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Identification and Distribution of Minnesota Leucorrhinia Species (Odonata, Libellulidae)

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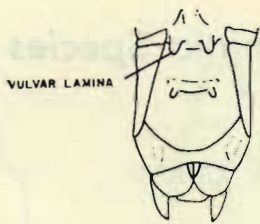


FIG. 6 INTACTA, ♀

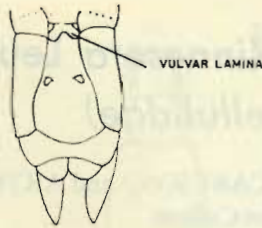


FIG. 8 PROXIMA, ♀

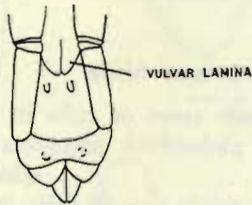


FIG. 7 HUDSONICA, ♀

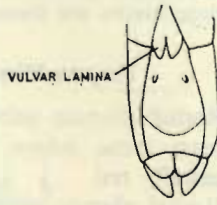


FIG. 9 FRIGIDA, ♀

deeply notched when seen from below (Fig. 4);
labium usually with whitish sides *proxima*

- 5. Middle and posterior abdominal segments bearing broad, triangular yellow spots on dorsal surface *hudsonica*

A yellow twin spot on dorsum of the seventh abdominal segment (teneral specimens may have yellow markings on segments preceding segment seven) *intacta*

- 6. Abdomen with a yellow spot on dorsum of seventh segment 7
- Abdomen without a yellow spot on dorsum of seventh segment 8

- 7. Plates of vulvar lamina narrow and widely separated (Fig. 6) *intacta*
- Plates of vulvar lamina in contact on at least part of mesal surface (Fig. 7) *hudsonica*

- 8. Vulvar lamina reduced to a pair of rounded knobs (Fig. 8) *proxima*
- Vulvar lamina triangular with the bases usually in contact (Fig. 9) *frigida*

The foregoing key only differs from the well known work of Garman (1927) and others in that some of the characteristics described by Hagen (1890) and Calvert (1890) have been used in combination with generally employed key characteristics. This review of classification should help prevent misidentification because of variation of a single character.

Using previously prepared keys, it also was often difficult to identify females or teneral specimens. Commonly employed classification characteristics were examined in 200 *intacta* specimens and most were found to vary considerably. Similar examinations of small *frigida* and *proxima* series indicated the necessity for male and female sections in the key. These studies proved the genital plate characteristic of the female to be the only consistently reliable characteristic for female identification.

Leucorrhinia intacta Hagen. A conspicuous yellow spot on the seventh abdominal segment readily distinguishes the male of this species. This species appears to breed in lakes and ponds throughout most of the United States and Canada. The *intacta* collection sites are shown in Fig. 10. This species is not only widely distributed throughout the state, but is clearly our most abundant *Leucorrhinia*. The 366 *intacta* specimens examined in this study were collected from May to early August. The peak of the adult population seems to occur from June 15 to July 15.

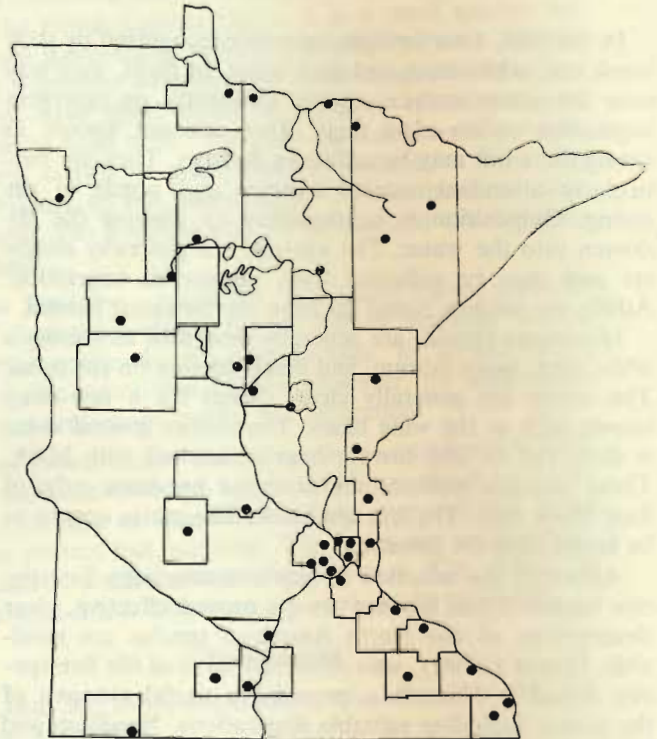


FIG. 10 INTACTA COLLECTION SITES

An examination of 6 characteristics on 200 specimens not only provided the basis for selection of characteristics used in this key, but revealed some interesting intra-specific variations. The labium color is normally black with light colored patches. Of the 39 specimens with totally black labia, 33 were males. Infuscated wings were found only among females. The extension of yellow markings on the abdominal segments was also a trait of *intacta* females except in teneral specimens. The number of cell rows in the trigonal interspace developed into another sex-associated character. The female tendency for more cell rows in the forewing trigonal interspace is shown in Table 1. It is suspected that similar sex dimorphisms exist in other *Leucorrhinia* species.

Table 1. Variation in cell rows in the forewing trigonal interspace among *Leucorrhinia intacta* males and females.

Cell rows in trigonal interspace	Males	Females
3	27	51
3-2-3	25	11
2-3	66	16

Leucorrhinia proxima Calvert. A northern ranging species (see Fig. 11) easily separated from *intacta* by the black abdomen except for the pruinose swollen basal segments. Of the 37 specimens encountered in this study, none were taken south of Duluth. June appears to be the month of greatest abundance. The unusual genital plate of the female (Fig. 8) is an excellent definitive character.



FIG. 11 COLLECTION SITES FOR PROXIMA •, FRIGIDA X, HUDSONICA Δ, GLACIALIS ○.

Leucorrhinia frigida Hagen. A delicate little species superficially resembling *proxima*. The labium is black. The swollen basal abdominal segments are markedly pruinose in mature specimens. This species is smaller than *proxima*. The distribution of the few Minnesota specimens encountered is rather remarkable. They were collected in June at Ely, Orr, Brainerd, and Winona. White (1963) reported taking *frigida* four out of five seasons at a central Pennsylvania pond. These records suggest that *frigida* may have a widely scattered distribution in Minnesota.

Leucorrhinia hudsonica Selys. A small species more brightly marked with red or yellow than the previous species. It is not common in Minnesota. The Minnesota specimens used in this study were taken at Brainerd, Bemidji, Lake Itasca, Lake Saganaga, and Lake of the Woods county. Many specimens were collected in Manitoba and Saskatchewan. White (1963) took one *hudsonica* during his five-year study of a Pennsylvania pond. Muttkowski (1908) also reported isolated occurrences of *hudsonica* in Wisconsin.

Leucorrhinia glacialis Hagen. The only specimens encountered in this study were in the University of Minnesota collection. Two specimens bore labels from Lake Itasca and the other specimen was taken near Pine City (see Fig. 11). This is a somewhat larger *Leucorrhinia* with more red in the color pattern than in the previously

described species. Neither *glacialis* nor *frigida* has previously been reported from Minnesota.

Among the Minnesota species, *intacta* and *hudsonica* seem to be closely related, and *frigida* and *proxima* show kinship. These judgments are based in large measure on the marked similarities in structure of the male abdominal appendages, and, to a lesser degree, on general color patterns. Walker (1940) in describing *patricia* from an Ontario specimen, placed it near *hudsonica*. Walker's drawings and description certainly indicated kinship to the *intacta-hudsonica* species.

Hagen (1890) regarded *glacialis* as related to *intacta*. However, the overall size and superior appendages are very similar to *proxima*. Specimens of the remaining North American species, *borealis* Hagen, have not been seen. The literature indicates *borealis* to be the largest, the earliest to emerge, and the northernmost in range of all North American *Leucorrhinia*. Hagen (1890) placed it between two European species, *pectoralis*, and *rubicunda*.

In general, ordinarily good specific characteristics such as hamules are not particularly distinctive among species in this genus. Wing venation and color patterns also merge among *Leucorrhinia* populations. The hamules have been used with very modest success to isolate species. In the writers' opinion, only the hamules of *frigida* are distinctive enough to be used.

Another peculiarity of this species group is its restriction to the northern portion of the earth. In North America, the greatest profusion of species occurs north of the United States. This raises some questions: Does this distribution imply considerable post-glacial evolution? Is the wide spread distribution of *intacta* over the continent dependent on the ability to adjust to warmer waters? All species studied appear closely related, although two species groups seem to exist. The *intacta-hudsonica* group and the *proxima-frigida* group represent the most obvious divergence within the genus.

When the populations within a genus can be readily identified, many other avenues of investigation become inviting. The biology of these insects offers many study opportunities. Only one specimen (*intacta*) has been reared to adulthood in our laboratories. The effects of diet, photoperiod, and temperature upon *Leucorrhinia* development have only been superficially examined. The taxonomy of the immatures also should be reviewed.

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Dr. — Yes or No

The following correspondence is reprinted from the cited issues of SCIENCE:

Rank Discrimination

Being a community rich in degree-holders of every kind, Princeton is likely to have Ph.D.'s, M.D.'s, D.D.'s, and so forth among its candidates for election to the school board. Under the auspices of the League of Women Voters, our recent candidates gathered before elections for public questioning. In front of each was a name plate. The title "Dr." appeared with the names of M.D.'s; the Ph.D.'s were designated "Mr." Searching for an explanation, I found that the League of Women Voters solemnly believes that being identified by the title "Dr." embarrasses a Ph.D.—especially "after hours" (a reservation that apparently does not apply to M.D.'s or D.D.S.'s seeking public office "after hours").

Pundits on etiquette were also cited as authority, although with some controversy, since apparently they differ. Inclusion of the title in one's telephone-directory listing was an additional criterion for establishing the right to it (three Ph.D.'s are so listed in Princeton, including the president of Princeton University).

Are degrees becoming obsolete? Are we headed toward the abolition of titles, or is this manifestation reserved for Ph.D.'s?

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(30 July 1965, Vol. 149)*

Degrees and Titles

A recent letter by Benarde ("Rank discrimination," 30 July, p. 499) objects to not addressing Ph.D.'s as Dr.

It is my impression that there are two entirely different types of titles in the English language—true titles and occupational titles. Examples of the first type are Hon., Lord, Mr., Esq.; of the second type, Coach, Sen., Officer, Gov., Lt. The title Dr. can be either. That the distinction between the two types is quite sharp can be seen by considering how they are used: True titles can never be used by themselves; only press-photographers yell, "Hey Duke, how about one more picture?" and very few people would say, "Will this cut be all right, Mrs.?" Unless the form of address is ceremonial, such as "Madam" or "Your Excellency," one must always add the name:

"Take a letter, Miss Green." On the other hand, it is quite proper to address somebody by occupational title without the name: "Officer, I wasn't speeding!" Indeed, this form is often used in an impersonal way to address people who are somewhat faceless and interchangeable. One way to indicate respect is to use an occupational title as if it were a true title and add the name to it. Furthermore, one never refers to oneself by true title, particularly if it carries the connotation of distinction, but it certainly is proper to use one's occupational title; "I am the Hon. Joe Gray" will never do, but there is nothing wrong with "This is Senator Gray calling."

In Latin, "doctor" means "teacher." As a true title it designates those upon whom it was bestowed for having taught the community of scholars something, that is, for having made a significant contribution to the body of knowledge in a field of science or humanities (usually in a dissertation). It was first granted in the 13th century to theologians and lawyers. Later the word acquired its occupational meaning, designating those engaged in the healing professions. This came about because the only educated person the illiterate man of the street—who didn't know better but wanted to be respectful—ever came in contact with was the healer.

Thus a veterinarian, or a chiropodist, or an M.D., or an optometrist, or a dentist, or a naturopath, or a naprapath, or a podiatrist, or a chiropractor, or an osteopath is addressed by occupational title alone: "Good morning, Doctor," and he introduces and signs himself as Dr. (The foregoing list was compiled from the Chicago classified telephone directory by looking up "Doctor" in the index.) This has nothing to do with having or not having a doctor's degree, although in this country, where academic practice imitates popular usage, just about all these practitioners have one; in Britain or the Scandinavian countries, for example, where the original sense of the degree is preserved, they don't. (Some British physicians do get an M.D., but this is comparable to obtaining a Ph.D. on top of a medical degree here.)

On the other hand, it is not good form in English for a Ph.D. or the holder of an honorary degree to refer to himself as Dr.—though in some fields it is customary to put an abbreviation of the degree after the name—because in his case it is a true title, indeed one denoting

(Continued on page 32)