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Identification and Distribution of *Sympetrum* in Minnesota (Libellulidae, Odonata)¹

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Sympetrum species may be seen in flight throughout Minnesota in late summer and autumn. Large numbers may be seen flying along the edges of lakes and ponds or foraging in meadows and marsh grass. The general body color varies from yellow-brown in teneral specimens to bright red in older individuals. Only *danae* never shows red. Unfortunately the red fades to dull brown in dried specimens. The wings may be hyaline or marked with yellow bands. These dragonflies are easily collected with a net as the flight is not particularly swift and they rest frequently.

The literature indicates this large genus is represented in Minnesota by six species, although ten are regional. Needham and Westfall (1955) state "about a dozen" are North American although fourteen populations are treated in this comprehensive work. Whedon (1914) lists six species as occurring in Minnesota; however, one has been subsequently moved to *Tarnetrum*, and another has been reduced to synonymy. Existing literature does allow identification of local species, although females are not always clearly defined. This study was initiated to determine how many *Sympetrum* species the abundant and varied aquatic habitat of Minnesota supported; and if these species were associated with particular aquatic habitats.

During the summer of 1962, a collection sequence was planned to sample the distribution of *Sympetrum* species within the State and to determine the period of seasonal abundance. The collecting period continued from June 12 to August 29, 1962. The exact areas revisited are shown in Fig. 1. These collection records and the *Sympetrum* specimens of the Gustavus Adolphus and University of Minnesota insect collections form the source material of this study. Over thirteen hundred Minnesota specimens were examined as well as material from neighboring states and Canada.

Characters Used in *Sympetrum* Identification: Like most libellulid genera, *Sympetrum* is chiefly characterized by the wing venation. These characters include two or more bridge cross veins, well developed anal foot, last antenodal cross vein incomplete, and the discoidal field of the front wing is parallel-sided or narrowed distally. The prothorax has an elevated and bilobed hind margin.

Species are separated by tibial color, face color, wing color, structure of the hamules and superior appendages in males, and the genital plates in females. Color char-

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² Academic Assistant.

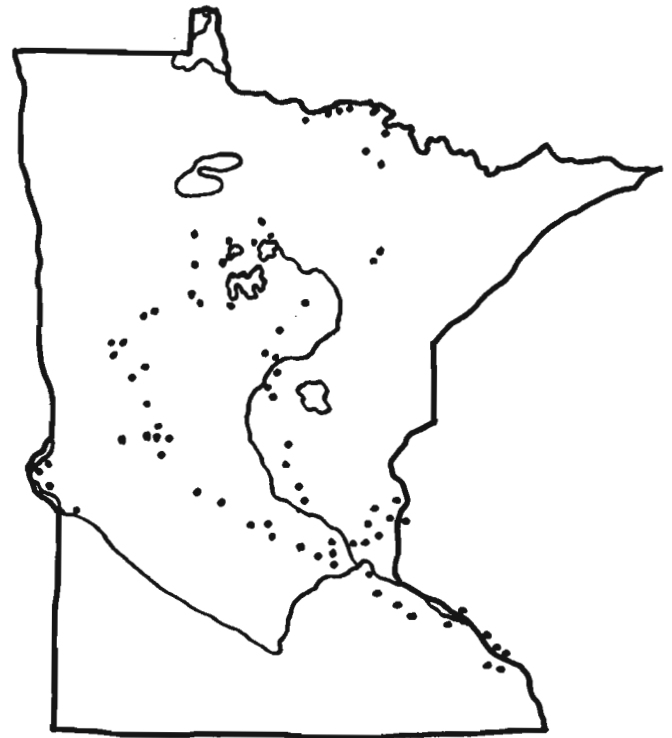


FIGURE 1. Collection Sites, June 12–August 29, 1962.

acters are not the most desirable since they may vary among individuals as well as fade in storage. However, tibial and wing color patterns appear quite stable among the specimens examined in this study. These color patterns survived over sixty years of storage in some specimens. Color patterns are necessary in the separation of *Sympetrum* females. The genital plates only separate our species into two groups. The hamules are also of two basic types; however, specific modifications of these types are usually apparent.

KEY TO MINNESOTA SPECIES

1. Tibiae entirely black 3
Tibiae yellow or yellow with black stripes 2
2. Tibiae entirely yellow, wings clear to yellowish stained; body yellowish or reddish
vicinum
Tibiae yellow with black stripes on outer surface; wings with yellowish costal strip extending to stigma *costiferum*
3. Males 4
Females 9

4. Hamules bifid in pincer-fashion, from one-fifth to nearly one-half of the distance to the anteroventral angle of hamule. (See Fig. 2-4) Superior abdominal appendages with prominent inferior tooth (Fig. 13) . . . 5

Hamules deeply notched, appearing as two separate branches (Fig. 8-11).

Superior abdominal appendages with only denticles or no inferior tooth (Fig. 12) 7

5. Hamules slightly bifid, about one-fifth the distance to anteroventral angle, inner branch much thinner than outer branch, outer branch stout, distal end truncate. Wings glass-clear with yellow restricted to extreme proximal area. Face usually white *obtrusum*

Hamules more deeply bifid 6

6. Hamules bifid for approximately one-third distance to anteroventral angle. Branches of hamules more nearly equal. Wings somewhat stained with a yellowish haze, yellow confined to proximal area; veins often reddish. Face usually red *internum*

Hamules bifid for nearly one-half the distance to anteroventral angle. Outer branch slightly stouter than inner branch, hamule pincer-like in ventral view. Wings usually glass clear with yellow frequently extending to nodus *rubicundulum*

7. Wings glass-clear; body black and yellow *danae*

Wings with proximal half yellow 8

8. Thorax with black in sutures *occidentale*

Thorax without black in sutures *semicinctum*

9. Genital plate bifid (Fig. 15-16) 10

Genital plate emarginate, not bifid (Fig. 14) . . . 7 (same as males)

10. Vulvar lamina inflated and sharply turned dorsad toward abdomen, diverging at ends (Fig. 15). Wings with yellow often extending to nodus *rubicundulum*

Vulvar lamina not inflated (Fig. 16) 11

11. Wings glass-clear except for tinge of yellow at extreme proximal base, veins black *obtrusum*

Wings somewhat stained with yellow-brown, with yellow occasionally extending as far as nodus; veins often reddish *internum*

Of the eight species treated in the preceding key *costiferum*, *danae*, and *occidentale* have not previously been reported from Minnesota. A previously reported species, *ambiguum*, was not found in this study.

The separation of *obtrusum* and *internum* females is not completely effected in this key. In the writers' opinion, the wing characters are more apparent in a series than in a single specimen. The contrast in this character is not as good as desired. It was not possible to separate the females of these species using the vulvar lamina characters described in the literature.

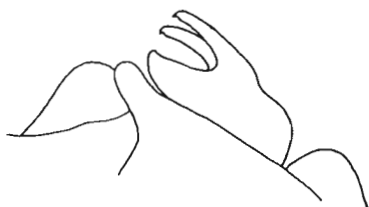


FIG. 2 RUBICUNDULUM



FIG. 3 INTERNUM



FIG. 4 OBTRUSUM



FIG. 5 RUBICUNDULUM

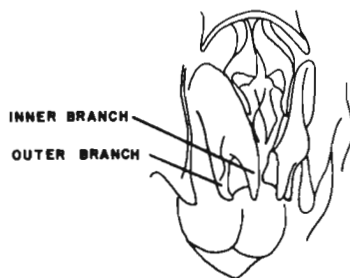


FIG. 6 INTERNUM



FIG. 7 OBTRUSUM



FIG. 8 DANAÆ

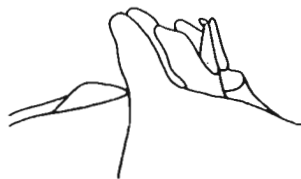


FIG. 9 VICINUM



FIG. 10 SEMICINCTUM



FIG. 11 COSTIFERUM

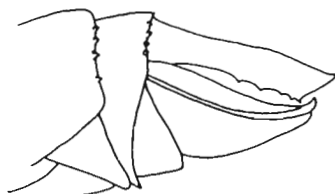


FIG. 12 SEMICINCTUM



FIG. 13 RUBICUNDULUM

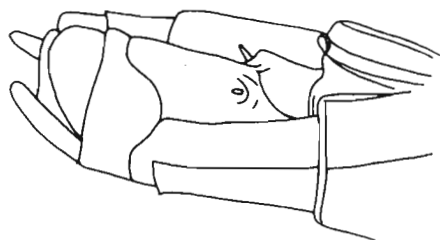


FIG. 14 SEMICINCTUM



FIG. 15 RUBICUNDULUM

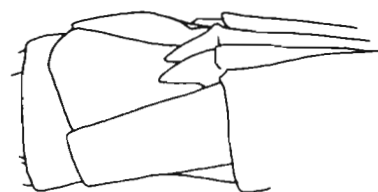


FIG. 16

Distribution and Seasonal Abundance: The distribution of each species within the state is shown by Figures 17-24. The seasonal distribution presented herein also represents the total collection records. It is hoped that the regularized collection routine of 1962 will lend more credence to these data. Garman (1927) reported a similar seasonal distribution for *Sympetrum* in New England. Montgomery (1950) describes seasons of abundance for *internum*, *vicinum*, *rubicundulum*, and *obtrusum* in Indiana, which are quite similar to Minnesota collection records. Walker's (1933) seasonal records for Manitoba agree quite well with the previously cited observations.

Sympetrum vicinum (Hagen). This species seems to occur throughout the State. Most numerous from August until killing freeze in October; 308 specimens.

Sympetrum costiferum (Hagen). Widespread throughout the State. Abundant from late July through September; 294 specimens.

Sympetrum obtrusum (Hagen). Another species with state-wide distribution. Common from July through September; 519 specimens.

Sympetrum internum (Montgomery). This species was long known as *decisum* Ris, and under this name was commonly considered conspecific with *obtrusum*. In a study of types in the Hagen collection, Montgomery (1943) found that the specimens called *decisum* by Ris

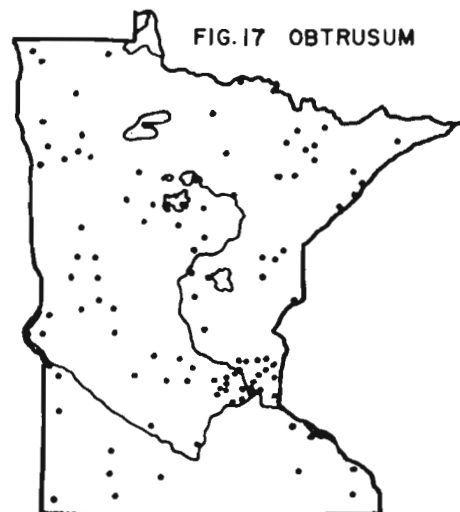
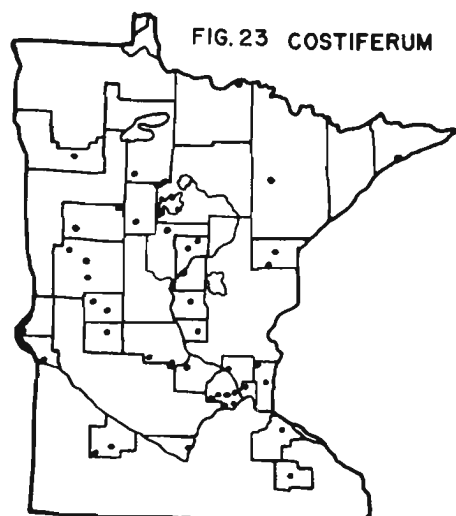
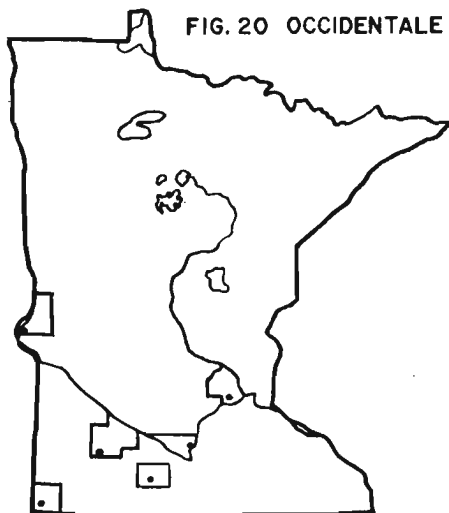
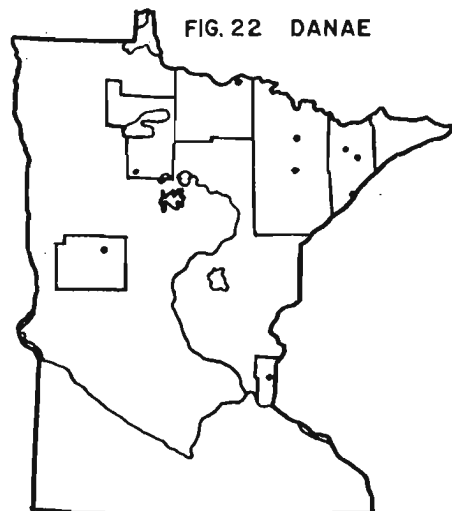
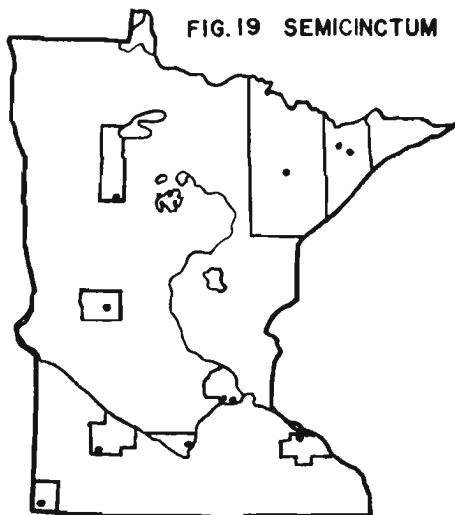
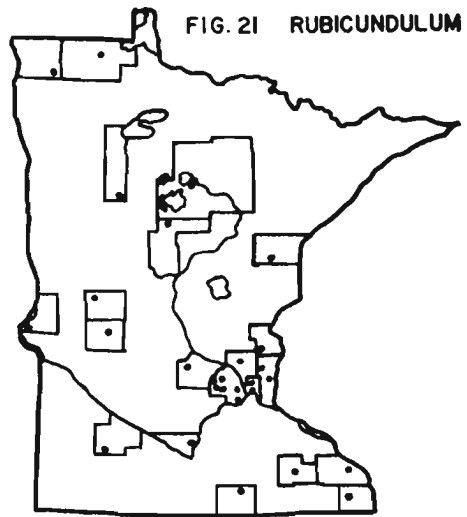
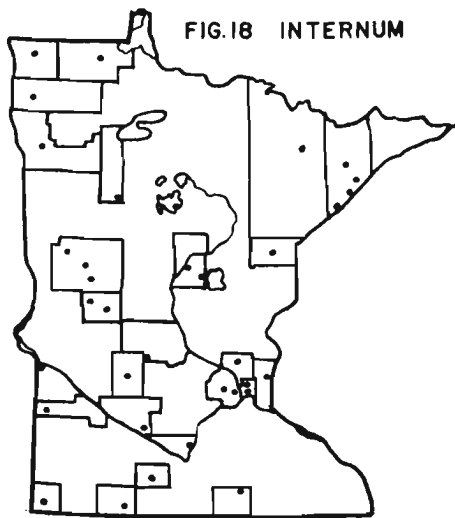
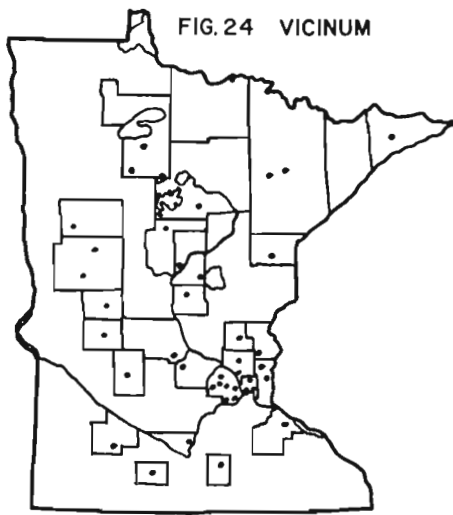


FIG. 17 OBTRUSUM





were under the manuscript name of *Diplax interna*. Montgomery applied *internum* to these specimens which decidedly showed relationship to *obtrusum* and *rubicundulum*. This species has been taken at widely separated areas within Minnesota. Sixty-one specimens were taken from Nicollet, Renville, Hennepin, Anoka, Ramsey, Watonwan, Big Stone, Douglas, Stearns, Ottertail, Crow, Lake, Roseau, and Clearwater counties. This is also a late summer species usually occurring from July through September.

Sympetrum rubicundulum (Say). This species is probably found with *internum* although more collection sites have been recorded. This species seems to have geographic races. Most midwestern specimens examined show a marked flavescence over the basal half of the wings. Specimens of this type were formerly considered as *assimilatum*. As formerly used, *assimilatum* would have included the Minnesota *rubicundulum* population. New England specimens appear smaller and lack the extension of yellow over the wings. A western clear winged species, *pallipes* (Hagen), seems closely related to *rubicundulum*. In Minnesota, *rubicundulum* may be found from July through September; 108 specimens.

Sympetrum danae (Sulzer). A small black and yellow species which according to Needham and Westfall (1955) is restricted to northern North America, Europe, and Asia. Only 29 specimens were found within the Minnesota material. These specimens were taken in Beltrami, Koochiching, Lake, Saint Louis, Ottertail, and Washington counties. The single Washington County specimen, taken at Stillwater by Ralph Gunderson, appears to be farther south than the normal range for this species. Most of the specimens were taken in July and August.

Sympetrum occidentale Bartenev. Walker (1951) reviewed the relationship of *semicinatum* and the *occidentale* complex. Walker regards *occidentale* as a western species ranging from the Pacific Coast to the Great Plains in the United States and Canada. Only 19 specimens were encountered in this study. These specimens were taken in Nicollet, Watonwan, Traverse, Redwood, Rock, and Hennepin counties.

Sympetrum semicinatum (Say). A small eastern species closely related to *occidentale*. Eighteen specimens were among the Minnesota material studied. These specimens were taken in Rock, Nicollet, Hennepin, Douglas, Clearwater, and Lake counties. Most *semicinatum* and *occidentale* were taken from July through September.

Some collection of immature Libellulidae and rearing of this material was attempted. Four specimens of *vicinum* were successfully reared. These naiads were taken from a roadside slough near Red Wing, Minnesota. It is difficult to state habitat preference without a comprehensive sampling of immatures from different aquatic habitats and the identification of these forms. It seems quite possible that the preferred adult foraging areas could in many instances be somewhat removed from oviposition habitat. Our adult collection records only indicate that impounded waters probably produce the bulk of the *Sympetrum* population.

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