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A NEW NORTH AMERICAN *SOMATOCHLORA*
(ODONATA-CORDULINAE)

BY E. B. WILLIAMSON

Somatochlora hineana, new species

THE following description is based essentially on the form and employs the terms used by Walker (*North American Species of Somatochlora*, 1925).

A species nearly related to *S. tenebrosa*, similar in proportions, slightly larger, not so distinctly dark colored, and with the thoracic lateral stripes much more conspicuous.

The male runs out in Walker's key (1925) to 15'—*tenebrosa*; the following couplet will separate the two:

- 15a. Apical half of superior appendage bent abruptly ventrad at the dorsal process; lateral thoracic stripes pale light brown or yellowish brown, antealar sinus black, as dark as the mesepisternum anterior to it.....*tenebrosa*
15a'. Apical fourth of superior appendage bent abruptly ventrad about midway between the dorsal process and the apex of the appendage; lateral thoracic stripes bright yellow, antealar sinus largely brown, paler than the mesepisternum anterior to it.....*hineana*

The female runs out in the same key to 5 under couplet 4. To the couplet 5 and 5' add the following:

- 5". Vulvar lamina shorter than appendages and longer than 9, suberect, about 135°; lateral thoracic stripes conspicuous; tibiae wholly

black; more than 10 cells between M_1 and M_{1n} ; depth of 9 greater than its length..... *hineana*

Male. Labium and labrum light yellow, the latter slightly darker in the middle along the suture or with a small median basal spot with a short bar or two spots at its lower end; clypeus, sides, and lower part of frons in front, ochraceous, or the pale parts of the frons yellow, especially the lower part of the frons in front; upper part of frons in front and frons above, dark metallic green, sharply patterned, the anterior border straight; vertex slightly duller and brownish, with or without a tip of yellow on either side; occiput ochraceous. Pile of face dark brown. Rear of head black, fringed with pale brownish pile.

Prothorax brown, edged in front with light yellow. Thorax brown, surface largely with green and blue reflections, which are most constant on the dorsum, especially above, and on the anterior border and around the lower end of the yellow lateral stripes, where they tend to become black. Lateral thoracic stripes bright yellow and sharply defined, the anterior 4.5–5 mm. long and about 1 mm. broad, the posterior about 3.5 mm. long and about one-third wider than the anterior. Antealar sinuses brown, not as dark as the mesepisterna anterior to them; interalar areas bright yellow. Underside of thorax, coxae, front trochanters, upper surface of middle and hind trochanters, and a streak along outer surface of front femora, light brown. Pile of thorax pale brownish, thin and short. Wings hyaline, the anal triangle and adjacent membrane, yellow tinged. Costal margin brown; venation black; pterostigma dark brown; membranule smoky brown, basal third or fourth gray.

Abdomen: Segment 1 dull brown; 2 and base of 3 polished dark brown; remaining segments greenish black with dull lustre; the following parts of 2 light yellow: a large anterolateral blotch below the auricles, the genital lobes except their brown margins, an area about half that size dorso-cephalad to the lobes, which may be continuous with the large antero-

lateral blotch, and a marginal annulus, interrupted mid-dorsally. Segment 3 with a large basal lateral area, nearly or quite divided at midheight, produced posteriorly above about one-fourth or one-fifth the length of the segment to form a roughly triangular area, and below to form a longer triangle along the ventral margin about one-half the length of the segment. Remainder of abdomen without pale spots. Hairs pale brownish, not abundant, thickest on 5-8, and especially on 6 and 7.

Abdomen a little shorter than hind wings, slender, gradually expanding beyond the constriction of 3 to the end of 6, thence narrowing again to the end; apical breadth of 5 about three-fifths of its length. Genital lobes well-rounded, slightly longer than wide, their length slightly more than one-third of the depth of the abdomen in the same transverse plane. Hamuli hooked, apices bluntly pointed, ventral edge almost a semicircle. Penis not examined.

Superior appendages about as long as 9 + 10 or slightly shorter; basal half cylindrical, parallel or nearly so, with a low conical dorso-external process at midlength of appendage; beyond the dorso-external process the appendages are slightly sinuous, gently convergent, inclined ventrad to about the same degree as the basal half inclines dorsad, and meet at a distance from the dorso-external process slightly less than the distance from the base of the appendages to the dorso-external process, where they are bent abruptly ventrad, slightly laterally compressed on the ventral margin, and truncated with the truncated edge nearly vertical, directed cephalad, the acute apex directed ventrad; the truncated edge and immediately adjacent parts are represented in *tenebrosa* by a smaller homologue. On the concave side of the appendages and on the mesal face, not reaching the base and extending beyond the dorso-external process, are sparse erect hairs. Inferior appendage about three-fourths as long as the superior appendages, strongly upcurved, but less so than in *tenebrosa*; in ventral view width at base about one-third the length, sides

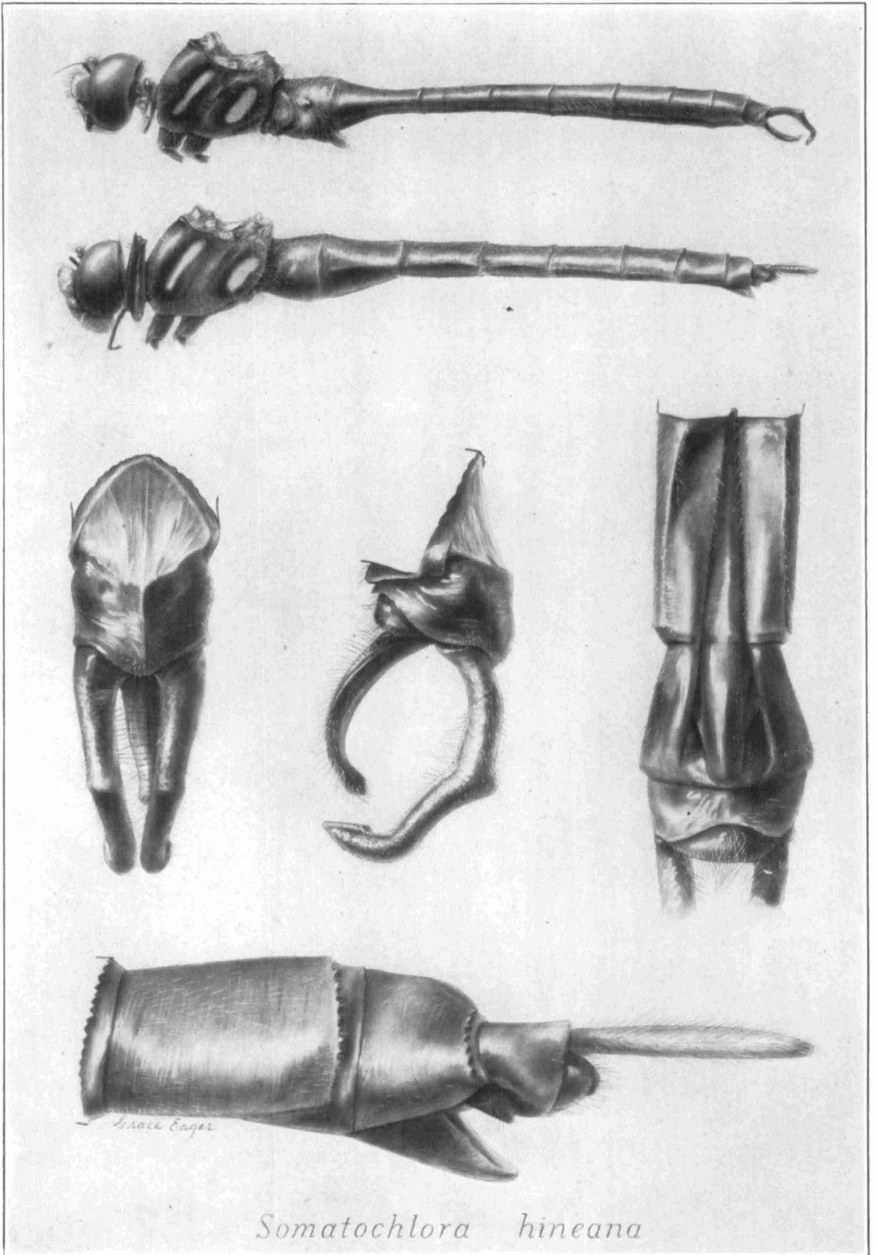
nearly straight, tapering from base to the blunt apex which is about one-third as wide as the base; a small median round knob on the apex; dorsal surface of appendage flat (thus differing from *tenebrosa* in which the upper surface is hollowed out), the lateral edges bevelled; inferior surface at base concave, passing into a flat surface at the apex; ventral surface with hairs similar to those described on the superior appendages.

Female. Coloration almost as in male, labrum with a median transverse black bar, a geminate spot or small median black spot with a small obscure area on either side of it, vertex terminated on either side with a yellow spot, basal lateral spot on 3, below midheight, produced posteriorly about three-fourths the length of the segment in a large, roughly rectangular spot, extending below to the margin of the tergum (this area may be obscured or lost by postmortem changes). Abdomen about as long or a little longer than hind wing. Wings hyaline or with the merest trace of brownish tinging. Segment 9 with depth at base greater than the dorsal length, the latter variable in dried material due to variation in elevation or depression of the apex of the segment; segment 8 about twice as long as 9. Vulvar lamina about midway between flat and erect, directed caudo-ventrad, a little longer than the lower margin of 9, slightly compressed, trough-shaped, in profile triangular, upper side straight, lower side very slightly convex, almost straight, the base equal to about half the length of the lower side, apex blunt. Appendages about one-half longer than the vulvar lamina, slender, nearly symmetrical, slightly curved in proximal half with the concave side outwards, stoutest just beyond the middle, gently tapering distally to pointed apices; hairs small.

Venation. Antenodals: front wing, male 8 in first series, 5 wings; 9 in first series, 1 wing; 8 in second series, 5 wings; 9 in second series, 1 wing: female 8 in first series, 6 wings; 9 in first series, 2 wings; 8 in second series, 5 wings; 9 in second series, 2 wings; 10 in second series, 1 wing: hind wing,



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Somatochlora hineana

male 5 in both series of six wings except in 1 wing there are 6 in second series: female 5 in first series, 5 wings; 6 in first series, 3 wings; 5 in second series, 5 wings; 6 in second series, 3 wings. Postnodals: front wing, male 7 in 3 wings, 8 in 3 wings; female 6 in 1 wing; 7 in 6 wings; 8 in 1 wing: hind wing, male 6 in 1 wing; 8 in 2 wings; 9 in 3 wings: female 7 in wings; 8 in 1 wing; 9 in 4 wings. Number of cells between M_1 and M_{1a} : front wing, male 12 in 2 wings; 13 in 1 wing; 14 in 1 wing; 15 in 1 wing; 18 in 1 wing: female 14 in 1 wing; 15 in 2 wings; 16 in 1 wing; 17 in 2 wings; 20 in 2 wings: hind wing, male 14 in 2 wings; 15 in 3 wings; 16 in 1 wing: female 14 in 2 wings; 15 in 1 wing; 16 in 1 wing; 17 in 2 wings; 19 in 2 wings. Triangles all once-crossed but in 1 male front wing there is an added crossvein half way across the triangle, and in 1 female hind wing there is a complete second crossvein. Subtriangle of front wing 3-celled in all. Subtriangle of hind wing present in all. Posttrigonal cells in front wing 3 in all wings but 1 female wing where there are 4, followed by 2 for 3-6 rows, followed by 3: in hind wing 2 (5 wings) or 3 (9 wings), followed by 2 for 2-4 rows, followed by 3, increasing. Cells between Rs and Rspl: front wing 6-9, average for 14 wings 7.5: hind wings 7-10, average for 14 wings 8.3. Pterostigma about 4 times as long as broad, very slightly narrower (4.3-4.5 times as long as broad) in 2 males.

Measurements. Length, male 58-59, female 60-63; thorax, male and female 10; abdomen, male 38.5-41, female 41-45; length of segment 5, male 5, female 6-6.5; width of segment 5, male 3, female 3-3.5; hind wing, male 41-41.5, female 40.5-41.5; width of hind wing, male 11.5-12.5, female 13; stigma, male and female 3; width of head, male and female 8.5-9; length of hind femur, male 9, female 8.5-9, usually 8.5; appendages, male 3.5, female 4; length of vulvar lamina, female 2.5.

Types. Holotype male, along dredged channel of North Fork of Little Miami River, near Indian Lake, Logan County,

Ohio, June 14, 1929, C. H. Kennedy, collector; allotype female, same locality and date, James S. Hine, collector. Both in collection of the Museum of Zoology, University of Michigan, through the courtesy of the Ohio State Museum.

Material Studied. Three males, four females; all the same locality as the types; one male, June 7, 1929, James S. Hine; one male and three females, James S. Hine, and one male, C. H. Kennedy, June 14, 1929; and one female, Eli Captain, July 4, 1930. Types and female collected by Eli Captain in collection of the Museum of Zoology; others in collection Ohio State Museum.

Distribution and Affinities. This species is known only from the type locality. It belongs to that small group of species which has its range south of that of the larger number of species of the genus in North America. Its closest ally is *tenebrosa*. I have never seen *S. provocans*, but from the very complete descriptions and figures of that species I believe its relationships are with *tenebrosa* and *hineana*, rather than with *filosa*. The male appendages suggest this, the only character out of line being the triangular inferior of *provocans*. The suberect ovipositor of *hineana* is intermediate in character to the horizontal ovipositor of *provocans* and the erect ovipositor of *tenebrosa*. The structure of the ovipositor determines more or less definitely the specific habitat required for successful oviposition and might therefore be influenced by natural selection and be to that extent a less valuable character for group definition than the male appendages.

Bionomics. Early in June, 1929, Professor Kennedy wrote me that Professor Hine had just come in from a collecting trip with an undescribed *Somatochlora* male. This was the male taken June 7 by Professor Hine, who later showed me the place where it was captured. The region was visited a week later by Kennedy and Hine and two males and three females were taken. In 1930, Eli Captain, Norman Shufelt, Nathan Linn, and I visited the type locality on three different days, meeting Professor Hine and his associates there, and the members of the party gave largely or entirely of their time

in an intensive search for somatochloras. The net result of this activity was a single female taken at 6:20 A. M., July 4, by Eli Captain. Incidentally Eli Captain, Nathan Linn, and I had slept the night before in an adjoining meadow, and we began looking for somatochloras at 4:30 A. M.

Ohio State Road Number 117 crosses the North Fork of the Little Miami River north of Huntsville, Ohio. The North Fork is a small stream at the bridge, only a few feet wide and at the season we were there carrying but little water. From its source a mile or two above the bridge it meanders through open and pastured fields in an almost flat terrain of clay soil. Below the bridge there are some willows, adjacent thickets, a few trees, and long, dense growths of lizard-tail through which the water winds its way, often concealed by the abundant vegetation. This condition passes abruptly after about a quarter of a mile into a deep dredged channel about 20 feet wide, which extends into Indian Lake. The upper end of the dredged channel, possibly a quarter to a half mile in length, is in heavy swamp woods, winding through which is the old channel of the creek, now reduced to pools of greater or lesser length.

In this woods is a heronry which Professor Hine visited on June 7, 1929. Leaving the woods along its northern side where it adjoins a golf course, he saw a dragonfly hovering two or three feet above the ground in an open spot under a bush. This was captured, and was later referred to Professor Kennedy who recognized it as an undescribed species. He and Professor Hine returned to the site on June 14. The day was rainy and apparently unfavorable. They failed to find any somatochloras in the woods, but on visiting the dredged channel they were able to take five specimens resting on low bushes on the wood's side of the high bank of earth thrown up by the dredge when the channel was dug. In 1930 no somatochloras were certainly seen by any of us, except the single female taken by Eli Captain. This was first seen soaring at almost tree top height, from which it descended to

alight about ten feet high in a small ash tree on the right bank of the dredged channel. In 1930 our party divided at each visit and we searched carefully the full length of the creek, including both banks of the dredged channel, the adjacent forest and pools, and the edges of the forest along the golf course, thickets, old meadows, and grain fields. Until we discover where females oviposit, the search for this species promises but little results.

James S. Hine was born on a farm near Wauseon, Ohio, on June 13, 1866, and died suddenly, without warning, at Columbus, Ohio, on December 22, 1930. Practically all his life after early manhood was spent at the Ohio State University. At the time of his death he was Curator of Natural History in the Ohio State Archaeological and Historical Society. His scientific interests were faunal and taxonomic, and included both vertebrates and invertebrates. He will be remembered longest for his work on Diptera, especially the Tabanidae. In this group his flair for taxonomy and his unflagging industry for more than a quarter of a century built a temple of Truth for his monument. To that temple I bring this small urn to place in the alcove where rest *Rhodopygia hinei* Calvert and *Argia hinei* Kennedy, witnesses of his love of dragonflies and of the affection and appreciation of his colleagues. When Dr. Kellicott was engaged in studying Ohio dragonflies, Professor Hine was his most active and valuable assistant, and, following Dr. Kellicott's untimely death, he completed and edited the handbook on Ohio Odonata which Dr. Kellicott had in preparation. Later Professor Hine published several faunal and diagnostic papers on Ohio dragonflies and described and named a new species, *Gomphus viridifrons*.

The beautiful plate which accompanies this paper is the work of Miss Grace Eager, Museum Artist. The figures are of the type male and allotype female. Dr. E. M. Walker has kindly examined specimens of *S. hineana* and has confirmed the opinion of Professor Kennedy and myself that it is distinct.