

OCCASIONAL PAPERS OF THE MUSEUM OF
ZOOLOGY

UNIVERSITY OF MICHIGAN

ANN ARBOR, MICHIGAN THE UNIVERSITY OF MICHIGAN PRESS

THE STATUS OF *SYMPETRUM ASSIMILATUM*
(UHLER) AND *SYMPETRUM DECISUM*
(HAGEN). (ODONATA-LIBEL-
LULINAE)

BY E. B. WILLIAMSON

THE excuse for this brief note is found in the plate which accompanies it. The figures are reproductions of four beautiful drawings by Miss Grace Eager, the Museum artist.

As to *Sympetrum assimilatatum*, it may be disposed of in a few words. From an examination of many specimens, I can only conclude that it is an indefinite form, occurring in both sexes, passing through all gradations from the yellowest winged individuals (*assimilatatum*) to those with little or no yellow at the wing bases (*rubicundulum*), freely interbreeding, and quite independent of geographical and seasonal distribution so far as known. Certainly all the forms have been taken in one day at one small artificial pond, and since each imago as it emerges has the wing pattern it will carry through life, a reasonable explanation of the yellow of the wings is that it is the result of ecological factors affecting larval life. There is no morphological basis to support some older opinions that intermediates exist which break down the distinctions between *rubicundulum* and *obtrusum*, *decisum*, and possibly other species. Not only is the male of *rubicundulum* distinct

by the form of the hamule, but the female is separated clearly from related species by the vulvar lamina which is inflated, and has the apices, themselves partaking of the inflation, directed dorsad (upcurved), and almost parallel, not directed caudad and divergent, as stated in descriptions. In his description of the species Say¹ says, "I have found many individuals of this species." He described the yellow winged form which Hagen failed to associate with Uhler's *assimilatum*. Say implies, by failing to state otherwise, that the yellow winged form occurs in both sexes, thus making it almost certain that his *rubicundulum* included specimens of the species known by that name today. It is not improbable that Say had before him in his "many individuals" not only this species but also at least one other species, *obtrusum*, for he states "front greenish white" which generally applies much better to this latter species.

The case of *decisum* is entirely different from that of *assimilatum*. While the latter has been too readily recognized on the basis of a conspicuous but non-essential character, *decisum*, a good species, has suffered not only non-recognition, but has been shifted about in its assumed relationships.

The species with which later authors generally have confused *decisum* east of the Mississippi River is *rubicundulum*, but in reality it is *obtrusum*, and not *rubicundulum*, which is the nearest relative of *decisum* in this area.

Hagen himself, in describing *decisum* in 1874, compared it with only one species, the "very similar" *vicinum*, though fragmentary specimens from the Yellowstone, referred "probably" to *decisum* in 1874, had been recorded as "nearly related" to *rubicundulum* in 1873. In 1875 he questioned the distinctness of *obtrusum* and *decisum*, and Calvert, as reported by Currie (1905), had come to the conclusion that *decisum* was a synonym of *obtrusum*. Later *decisum* was removed from association with its near-relative, *obtrusum*,

¹ Say, Thomas, 1839, "Descriptions of New North American Neuropterous Insects and Observations on some already described," *Jour. Acad. Nat. Sci. Phila.*, 8: 2-46.

and the males, at least, in the eastern range, were more or less confused with the males of *rubicundulum*, so both Ris and Walker made it a trinomial under that species. From this position Walker restored it to its rightful specific rank. Had Muttkowski's treatment of *Sympetrum* (1908) been given the attention it deserved, some of the later confusion might have been avoided.

S. decisum is a clear-winged species except that, among the females alone, some individuals have the wings basally golden yellow. In this combination of characters it differs from all other eastern species of *Sympetrum*. These yellow-winged females of *decisum* occur probably throughout the range of the species; certainly they are found in North Dakota and Michigan. The failure to distinguish females of *decisum* and *rubicundulum* morphologically has led some students to refer golden-winged forms of these two species to *assimilatam* (= *rubicundulum*), thus depriving *decisum* of some of its locality records.

In *obtrusum* the inner branch of the hamule is about one-fifth the length of the hamule, and in *decisum* about one-fourth. The differences shown by the two species in the shape and proportions of these parts as seen in profile (the usual position in which they are studied and figured) is conspicuous enough to insure their certain separation, at least by recent students. The hamules are more deeply bifid in *rubicundulum* than in *decisum*, and individuals may generally be properly assigned specifically, but there are individuals of *decisum* in which the hamules, due to diverse displacements, in profile view are inadequate for certain determination. The male superior appendages of *decisum* and *rubicundulum* are generally specifically distinct, the upper edge in profile being more concave and upturned in *rubicundulum* and more nearly straight in *decisum*, but here again cases occur where positive determinations on the basis of this character alone are impossible. Color of the male appendages in these and other species may be of value, but this has not been demonstrated. Dark appendages are usually, if not always, found on tener-

als, the discoloration being due to post-mortem changes in appendages filled with fluids. With age the appendages lose this fluid and become of almost hornlike translucency which undergoes no post-mortem changes.

In reference now to the accessory genitalia of the two males figured on the plate accompanying this article, the most valuable male character separating *rubicundulum* from *decisum* (and its near relative *obtrusum*) may be pointed out. The mesal face of the outer branch of the hamule in *rubicundulum* is roughly semi-elliptical, concave, and dish or shell-like. In *decisum* the same face is heavier, less regular in shape, and its posterior edge is bicuspidate. This radical difference between the two species is shown on both hamules of each species figured.

As shown on the same plate the vulvar lamina of *rubicundulum* is inflated and distinctly different from that of *decisum*; so the golden-winged females of *decisum* need never be confused with the yellow-winged females of *rubicundulum*. Since *obtrusum* females and clear-winged females of *decisum* are often almost or quite inseparable, it follows that the golden-winged specimens of *decisum*, once so easily confused, are in reality easily recognized.

The *decisum* and *obtrusum* females are not always separable by the vulvar lamina. In the best marked cases the apices of the lamina of *S. decisum* are widely divaricate; and those of *obtrusum* are longer and contiguous. The vulvar lamina in both species is, however, more or less pliant and subject to distortion from many causes, so questionable specimens are not rare. That good morphological differences (including color patterns) exist for the separation of both sexes of these two species is not doubted, but the necessary study has not fallen within the scope of this paper. An adequate revision of the North American species of *Sympetrum* awaits some future student.

In any habitat of *Sympetrum*, fully matured individuals can be almost as readily identified in the field as in the laboratory. In fact any effective collecting is based on the recogni-

tion in the field of specific distinctions (not necessarily identifications); and often the differences detected there are as obvious and suggestive as characters studied in the laboratory. The characters of *Sympetrum* become emphasized with age, so the beginner, wishing to learn the species of his locality, would do well to confine his collection and observations of imagoes to fully matured specimens, leaving the fragile, and, as far as specimens go, the generally worthless tenerals for later specialized studies when the species are well known to him. Meeting his problem in this way, he will find it possible after a time to walk through a marsh and observe and identify on the wing possibly a list like this—90 *rubicundulum*, 5 *vicinum*, 4 *obtrusum*, and 1 *ambiguum*. Until he can so recognize and choose, he cannot experience the real joys of collecting.

In a mixed population of fully adult individuals, flying in the sunlight, *decisum* alone moves in a golden reddish bit of haze due to the color of its venation. At rest its face at the distance of a dozen feet or more is almost cherry red, as contrasted with the white face of *obtrusum* and the yellowish brown face of *rubicundulum*. In fact adequate field experience will give the collector a sense of the essential distinctness of these three species of *Sympetrum* that the student knowing them only from preserved specimens may never attain.

The following bibliography of *S. decisum* has been prepared by Leonora K. Gloyd.

BIBLIOGRAPHY OF *SYMPETRUM DECISUM*

BANKS, NATHAN

- 1894 On a collection of neuropteroid insects from Kansas. Ent. News, 5: 178-180.

CURRIE, ROLLA P.

- 1905 Dragonflies from the Kootenay District of British Columbia. Proc. Entom. Soc. Washington, 7: 16-20.

GARMAN, PHILIP

- 1927 Guide to the insects of Connecticut. Part V. The Odonata or dragonflies of Connecticut. Connecticut Geol. and Nat. Hist. Surv. Bull. no. 39: 1-331, 22 pls., 67 figs.

HAGEN, H. A.

- 1873 Odonata from the Yellowstone. In Sixth Annual Report U. S. Geol. Surv. Terr. for 1872, by F. V. Hayden: 728-729. (As *Diplax* spec. nov.)
- 1874 Report on the Pseudo-neuroptera and Neuroptera collected by Lieut. W. L. Carpenter in 1873 in Colorado. In Seventh Annual Report U. S. Geol. Surv. Terr. for 1873, by F. V. Hayden: 571-606.
- 1875 Synopsis of the Odonata of America. Proc. Boston Soc. Nat. Hist., 18: 20-96.

HOFFMAN, CHARLES

- 1924 Odonata (Dragon-flies and Damsel-flies) of Henry County. Iowa Acad. Sci., 31: 441-442.

KENNEDY, C. H.

- 1915 Notes on the life history and ecology of the dragonflies (Odonata) of Washington and Oregon. Proc. U. S. Nat. Mus., 49: 259-345, 201 figs.
- 1917 Notes on the life history and ecology of the dragonflies (Odonata) of central California and Nevada. *Ibid.* 52: 483-635, 404 figs.
- 1917 The dragonflies of Kansas. The Odonata of Kansas with reference to their distribution. Bull. Univ. Kansas, Biol. Ser. 18 (Bull. Dept. Ent., vol. 11): 127-145, 7 pls. 1 map.
- 1928 Evolutionary level in relation to geographic, seasonal, and diurnal distribution of insects. Ecology, 9: 367-379.

KIRBY, W. F.

- 1890 A synonymic catalogue of Neuroptera Odonata or dragonflies with an appendix of fossil species. London: Gurney & Jackson, ix+202 pp.

MUTTKOWSKI, R. A.

- 1908 Review of the dragon-flies of Wisconsin. Bull. Wisconsin Nat. Hist. Soc., 6: 57-127.
- 1910 Catalogue of the Odonata of North America. Bull. Pub. Mus. Milwaukee, 1: 1-207.

NEEDHAM, J. G.

- 1904 New dragon-fly nymphs in the United States National Museum. Proc. U. S. Nat. Mus., 27: 685-720, pls. 38-44.
- 1928 A list of the insects of New York. Order Odonata. Reprinted from Memoir 101, Cornell Univ. Agr. Exp. Sta.: 45-56.

NEEDHAM, J. G., AND HEYWOOD, HORTENSE BUTLER

- 1929 A handbook of the dragonflies of North America. Charles C. Thomas, Publ., Baltimore, Md. Errata Sheet.

OSBURN, R. C.

- 1905 The Odonata of British Columbia. Ent. News, 16: 184-196,
4 figs.

RIS, F.

- 1911 Collections Zoologiques du Baron Edm. de Selys Longchamps.
Libellulinen. Bruxelles, Hayez, Impr. des Académies.
Fasc. XIII: 529-700.
- 1916 *Idem.* Fasc. XVI; Pt. 2: 1043-1278, 98 figs., 8 pls.

WALKER, E. M.

- 1912 The Odonata of the prairie provinces of Canada. Canad.
Entom., 44: 253-266.
- 1917 The known nymphs of the North American species of *Sym-*
ptetrum (Odonata). *Ibid.*, 49: 409-418.
- 1923 Notes on the Odonata of Godbout, Quebec. *Ibid.*, 50: 5-12.
- 1924 The Odonata of the Thunder Bay District, Ontario. *Ibid.*,
56: 170-176, 182-189.
- 1927 The Odonata of the Canadian Cordillera. Bull. Provincial
Mus. Nat. Hist., Victoria, Brit. Columbia: 1-16.
- 1928 The Odonata (dragonflies) of the Lake Abitibi region.
Univ. Toronto Studies, Biol. Ser. no. 32: 37-44.
- 1929 Review, A Handbook of the Dragonflies of North America by
J. G. Needham and Hortense Butler Heywood. Ent. News,
40: 240-244.

WHITEHOUSE, F. C.

- 1917 The Odonata of the Red Deer District, Alberta. Canad.
Entom., 49: 96-103.
- 1918 Dragonflies (Odonata) of Alberta. Alberta Nat. Hist. Soc.
Red Deer [Canada]. 19 pp., 48 figs.
- 1918 Odonata of the Red Deer District, Alberta (Con't.). Canad.
Entom., 50: 95-100.
- 1918 Popular and Practical Entomology. A week's collecting on
Coliseum Mountain, Nordegg, Alberta. *Ibid.*, 50: 1-7.

WILLIAMSON, E. B.

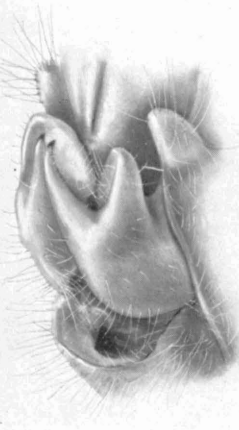
- 1917 An annotated list of the Odonata of Indiana. Univ. Mich.
Mus. Zool. Misc. Publ. 2: 1-12, 1 map.

EXPLANATION OF PLATE

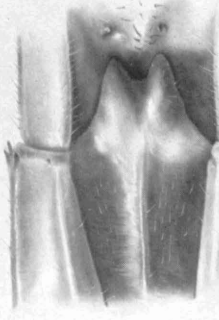
- FIG. 1. *Sympetrum rubicundulum* ♂, Oakland Co., Michigan, July 4, 1916, A. F. Combs.
- FIG. 2. *Sympetrum decisum* ♂, Whitefish Point, Chippewa Co., Michigan, July 31, 1916, A. F. Combs.
- FIG. 3. *Sympetrum rubicundulum* ♀, Third Woods, Washtenaw Co., Michigan, August 15, 1919, Elizabeth McCormick.
- FIG. 4. *Sympetrum decisum* ♀, Tahquamenon River, Luce Co., Michigan, August 15, 1927, J. H. and E. B. Williamson.

THE STATUS OF SYMPETRUM ASSIMILATUM

Sympetrum



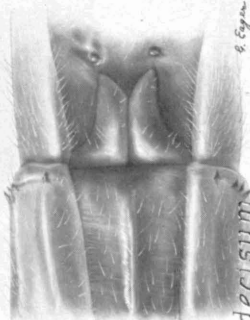
1. *rubicundulum*
Oakland Co., Mich.
July 4, 1916. A.F. Combs



3. *rubicundulum*
Washtenaw Co., Mich.
Aug. 15, 1919. Elizabeth M^{rs} McCormick



2. *decisum*
Chippewa Co., Mich.
July 31, 1916. A.F. Combs



4. *decisum*
Luce Co., Mich.
Aug. 15, 1927. J.H. and E.B. Williamson

