Gillett and Baker, Hemip. of Colo., p. 69, 1895.

Brachypterous female: Color pale straw yellow marked with black. Carinae of the pronotum and scutellum whitish, sides of the scutellum becoming almost a saffron yellow. Face excepting the carinae and margins deep black; apical fova and a dot near the outer posterior angle of each basal fova on the vertex, the anterior angles of the pronotum exterior to the lateral carinae and a small dot near the hind margin of the scutellum just within the lateral carinae black. Abdomen black, outer margin and a dorsal line on the tergum, connexivum and pygofers pale yellowish; slender hind edge of the ventral segments and the stiles whitish. Legs and margins of the coxae and pleural pieces pale, the femora and exterior edge of the tibiae lineated with black; anterior, intermediate and tips of the posterior tibiae brown. Antennae yellowish brown with a black annulus on the base of each joint. Elytra oblong, rounded at apex and exceeding the abdomen, obscurely yellowish, subhyaline marginal nervures strong, yellowish, discal distinct, concolorous. Oviduct and anal stile black. In many examples there is a blackish dot on the disc of the pronotum either side of the median carina and the pronotum may be minutely dusted with dusky, or there may be a darker longitudinal cloud on either side of the median carina, or the disc of both may be black with the carinae pale and the lateral margins yellowish or even fulvous. The macropterous females in the examples before me have the venter pale with a black discal cloud more or less extended; the sides minutely dotted with brown and bearing a row of black points, one on each segment, and the elytra are quite strongly clouded with smoky toward their tips.

The males are of a dead black color with the carinæ and sutures slenderly pale, at least on the face, the legs are more or less lineated with pale and the posterior tibiæ and tarsi are pale faintly tinged with brown, with the claws blackish. Apical half of the last joint of the antennæ pale brown. Elytra deep smoky brown becoming more transparent toward their tips, with brownish nervures.

In this species the front is oval and rather broad but more contracted between the eyes than in *lineatipes*. The vertex is truncated at base; the pronotum is rather deeply and angularly emarginated behind, the scutellum is short with an unusually large and abrupt apex which is rounded at tip and ecarinate, the median carinæ becoming obsolete opposite the lateral sinuses. The pygofers of the female are rather small and parallel and in the male the aperture of the pygofers has much the form it has in *pellucida* but the stiles are smaller and less divergent above, becoming nearly parallel at their base which is included within the ventral sinus of the pygofers.

Colorado. Described from many examples received from Prof. C. P. Gillette including both the long and short winged forms of both sexes. This is a very pretty and interesting species which seems to be quite variable in the extent of the black markings on the female. Like *pellucida* and *lineatipes* the two sexes differ widely in color.

GENUS ACHOROTILE, Fieb.

Fieber, Verh. der Zool. Bot. Ges. Wien, XVI, p. 521, 1866.

Cicad. d'Europe, I, p. 92, 1875; 88, pl. 8, 1876.

Sahlberg, Cicadariæ, p. 472, 1871.

Ashmead, Ent. Am., V, p. 27, 1889.

ACHOROTILE ALBOSIGNATA, (Dahlb.)

Delphax albosignata, Dahlb. Vet. Akad. Handl., 1850, p. 199.

Stal, Of. Vet. Akad. Forh., XI, p. 196, 1854.

Delphax fuscinervis, Dahlb., Vet. Akad. Handl., 1852, p. 113.

Ditropis albosignata, Sahlbg., Cicadariæ, p. 472, 1871.

Achorotile albosignata, Fieb., Verh. der Zool. Bot. Ges. Wien, XVI, p. 521, 1866.

Fieber, Cicad. d'Europe, IV, p. 89, 1876.

Van Duzee, Bul. Buf. Soc. Nat. Sci., V, p. 192, 1894.

Numerous immature examples of this species were taken by me about a bog swamp at Concord, N. Y. in May 1888, and a few scattering specimens elsewhere. An examination of the mature form may show this to be distinct from the European species but it seems to me very unlikely that such would be the result.

PENTAGRAMMA, new genus.

Form broad, elliptical. Head nearly as wide as the pronotum, prominent and tumid before. Vertex broad, heptagonal, rounded at the apex which surpasses the eyes. Face convex, front nearly as wide as long, the two median carinae widely divergent forming an oval compartment, approximate, parallel and indistinct over the tumid apex of the head; sides of the front broadly rounded, carinate. Cheeks mostly deflexed but with an oblique carina below the antennae, forming there a sloping area. Clypeus large, convex, triangular, sides feebly carinate. Antennae stout, subterete, first joint about one fourth the length of the second, oblique at apex. Pronotum shorter than the vertex, moderately concave behind, tricarinate, the lateral carinae curved outward under the eyes. Scutellum normal, with five carinae. Anterior and intermediate feet flattened, not foliaceous, posterior tibiae a little longer than their tarsi, thickened at tip and armed with three spines on their outer edge.

This genus may be distinguished from any other yet characterized by the five scutellar and two frontal carinae and the short basal joint of the antennae. The type and only species now known is **Liburnia vittatifrons** Uhler, and of this I have seen only females. A study of the males may necessitate some change in the characters given above but they cannot unite it with any genus now established.

PENTAGRAMMA VITTATIFRONS, (Uhler.)

Liburnia vittatifrons, Uhler, Bul. U. S. Geol. & Geog. Surv., II, p. 351, 1876. IV, p. 510, 1878.

Standard Nat. Hist., II, p. 241, 1884.

This is our most conspicuous described North American representative of this group. It is a large green species approaching one third of an inch in length. The front is brown with a transverse green band, and against the antennae is a black spot and a larger one covers the inner disc of the anterior coxae. The antennae and legs are also lineated with brown.

Mr. Uhler records it from N. Y., N. J., Illinois, Dakota and Montana. On the Atlantic Coast it is an inhabitant of the salt-marshes.

Prof. Herbert Osborn (Proc. Iowa Acad. Sci., i, pt. 2, p. 127.) mentions a closely allied insect from Iowa but does not describe it as a distinct species.

GENUS STIROMA, Fieb.

Fieber, Verh. der Zool. Bot. Ges. Wien, XVI, p. 521, 1866.

Cicad. d'Europe, I, p. 8, 1875; II, pl. 8, 1876.

Edwards, Trans. Ent. Soc. London, 1886, p. 93.

STIROMA INCONSPICUA, Uhler.

Stiroma inconspicua, Uhler, Bul. U. S. Geol. & Geog. Surv., III, p. 458, 1877.

Gillette & Baker, Hemip. of Colo., p. 70, 1895.

So far this insect has been recorded only from Colorado. It is unknown to me.

Last June I took at Hamburg, N. Y. a very immature little Delphacid evidently pertaining to this genus. It is pale yellow becoming brownish on the head and pronotum. Eyes and front black, carinæ white. The two median carinæ of the front are distinct and parallel through their whole length.

UNCERTAIN SPECIES.

The following species of doubtful position have been described from our territory:

Delphax vittata, Stal, Berliner Ent. Zeits., VI, p. 315, 1862.

Hab. Carolina, Pennsylvania.

Delphax producta, Walk., Homop. British Museum, III, p. 353, 1850.

Hab. Jamaica.

Delphax luteivitta, Walk. Homop. British Museum, III, p. 354, 1850.

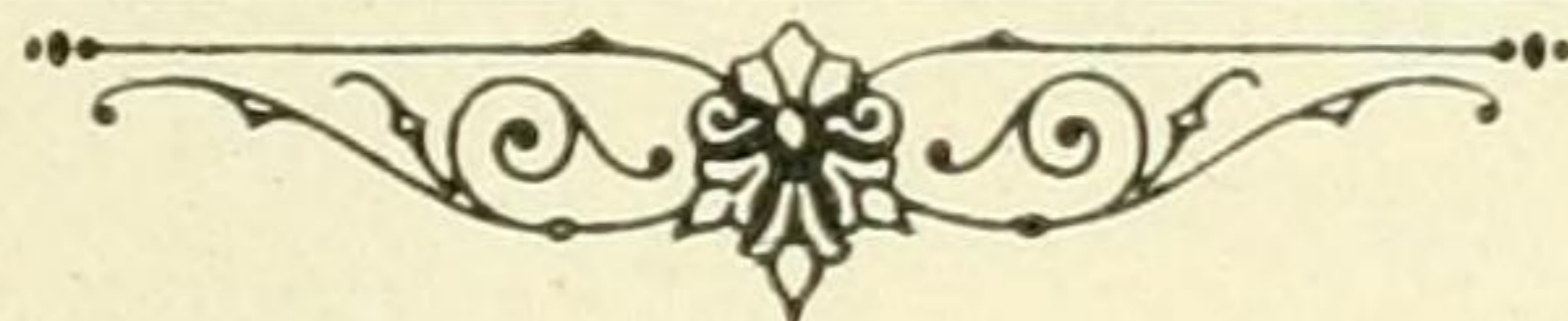
Hab. United States.

Delphax unicolor, Walk. Homop. British Museum, III, p. 354, 1854.

Hab. Hudson's Bay.

Delphax pictifrons, Stal, Stal. Ent. Zeit., XXV, p. 50, 1864. (Hemip.

Mex. No. 360.) Hab. Mexico.



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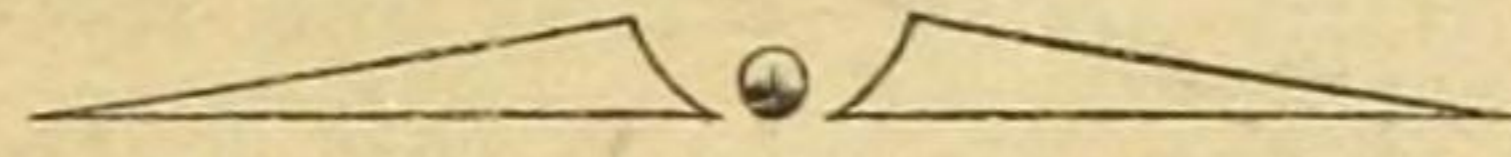
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BUFFALO SOCIETY

OF

Natural • Sciences,

≡ REPORTS ≡

THIRTY-FOURTH ANNUAL MEETING,

May 18th, 1894.

To the Buffalo Society of Natural Sciences.

Gentlemen:

Our Annual Meeting gives us an opportunity to pause a moment in our work, and note what we have done and what is most necessary to be done in the near future. The past year has been an uneventful one. We have suffered no great loss, and have made no startling gains. Our Museum and Library have been kept open to the public, and have been freely used. Our meetings have been fairly well attended, and some interesting discussions have taken place. Our rooms have been used by the Teachers' Association of the Public Schools of Buffalo, for a series of meetings, by the Electrical Society, by the Field Club, and by the Medical Society. The course of formal lectures given by our own Society during the winter, while the attendance did not pay the expenses, were interesting and instructive, and we may hope will bear good fruit in the future. We have not been able to continue our publication of the Bulletin, as we hoped to do at the beginning of the year. I would again call your attention to the importance of this matter, if we are to retain our position among kindred institutions. We are still receiving, every month, numbers of publications from other Societies, who, years ago, placed our name on their list of exchanges, and we are beginning to receive letters asking for our late numbers, thinking that as none had been received from us lately, we had either revised our exchange list or that our publications forwarded had gone astray. It is not creditable to our work or our position that we should allow this matter to rest in this condition.

The report of the Curator gives you in detail memoranda of the gifts and bequests to the Museum. We need even now more and better arranged case room for the proper display of our collections, so that they may be more easily studied. Our Library especially needs your attention. We have a large mass

of material, in pamphlets and other publications, which are absolutely inaccessible to the student in their present condition. They should be bound, catalogued and properly arranged in cases where they can be found easily by those desirous of consulting them.

Financially, our Treasurer's report shows that we are in much better condition than we were a year ago. Thanks to the generosity of Mrs. Robert P. Wilson, and of those who subscribed to the fund for the payment of the old indebtedness of the Society, we are practically out of debt. A few items, for which our treasurer has been unable to get the bills, are still unpaid, but the balance of the subscriptions now due will enable us, when paid, to settle them. We have lately received from our kind friend, Judge James M. Smith, the generous donation of \$5000.00, to be used as, in the discretion of its Board of Directors, will be for the best interests of the Society. While it is the earnest wish of your officers to see the Permanent Fund of the Society, upon the income from which the growth and welfare of the Society in the future so largely depend, increased as rapidly as possible, it is a question whether, in the present condition of the Library and the Museum, a portion of this gift may not be advantageously used in bringing them more fully up to the requirements of those for whose aid we hold them. This matter is now receiving the careful attention of your officers.

In membership the Society has not grown during the past year. Offering the free use of our Museum and Library, as we do, to all students, the only inducement that is left to become a member of the Society is a desire to aid in the work for which the Society was formed and which it is doing. It is earnestly to be desired that all those who are interested in scientific work should feel their responsibility to aid in the maintenance of this Society.

In closing, allow me to extend my thanks to the officers who have assisted in the work of the past year.

Subscriptions to fund to pay the debt of the B. S. N. S.

H. A. Richmond,	\$ 100.00
C. D. Marshall,	100.00
D. P. Rumsey,	100.00
E. G. Spaulding,	100.00
J. M. Richmond,	100.00
W. H. Glenny,	100.00
Wm. Hamlin,	100.00
Mrs. E. A. Glenny,	100.00
J. J. Albright,	100.00
R. V. Pierce,	50.00
F. D. Locke,	50.00
J. H. Dawes,	50.00
Dr. Howe,	50.00
W. H. Glenny,	50.00
C. H. Williams,	50.00
J. C. Nagel,	50.00
A Friend (per W. H. G.)	85.00
Lee H. Smith,	25.00
W. C. Barrett,	25.00
P. P. Pratt,	25.00
Estate C. G. Curtiss,	25.00
F. Park Lewis,	25.00
A. T. Kerr,	25.00
S. M. Clement,	25.00
O. Reinecke,	10.00
Wm. McMillan,	10.00
A. R. Wright,	10.00
J. T. Cook,	10.00
	\$ 1550.00

Gentlemen:

Your Finance Committee would report that the balance on hand at the beginning of this year, as reported by

The Treasurer of the Permanent Fund was . . .	\$ 647.11
The Treasurer of the Society	166.10
We estimate the receipts of the year to be	
From Interest on the Permanent Fund	1200.00
“ Dues of Members	500.00
“ Estate of Dr. G. E. Hayes	100.00
	<hr/>
	\$2613.21

From this amount we recommend at present appropriations

To the Library Association, for our share of expenses in this building	\$ 500.00
For Salary of Curator	600.00
“ “ “ Janitor	300.00
“ Insurance	85.00
“ Gas and Water	110.00
“ Stationery and Postage	40.00
“ Expense of Collecting Dues	25.00
“ Publication of the Bulletin	125.00
	<hr/>
	\$1785.00

The Society also has on hand the gift of Judge Smith, of \$5000.00. After a careful consideration of the needs of the Society, and a consultation with its officers, we recommend the appropriation from this sum.

To the Librarian, for binding of pamphlets, completion of defective volumes, and other work necessary to put the Library in good condition and render it accessible to students	\$ 850.00
To the Committee on Rooms for a reorganization of the Museum, general renovation of the rooms, new cases, etc. etc.	650.00
To the Permanent Fund Commission, for investment	3500.00
	<hr/>
	\$5000.00

H. A. RICHMOND.
CHARLES R. WILSON.
HENRY R. HOWLAND.

Buffalo Society

In account with

* * **MAY**

1893.

May 9,	Balance from last report,	-	-	\$ 36.28
9,	R. P. Wilson bequest,	-	-	\$1,500.00
12,	Hayes fund,	-	-	100.00
12,	C. C. Hill, Treas. Lecture Com.	-	-	14.85
	Dues,	-	-	522.25
	Treasurer Permanent Fund,	-	-	1,400.00
	Subscriptions,	-	-	1,550.00
	Total cash received,	-	-	\$5,087.10

\$5,123.38

Natural Sciences,

A. Bull, Treas.

1894. * *

Jos. Metz, - - - - -	\$ 100.00
F. K. Mixer (Salary) - - - - -	450.00
Mary McAlpin (Salary) - - - - -	282.00
Gas in Large room 78.84, in Com. room 22.36	101.20
Water, - - - - -	8.55
F. Feyl (Kalsomining) - - - - -	35.00
Freight and Cartage, - - - - -	5.93
Photos and framing, - - - - -	8.80
Fixing locks, - - - - -	1.75
Labor and materials for fixing casts, - - - - -	7.73
Georger, Harries & Co. (Glazing) - - - - -	7.50
Collectors commission, - - - - -	18.34
H. Smith & Voss, - - - - -	7.00
John Lorenz, - - - - -	1.90
H. G. White & Co., - - - - -	21.49
Postage Secy. 6.09, Treas. 2.90, - - - - -	8.99
Peter Paul Book Co., - - - - -	1.75
F. P. Jones & Co., - - - - -	1.00
J. W. Clement (Printing) - - - - -	3.00
Reinecke & Zesch " - - - - -	20.00
Cological Cabinet, - - - - -	30.00
Smith, Davis & Co., - - - - -	165.00
L. G. Sellstedt for portrait Dr. Hayes - - - - -	450.00
Baker, Jones & Co., - - - - -	504.55
Prof. Arey, - - - - -	200.00
Advertising Prof. Arey's lectures - - - - -	15.80
P. P. Burtis Treas. Buffalo Library, - - - - -	2,500.00
Total cash paid, - - - - -	4,957.28
Balance on hand, - - - - -	166.10
	<hr/>
	\$ 5,123.38

To the Buffalo Society of Natural Sciences:—

The Commissioners of the Permanent Fund of the Society submit the following Report for the year ending May 18., 1894.

At the date of the last Annual Report the principal of the fund aggregated \$20,677.50 invested as follows:—

PRINCIPAL OF FUND.

Bond and Mortgage of Lord & Inglehardt, 6%	. . .	\$3,500.00
“ “ Francis A. Wade, “	. . .	3,500.00
“ “ Emeline T. Husted, “	. . .	2,000.00
“ “ Alice Collins, “	. . .	1,050.00
“ “ L. A. Price, “	. . .	1,500.00
“ “ George F. Francis, “	. . .	1,400.00
“ “ A. J. Roehner, “	. . .	1,375.00
“ “ R. C. Sage, “	. . .	1,100.00
“ “ Edward P. Mills, “	. . .	2,000.00
“ “ Caroline T. Beach, “	. . .	1,500.00
“ “ Emily M. Waite, “	. . .	1,000.00
Balance on deposit, “	. . .	752.50
		<hr/>
		\$20,677.50

The following sums have been paid in upon the principal of the Securities:

1894.			
January 4.	Principal, R. C. Sage, B. & M.	. . .	\$1,100.00
March 2.	“ Alice Collins, B. & M.	. . .	1,050.00

No additions have been made to the principal of the fund during the year.

Schedule B hereto annexed shows the present condition of the Permanent Fund and the manner of its investments.

INCOME AND DISBURSEMENTS.

The balance on hand to the credit of the income account at the date of the last annual report was \$1,050.43. We have received during the year ending May 15th, 1894, on account of interest moneys \$1,019.18, making a total of \$2,069.61 as shown by Schedule "A" hereto annexed.

We have paid to the Treasurer of the Society since the date of our last report the sum of \$1,400.00, and have paid \$22.50 being for accrued interest on the T. L. Brady bond and mortgage purchased by the Society, leaving a balance of \$647.11 on hand at the date of this report.

The following changes have occurred in the investments:—
On June 1st., 1893, the sum of \$600.00 was invested at 6% in bond and mortgage of Jane A. Martin on unencumbered property in the City of Buffalo.

On August 25th, 1893, the sum of \$300.00 was invested at 6% in bond and mortgage of Henry Hitschler on unencumbered property in the City of Buffalo.

On March 15th, 1894, the sum of \$1,500.00 was invested at 6% in bond and mortgage of T. C. Brady, on unencumbered property in the City of Buffalo.

Dated, May 18, 1894.

CHAS. D. MARSHALL,

Treasurer.

Schedule "A" referred to in the foregoing report showing receipts of interest on account of the Permanent Fund and disbursements:

1893.			
May	12.	Balance of interest moneys an hand at the date of last report,	\$1,050.43
"	12.	By interest of E. T. Husted,	15.00
"	26.	" " " G. F. Francis,	42.00
July	1.	" " " E. P. Mills,	60.00
"	14.	" " " Lord & Inglehardt,	105.00
Sept.	5.	" " " E. T. Husted,	45.00
"	8.	" " " F. A. Wade,	105.00
"	10.	" " " L. A. Price,	45.00
Nov.	3.	" " " E. M. Waite,	30.00
"	8.	" " " Alice Collins,	31.50
"	9.	" " " E. T. Husted,	15.00
"	13.	" " " C. T. Beach,	45.00
"	23.	" " " Jane A. Martin,	18.00
"	28.	" " " G. F. Francis,	42.00
July	1.	" " on deposits,	8.28
Dec.	27.	" " of E. T. Mills,	60.00
1894.			
Jan.	1.	" " on deposits,	3.44
"	4.	" " on R. C. Sage,	33.71
"	19.	" " of Lord & Inglehardt,	105.00
Feb.	2.	" " " L. A. Price,	45.00
"	23.	" " " H. Hitchler,	9.00
March	2.	" " " A. Collins,	21.25
March	19.	By interest of F. A. Wade,	105.00
May	1.	By interest of E. M. Waite,	30.00
			\$2,069.61

DISBURSEMENTS.

1893.			
August	2.	To paid Treasurer, L. A. Bull,	\$1,000.00
1894.			
March	8.	To paid Treasurer,	200.00
"	15.	To paid accrued interest, Brady B. & M.	22.50
May	17.	To paid Treasurer,	200.00
"	17.	To balance on hand subject to call of Treasurer,	647.11
			\$2,069.61

Schedule "B" referred to in the foregoing report showing the condition and manner of investment of the principal of the Permanent Fund.

Bond and Mortgage of	Lord & Inglehardt, 6%	. . .	\$3,500.00
"	" Francis A. Wade,	" . . .	3,500.00
"	" Emeline T. Husted,	" . . .	2,000.00
"	" L. A. Price,	" . . .	1,500.00
"	" George F. Francis,	" . . .	1,400.00
"	" A. J. Roehner,	" . . .	1,375.00
"	" Edward P. Mills,	" . . .	2,000.00
"	" Caroline T. Beach,	" . . .	1,500.00
"	" Emily M. Waite,	" . . .	1,000.00
"	" Jane A. Martin,	" . . .	600.00
"	" Henry Hitchler,	" . . .	300.00
"	" T. C. Brady,	" . . .	1,500.00
	Balance on deposit,	502.50
			<hr/>
			\$20,677.50

May 18, 1894.

Your membership committee would report as follows:

Number of Members at beginning of the year,	-	-	176
Number resigned	-	-	11
Number elected,	-	-	5
Present Membership,	-	-	<u>170</u>

Respectfully Submitted

L. A. BULL,
Chairman.

The Lecture Committee beg leave to report that during the past year an effort has been made by the Society of Natural Sciences to continue its work as an educator by conducting a course of University Extension Lectures. There were ten of these given by Prof. Albert L. Arey of Rochester upon the "Forces of Nature; Electricity as related to Modern Life". It is to be regretted that these were not as well attended by members of the society as it was hoped would be the case, and financially they were therefore not as successful as a similar course proved a year ago. The society has the satisfaction, however, of seeing that great interest was manifested on the part of the young men who availed themselves of the opportunity and have every reason to consider that in this respect the lectures were a credit to the Society and to the one who delivered them.

In addition to this systematic course of ten lectures a few others have been given, but the efforts of the members have been devoted to continuing other courses affiliated with those of the society but not strictly belonging to it. It is suggested that a greater concentration another year would result in larger audiences and greater interest to both speaker and listeners.

LUCIEN HOWE,
HENRY R. HOWLAND,
HERBERT M. HILL.

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Sci Buffalo society of natural sciences
B Bulletin. vol. 5, 1886-97.

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