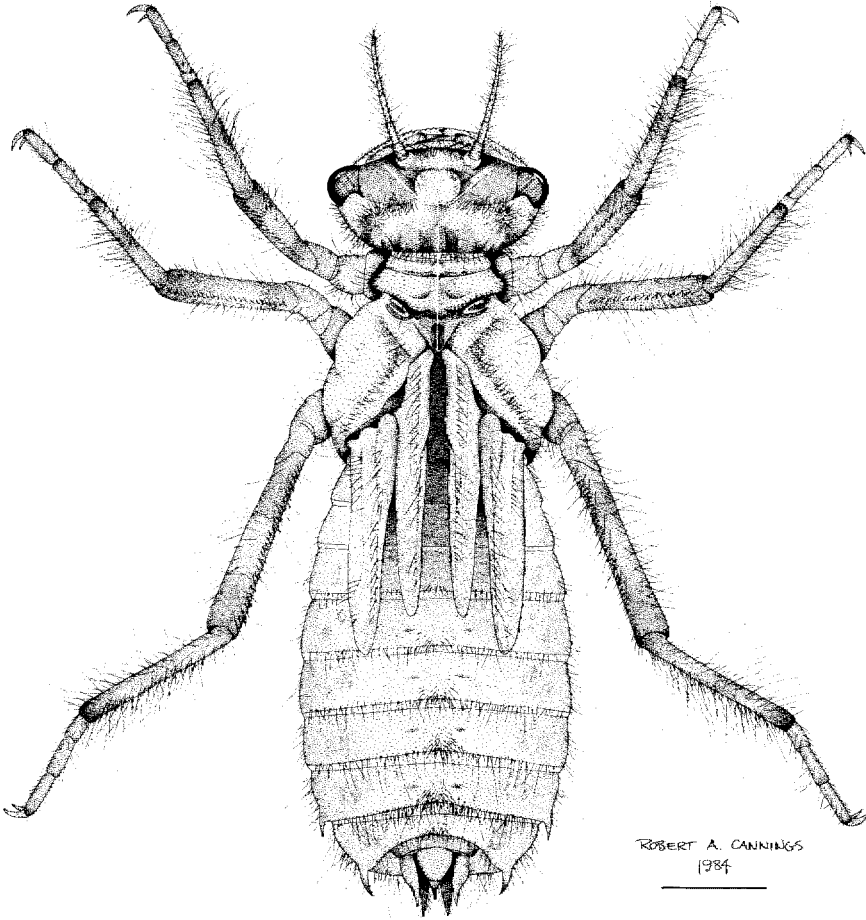


*Dragonflies of the Yukon*



FRONTISPIECE. Larva of the northern dragonfly *Somatochlora sahlbergi* Tryböm, a characteristic Yukon species that occurs in deep, cold pools with aquatic moss. Scale line 3 mm. Illustration from Cannings and Cannings 1985.

# Dragonflies (Odonata) of the Yukon

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**Abstract.** Thirty-three species of dragonflies are known from the Yukon. Distinctive odonate communities occur in small lakes and ponds, sedge marshes, fen ponds with aquatic moss, shallow sedge-moss fens and bogs, and small, slowly moving streams; there are few dragonflies in the large lakes and none yet collected from the large rivers of the Territory. Permafrost is a dominant feature of habitats in the northern Yukon. Summers are warmest in the low, central valleys, but the northern valleys can also have warm, albeit short summers. The arctic slope has cool, very short summers; apparently, dragonflies do not regularly breed there. The northern limit of the Odonata in North America is essentially the arctic treeline, with only a few individuals of 1 or 2 species breeding, perhaps only periodically, slightly to the north.

Biogeography, distribution, habitat, flight period, and other ecological data are discussed for the 33 species. Faunal elements are outlined: 23 species are Boreal; 3 are from the Transition zone; 2 are Cordilleran; 1 is East Beringian in North America; 1 is widespread in the west; 3 are widespread throughout North America. Boreal species can be further divided into 4 subelements: 13 species are Widespread boreal, 4 are Northern boreal, 4 are Southern boreal, and 2 are Western boreal. Six species have Holarctic distributions.

**Résumé.** *Les libellules (Odonata) du Yukon.* Trente-trois espèces de libellules ont déjà été récoltées au Yukon. Des communautés caractéristiques d'odonates habitent les petits lacs et les étangs, les marécages à laïches, les tourbières minérotrophes à mousses aquatiques, les tourbières ombrotrophes peu profondes à laïches et à mousses et les petits ruisseaux à eaux lentes; les libellules sont rares dans les grands lacs et aucune n'a jamais été trouvée dans les grandes rivières du territoire. Le pergélisol est une caractéristique dominante des habitats du nord du Yukon. Les étés les plus chauds se manifestent surtout dans les vallées centrales basses, mais les vallées du nord peuvent aussi connaître des étés chauds, quoique de courte durée. Sur le versant arctique, les étés sont frais et très courts; il semble que les libellules s'y reproduisent rarement. La limite nord des odonates en Amérique du Nord est essentiellement constituée par la ligne des arbres dans l'Arctique et seuls quelques individus appartenant à 1 ou 2 espèces s'aventurent parfois un peu plus au nord.

La biogéographie, la répartition, l'habitat, la période de vol et les données écologiques particulières à chaque espèce sont présentés. Leur origine est également examinée: 23 espèces sont boréales, 3 sont de la zone de transition, 2 sont cordillériennes, 1 est confinée à la Béringie orientale en Amérique du Nord, 1 est répandue dans tout l'ouest, 3 sont répandues partout en Amérique du Nord. Les espèces boréales peuvent encore être subdivisées: 13 sont répandues dans toute la zone boréale, 4 sont de la zone boréale nord, 4 sont de la zone boréale sud et 2 sont de la zone boréale ouest. Six espèces sont holarctiques.

## Introduction

The Odonata, commonly referred to as dragonflies and damselflies, make up a relatively small order of insects, comprising about 5000 species and 23 families world-wide. In North America there are 437 species known in 12 families. The order is predominantly tropical in distribution and is not diverse at high latitudes. Nevertheless, 33 species are known from the Yukon and, because of the abundance of individuals, the order forms one of the predominant

groups in standing freshwater communities there. The Yukon species are mostly boreal in distribution and, although several are occasionally collected just north of the arctic treeline, none can be considered arctic species. The Yukon fauna exhibits a number of patterns of interest to zoogeographers.

Metamorphosis in odonates is considerable though incomplete. The aquatic larvae go through 10 to 15 instars before emerging as terrestrial adults. The adults are aerial predators: large, strong-flying insects with large eyes, strong mandibles, and spiny legs. The larvae are also predaceous, and are armed with an enormously enlarged, hinged labium which is used as an extendible, grasping organ for prey capture.

The order is divided into three suborders, the Zygoptera (damselflies), the Anisoptera (dragonflies), and the Anisozygoptera, a small group not found in North America that is intermediate in appearance between the first-mentioned groups. Damselflies are slimmer, smaller, and usually fly more slowly than dragonflies, and at rest their equal-sized wings are generally held together above the body. Dragonflies are robust and capable of rapid flight; when perched their wings are held out away from the body.

In the damselflies and smaller dragonflies, development occurs rapidly and, even in the Yukon, adults emerge either later the same summer (as in *Lestes*) or in the following summer. However, in the larger dragonflies such as *Aeshna* or *Somatochlora*, short northern summers often mean that four or even five years are spent in the larval stage.

Walker (1953, 1958) and Walker and Corbet (1975) published most of the early records of dragonflies in the Yukon, which were largely the result of Canadian National Collection field trips to the southern and central regions in 1948 and 1949, to Rampart House in 1951, to the Ross River/Swim Lakes areas in 1960 and to Dawson and North Fork Pass in 1962. From 1979 to 1990, the region was visited a number of times by field parties from the University of British Columbia, the Royal Ontario Museum, and the Biosystematics Research Centre. To provide a basis for the present chapter, Cannings et al. (1991) detailed the collecting records and known distributions of Odonata from the Territory.

The fauna is now moderately known for the Shakwak and Tintina trenches, the Klondike and Dempster highways, the Ross River area and the Old Crow region. The area least studied is the extreme southeastern 'toe' of the Territory, a low-lying yet relatively inaccessible region that may contain several southern species as yet unrecorded in the Yukon.

In this chapter we outline the various habitats occupied by Odonata in the Yukon, summarize the biology and distribution of each species, and discuss some of the zoogeographic patterns exhibited by the fauna.

### **The Yukon as Dragonfly Habitat**

The Yukon has a boreal, continental climate, with long, cold winters and short, warm summers. The south is dominated by low, southeast-northwest trending valleys separated by mountain ranges; the 2 major valley systems are the Tintina and Shakwak trenches. The Tintina Trench and the valleys of the southern lakes have the longest and warmest summers in the Yukon (mean July temperatures of 16°C in Dawson and 14°C in Whitehorse), whereas the Shakwak Trench experiences cooler summers (mean July temperatures of 12°C in Haines Junction and Burwash Landing). In the extreme southeast, the Liard Plateau separates the Rocky Mountains from the Selwyn Mountains; the latter form the Yukon's southeastern wall. In the middle of the Yukon, the Ogilvie and Wernecke mountains form a broad, cold barrier, separating the northern and southern portions of the Territory. The low valleys of the Porcupine and Peel rivers in the north have warm, but short summers; Old Crow has a

mean July temperature of 14°C, but a mean May-September temperature of only 8°C. The north slope adjacent to the Beaufort Sea is much cooler, with very short summers: typical mean summer temperatures (May-September) are only 2°C at Komakuk Beach and Shingle Point; mean July temperatures are 7 and 11°C respectively.

One of the main physical features of the Yukon affecting dragonfly habitat is the permafrost layer. In the main valleys south of 62°N (the latitude of Carmacks and Ross River), permafrost is only a scattered feature, but to the north it becomes deeper and more widespread; north of about the Arctic Circle it is 100 m deep and continuous. This permanent ice layer traps surface water above it and creates many shallow wetlands. In larger ponds, it forms a shallow shelf around the deep, open centre. At the edge of some dragonfly ponds, such as those along the Ogilvie River and in the Richardson Mountains, ice is less than 50 cm below the surface in early July.

No species of dragonfly is truly arctic; the group is largely absent on the north slope of the Yukon, although 1 or 2 species breed in shallow ponds just north of the treeline.

The general aquatic habitats available to dragonflies in the Yukon are listed below, with the distinctive species associated with each.

1. **Large lakes.** The Yukon has many large, deep lakes, but because of the cold, oligotrophic nature of these water bodies, dragonflies are not present except in sheltered bays, where the fauna resembles that found in small lakes and ponds.
2. **Small lakes and ponds.** A wide variety of small lakes and ponds are present. Shallow, marl-bottomed lakes in the south are characterized by *Aeshna palmata* Hagen (species number 11 in the Annotated List below). Nutrient-rich lakes with shores lined with thick stands of sedges (Fig. 1) are inhabited by *Coenagrion resolutum* (Hagen) (4), *Enallagma cyathigerum* (Charpentier) (6), *Aeshna interrupta* Walker (9), *Aeshna juncea* (Linnaeus) (10), and *Somatochlora hudsonica* (Selys) (19). Deep ponds with peaty edges and floating *Nuphar* are common in the forests of the central region, and have abundant *Aeshna eremita* Scudder (8) and *Cordulia shurtleffi* Scudder (16), among others. Shallow ponds with relatively open shores usually are patrolled by *Somatochlora albicincta* (Burmeister) (17). In some of the southern valleys, alkaline ponds occur, characterized by *Sympetrum internum* Montgomery (32).
3. **Sedge marshes.** In the south (primarily), shallow sedge marshes (Fig. 2) are characterized by *Lestes dryas* Kirby (2) (local), *Somatochlora semicircularis* (Selys) (23) (known in the southeast only), *Libellula quadrimaculata* Linnaeus (30), *Leucorrhinia borealis* Hagen (26) (also in the low valleys of the north), and *Sympetrum internum* (32).
4. **Fen ponds with aquatic moss.** Mossy, sedge-bordered fen ponds occur throughout most of the Yukon, although they are much more common in the north and in the mountains (Fig. 3). They have a distinctive fauna, including *Coenagrion interrogatum* (Hagen) (3), *Aeshna septentrionalis* (Hagen) (12), *A. subarctica* Walker (14), and *Somatochlora sahlbergi* Tryböm (22) (north only). Fens are peatlands characterized by a high water table that is enriched by nutrients from upslope. Thus, they are more minerotrophic than bogs (Zoltai 1988) and are not significantly acidic, with a pH greater than 5.0 (Zoltai 1987).
5. **Shallow sedge/moss fens.** Where peatlands have filled in depressions, leaving a shallow (often no standing water is visible by July), evenly vegetated sedge and moss fen (Fig. 4), a distinctive odonate fauna appears. The characteristic taxa are: *Aeshna sitchensis* Hagen (13), *Somatochlora franklini* (Selys) (18), *S. kennedyi* Walker (20) (where there are open puddles), *S. whitehousei* Walker (25), and *Leucorrhinia patricia* Walker (28).



FIG. 1. Small lake north of Long's Creek, northwest of Kluane Lake in the Shakwak Trench. It is typical of small, eutrophic water bodies supporting populations of *Coenagrion resolutum*, *Enallagma cyathigerum*, *Aeshna interrupta*, *A. juncea*, and *Somatochlora hudsonica*.

6. **Bogs.** Bogs are peat-covered wetlands with a high water table and a general lack of nutrients; the surface is virtually isolated from mineralized soil water (Zoltai 1988) and the pH is markedly acidic (less than 4.7) (Zoltai 1987). Very few true bogs with odonate habitat were found and sampled. Bogs had similar faunas to the various fens studied; it seems that the dragonfly taxa respond mainly to habitat structure, rather than water chemistry.
7. **Slowly moving streams.** In the south, there are 2 dragonflies that characterize small, sedge-bordered streams (Fig. 5), *Aeshna umbrosa* Walker (15) and *Somatochlora minor* (Calvert) (21).
8. **Rivers.** No dragonflies are known from Yukon rivers, although *Ophiogomphus colubrinus* Selys or *O. severus* Hagen probably occur in the extreme southeastern corner of the Territory. This paucity of lotic species is typical of the Cordillera of western North America; many of the rivers and streams are cold and glacier-fed, having their sources in the mountains, and sustain a limited dragonfly fauna (Cannings and Stuart 1977).

### Faunal Elements

Species may be grouped with others that share similar distributions to form what can be termed faunal elements. The majority of the 33 species known from the Yukon are restricted to the Nearctic region, although 6 are Holarctic (defined here as species with transcontinental ranges in both North America and Eurasia) and one is Palaearctic-East Beringian (widespread in the northern Palaearctic but confined to extreme northwestern North America). This section describes the Nearctic faunal elements pertaining to the Yukon



FIG. 2. Sedge marsh in the Rancheria River valley, just north of the British Columbia boundary west of Watson Lake. Such marshes are characterized by *Lestes dryas*, *Somatochlora semicircularis*, *Libellula quadrimaculata*, *Leucorrhinia borealis*, and *Sympetrum internum*.



FIG. 3. Fen pond with submerged aquatic moss, Blackstone River, Dempster Highway. A distinctive dragonfly fauna includes *Coenagrion interrogatum*, *Aeshna septentrionalis*, *A. subarctica*, and *Somatochlora sahlbergi*. The latter species is the most boreal of dragonflies and is associated with ponds near treeline. This locality, at about 65°N, is close to the southern limit of the species in Canada.



FIG. 4. Fen adjacent to Porcupine River, 4 km southwest of Old Crow; a shallow, evenly vegetated sedge and moss fen. Typical species are *Aeshna sitchensis*, *Somatochlora franklini*, *S. kennedyi*, *S. whitehousei*, and *Leucorrhinia patricia*.

fauna (species with Holarctic and Palaearctic-East Beringian distributions are also assigned a North American faunal element). Distribution (including total range) maps for characteristic species in each element are given. These faunal elements are:

***I. Boreal.*** Species occurring in the northern spruce (*Picea*) forests, across the boreal zone from treeline to the southern margin. In general, these species range from the Atlantic Provinces across the northern New England states, Quebec, northern Ontario, parts of the northern tier of mid-western states, the Prairie Provinces north of the Great Plains, and northern British Columbia, often ranging considerably southward in the higher mountains and plateaus of the western Cordillera. These species can be further subdivided into:

*i. Widespread boreal.* With ranges as described above.

*ii. Northern boreal.* Species that are common near the northern treeline, but that are virtually absent from the northern contiguous United States and from the southeastern Atlantic Provinces, and do not extend far south into the Cordillera.



FIG. 5. Slowly moving, sedge-bordered stream near Watson Lake. In the southern Yukon, *Aeshna umbrosa* and *Somatochlora minor* are distinctive species found in this habitat.

iii. *Southern boreal*. Species that are uncommon north of 60°N in the west and absent near the Arctic treeline in the east, but range far down the Cordillera and/or into the southeastern Atlantic Provinces and New England states. Some (e.g. *Aeshna interrupta* Walker (9)) are common on the Great Plains.

iv. *Western boreal*. Species not found east of Hudson Bay.

2. *East Beringian*. Species confined to the extreme northwest in the New World, presumably having lived in the Beringian glacial refugium during the Pleistocene. The only species here, *Somatochlora sahlbergi* Tryböm (22), can be termed Palaeartic-East Beringian because the vast majority of its range is in Eurasia.

3. *Transition*. Species generally most common in the southern boreal forests and adjacent montane forests in the West and mixed and deciduous forests in the East.

4. *Cordilleran*. Species confined to the western mountains and their intervening valleys and plateaus. The 2 species in this element are found only in the southern part of the Yukon.

5. *Western*. Species confined to west of the 100th meridian, but otherwise ranging widely in North America.

6. *Widespread*. Species with broad distributions in North America, from north to south and east to west, overlapping several of the other elements listed. These species range into boreal regions to varying degrees.

### Checklist of Yukon Odonata

In the following list, species are confined to the Nearctic region unless otherwise noted. The 17 species marked by asterisks (\*) have been added to the list of 16 recorded by Walker



(1953, 1958) and Walker and Corbet (1975) during the recent survey of the Yukon insect fauna (Cannings et al. 1991).

### Suborder Zygoptera

#### Family Lestidae

- |                                   |                       |
|-----------------------------------|-----------------------|
| 1. <i>Lestes disjunctus</i> Selys | Widespread            |
| 2. <i>Lestes dryas</i> Kirby      | Holarctic, Widespread |

#### Family Coenagrionidae

- |   |                              |
|---|------------------------------|
| 3. <i>Coenagrion interrogatum</i> (Hagen)*    | Northern boreal              |
| 4. <i>Coenagrion resolutum</i> (Hagen)*       | Widespread boreal            |
| 5. <i>Enallagma boreale</i> Selys             | Widespread boreal            |
| 6. <i>Enallagma cyathigerum</i> (Charpentier) | Holarctic, Widespread boreal |

### Suborder Anisoptera

#### Family Aeshnidae

- |  |                              |
|--|------------------------------|
| 7. <i>Aeshna canadensis</i> Walker*          | Transition                   |
| 8. <i>Aeshna eremita</i> Scudder             | Widespread boreal            |
| 9. <i>Aeshna interrupta</i> Walker           | Southern boreal              |
| 10. <i>Aeshna juncea</i> Linnaeus            | Holarctic, Widespread boreal |
| 11. <i>Aeshna palmata</i> Hagen*             | Cordilleran                  |
| 12. <i>Aeshna septentrionalis</i> Burmeister | Northern boreal              |
| 13. <i>Aeshna sitchensis</i> Hagen*          | Widespread boreal            |
| 14. <i>Aeshna subarctica</i> Walker*         | Holarctic, Widespread boreal |
| 15. <i>Aeshna umbrosa</i> Walker             | Transition                   |

#### Family Corduliidae

- |  |                           |
|--|---------------------------|
| 16. <i>Cordulia shurtleffi</i> Scudder           | Widespread boreal         |
| 17. <i>Somatochlora albicincta</i> (Burmeister)  | Widespread boreal         |
| 18. <i>Somatochlora franklini</i> (Selys)*       | Widespread boreal         |
| 19. <i>Somatochlora hudsonica</i> (Selys)        | Western boreal            |
| 20. <i>Somatochlora kennedyi</i> Walker*         | Southern boreal           |
| 21. <i>Somatochlora minor</i> (Calvert)*         | Southern boreal           |
| 22. <i>Somatochlora sahlbergi</i> Tryböm*        | Palaeartic-East Beringian |
| 23. <i>Somatochlora semicircularis</i> (Selys)*  | Cordilleran               |
| 24. <i>Somatochlora septentrionalis</i> (Hagen)* | Northern boreal           |
| 25. <i>Somatochlora whitehousei</i> Walker*      | Widespread boreal         |

#### Family Libellulidae

- |   |                              |
|---|------------------------------|
| 26. <i>Leucorrhinia borealis</i> Hagen        | Western boreal               |
| 27. <i>Leucorrhinia hudsonica</i> (Selys)     | Widespread boreal            |
| 28. <i>Leucorrhinia patricia</i> Walker       | Northern boreal              |
| 29. <i>Leucorrhinia proxima</i> Calvert       | Southern boreal              |
| 30. <i>Libellula quadrimaculata</i> Linnaeus* | Holarctic, Widespread        |
| 31. <i>Sympetrum danae</i> (Sulzer)*          | Holarctic, Widespread boreal |
| 32. <i>Sympetrum internum</i> Montgomery*     | Transition                   |
| 33. <i>Sympetrum madidum</i> (Hagen)*         | Western                      |

## Annotated List of Species

About 200 locations in the Yukon have been sampled for dragonflies, albeit briefly; the distribution of these sites is given in Figure 6. The following species accounts outline the total range, distribution in the Yukon, and ecology of the 33 species known from the Territory. Cannings et al. (1991) contains complete collection data and distribution maps for all species. Following each species name is the faunal element to which the species belongs. Distribution maps for characteristic species of each faunal element are presented. Yukon

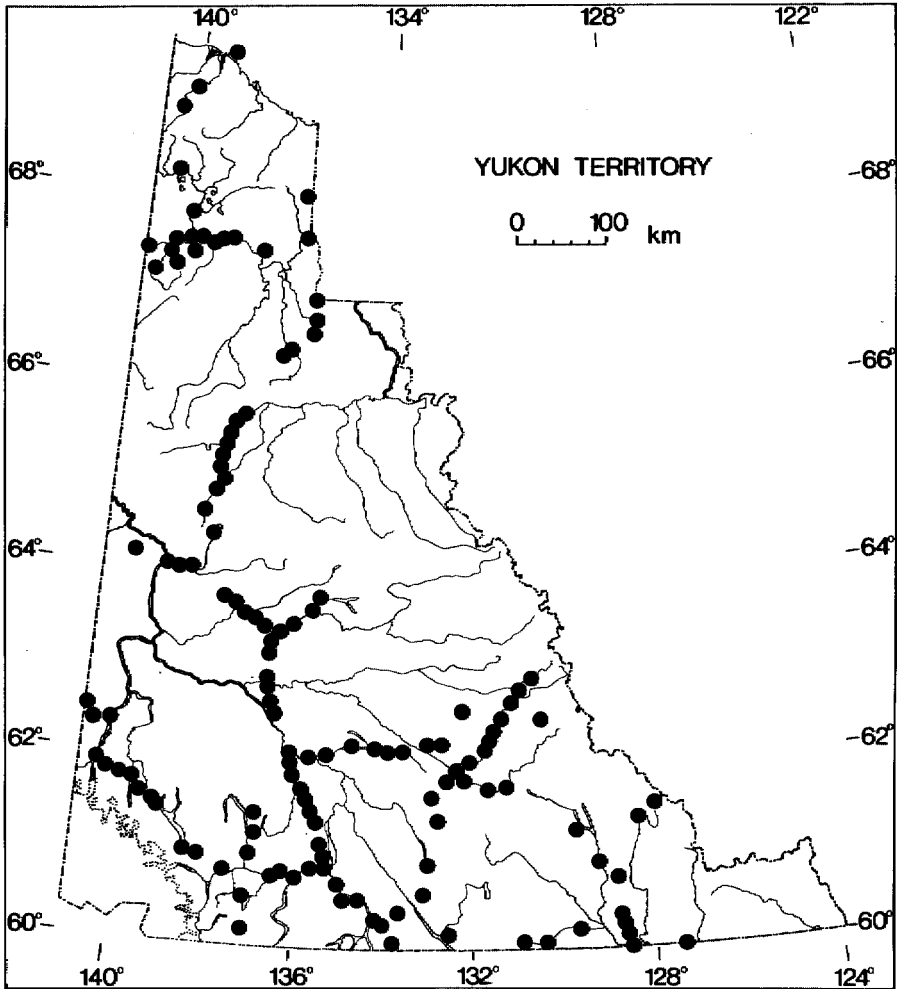


FIG. 6. All collection localities of dragonflies in the Yukon Territory.

records are summarized in terms of the Ecoregions of the Yukon recognized by the Ecological Stratification Working Group (1996).

### Suborder Zygoptera

#### Family Lestidae

This is a small but widespread family with 18 species of 2 genera in North America. Two species of the genus *Lestes* occur in the Yukon. In northwestern *Lestes*, the overwintering stage is the egg and the larvae grow very rapidly through the spring and early summer, emerging in mid- to late summer. This characteristic allows them to live in temporary ponds, although they also inhabit permanent waters.

**1. *Lestes disjunctus* Selys**

Widespread (Fig. 15)

*Distribution:* Alaska east to the Northwest Territories, Labrador, and Newfoundland, south to Florida, Texas, and Arizona.

*Yukon records:* Old Crow Basin (6), North Ogilvie Mountains (8), Eagle Plains (9), Mackenzie Mountains (10), Selwyn Mountains (11), Klondike Plateau (12), Saint Elias Mountains (13), Ruby Ranges (14), Yukon Plateau-Central (15), Yukon Plateau-North (16), Yukon Southern Lakes (17), Pelly Mountains (18).

*Biological information:* By far the more abundant of the 2 *Lestes* Leach species in the Yukon, *L. disjunctus* occurs throughout the forested part of the Territory (as far north as Old Crow) in a variety of habitats from sedge-bordered lakes to mossy fens. The recorded flight period is 27 June to 2 September, but most individuals do not appear until the third week of July. Emergence has been recorded as late as 1 September; the flight period, therefore, probably lasts until the onset of cold weather (normally between late August and late September).

**2. *Lestes dryas* Kirby**

Holarctic, Widespread

*Distribution:* Alaska east to the Northwest Territories, James Bay, the north shore of the St. Lawrence River, and Nova Scotia, south to New Jersey, Oklahoma, and California; Eurasia.

*Yukon records:* Old Crow Basin (6), Klondike Plateau (12), Yukon Plateau-North (16), Liard Basin (21).

*Biological information:* This species lives in deep sedge marshes in scattered localities throughout the low valleys of the Yukon, north to the lower Porcupine River. The few records give a flight period of 14 July to 15 August.

**Family Coenagrionidae**

This diverse family of small, often bright blue damselflies is represented by 98 species in 13 genera in North America. In the Yukon, four species occur, two from the predominantly Eurasian genus *Coenagrion* and two of the predominantly North American *Enallagma*. Larvae live in a wide range of standing waters.

**3. *Coenagrion interrogatum* (Hagen)**

Northern boreal

*Distribution:* Yukon east to the Northwest Territories and Newfoundland, south to Maine, Michigan, Wisconsin and central British Columbia.

*Yukon records:* Old Crow Basin (6), North Ogilvie Mountains (8), Eagle Plains (9), Selwyn Mountains (11), Klondike Plateau (12), Yukon Plateau-North (16), Liard Basin (21).

*Biological information:* Perhaps the most boreal of North American Zygoptera, *C. interrogatum* occurs throughout the Yukon, north to the Arctic treeline. Its habitat is more restricted than that of *C. resolutum*—although it lives in a variety of fens and marshes, it is common only in those with abundant aquatic mosses (Fig. 3) (Cannings and Cannings 1980). In a moss/sedge fen (pH 5.6) in the Selwyn Mountains, a female oviposited in dead, floating sedge leaves (km 128 Nahanni Range Road, 29 June 1985). Emergence is early and synchronous at the end of May and early June; the recorded flight period is 29 May to 2 August, but capture frequency declines markedly after mid-July. Copulations have been noted from 27 June to 8 July.

**4. *Coenagrion resolutum* (Hagen)**

Widespread boreal

*Distribution:* Alaska east to Hudson Bay and Newfoundland, south to New York, Ontario, Iowa, Alberta, and, in the mountains to Nevada and California.

*Yukon records:* British-Richardson Mountains (5), Old Crow Basin (6), Old Crow Flats (7), North Ogilvie Mountains (8), Eagle Plains (9), Mackenzie Mountains (10), Selwyn Mountains (11), Klondike Plateau (12), Saint Elias Mountains (13), Ruby Ranges (14), Yukon Plateau-Central (15), Yukon Plateau-North (16), Yukon Southern Lakes (17), Pelly Mountains (18), Liard Basin (21).

*Biological information:* This species has a wider range and wider habitat tolerance than *C. interrogatum*. In the Yukon it is virtually ubiquitous south of treeline—it is common at sedge or horsetail marshes and sedge-bordered lakes, and is also found in most fens. Wherever *C. interrogatum* lives, at least adult *C. resolutum* are almost always present, but the reverse is not true. The flight period recorded in the Yukon, 29 May to 3 August, is very similar to that of *C. interrogatum*, but at Koidern in 1979, *C. resolutum* emerged about one week later than *C. interrogatum* (Cannings and Cannings 1980). Copulations have been recorded from 2 June to 23 July, with most occurring from 15 June to 15 July.

**5. *Enallagma boreale* Selys**

Widespread boreal

*Distribution:* Alaska east through the Northwest Territories to Hudson Bay and Newfoundland, south to Massachusetts, Illinois, Manitoba, Alberta, and along the mountains to Utah and California.

*Yukon records:* Yukon Coastal Plain (1), British-Richardson Mountains (5), Old Crow Basin (6), Old Crow Flats (7), North Ogilvie Mountains (8), Eagle Plains (9), Mackenzie Mountains (10), Selwyn Mountains (11), Klondike Plateau (12), Saint Elias Mountains (13), Ruby Ranges (14), Yukon Plateau-Central (15), Yukon Plateau-North (16), Yukon Southern Lakes (17), Pelly Mountains (18), Yukon-Stikine Highlands (19), Liard Basin (21).

*Biological information:* This, along with the preceding species, is the most widespread damselfly in the Yukon. Its presence north of treeline (such as on Herschel Island: Walker and Corbet 1975), however, is most likely the result of wandering, wind-blown adults originating in the Mackenzie Delta, the Old Crow Flats, or the northernmost forested valleys. Despite intensive searching in 1983 and 1984, we found no adults or larvae either on Herschel Island or on the north slope of the Yukon mainland. *E. boreale* inhabits a wide variety of waters: sedge marshes, deep moss/sedge fen ponds, sedge-bordered lakes, and many others. Unlike in *Coenagrion* Kirby, the emergence is diffuse, with records ranging from 29 May to 2 July. Similarly, the recorded flight period is very long for this northern land, ranging from 29 May to 2 September. Copulations were recorded from 16 June to 7 August. One male was found in tandem with a female *E. cyathigerum* in Old Crow on 16 July 1983.

**6. *Enallagma cyathigerum* (Charpentier)**

Holarctic, Widespread boreal

*Distribution:* Alaska, east to Hudson Bay and Newfoundland, south to Connecticut, Ohio, Saskatchewan, Utah, and California; Eurasia.

*Yukon records:* British-Richardson Mountains (5), Old Crow Basin (6), Old Crow Flats (7), Eagle Plains (9), Mackenzie Mountains (10), Selwyn Mountains (11), Klondike Plateau (12), Saint Elias Mountains (13), Ruby Ranges (14), Yukon Plateau-Central (15), Yukon Plateau-North (16), Yukon Southern Lakes (17), Pelly Mountains (18), Liard Basin (21).

*Biological information:* This species has a similar range to that of *E. boreale* in the Territory, but is less often encountered. The habitat preferences of the 2 species are not easily distinguished, although *E. cyathigerum* is known from only 20 or so of the approximately 75 *E. boreale* sites. To complicate matters, the larvae of the 2 species are difficult to separate with confidence. In the Yukon, adult *E. cyathigerum* have been captured in sedge marshes, sedge/horsetail marshes, sedge-bordered lakes, mossy fen ponds, and sedge bog ponds. Its flight period is probably very similar to that of *E. boreale*; records range from 2 June to 10 August, with copulations recorded from 19 June to 10 August.

**Suborder Anisoptera****Family Aeshnidae**

The Aeshnidae, or darners, are the dominant group of large dragonflies in northern latitudes. Thirty-eight species occur in North America in 11 genera; nine species occur in the Yukon, all in the genus *Aeshna*. The larvae live in a wide variety of standing or slow-moving waters; they are relatively slender and adapted for climbing through aquatic vegetation. Adult males actively patrol the aquatic breeding habitat, continuously searching for females and only occasionally resting by hanging from a branch. Females possess an ovipositor which is well developed for laying eggs in plant tissue.

**7. *Aeshna canadensis* Walker**

Transition

*Distribution:* Yukon east to Quebec and Newfoundland, south to Maryland, Missouri, and Washington.

*Yukon records:* Yukon Plateau-North (16).

*Biological information:* Only one adult of this blue darner has been captured in the Yukon at Swim Lakes, near Ross River, 12 August 1960. This record (from a CNCI specimen previously identified as *A. eremita*) was unexpected, because *A. canadensis* has not been collected north of central British Columbia and is unknown from northern Alberta and the Northwest Territories. Its regular haunts are ponds and lakes with flooded or peaty margins (Cannings and Stuart 1975).

**8. *Aeshna eremita* Scudder**

Widespread boreal

*Distribution:* Alaska east through the Northwest Territories to Labrador and Newfoundland, south to Massachusetts, Ohio, Wisconsin, Manitoba, and Utah.

*Yukon records:* British-Richardson Mountains (5), Old Crow Basin (6), Old Crow Flats (7), Eagle Plains (9), Selwyn Mountains (11), Klondike Plateau (12), Saint Elias Mountains (13), Ruby Ranges (14), Yukon Plateau-Central (15), Yukon Plateau-North (16), Yukon Southern Lakes (17), Pelly Mountains (18), Liard Basin (21).

*Biological information:* The largest of the northern darners, the boreal *A. eremita* is a common inhabitant of forested valleys throughout the Territory, where it is dominant in sparsely vegetated or wooded lakes and ponds. It is also found at deep fens and sedge- or spikerush-bordered ponds. In the north it is only known in the low-lying Porcupine River system; it is rare in the upland valleys traversed by the Dempster Highway. Its recorded flight period is 24 June to 28 August, although some individuals undoubtedly survive into September. This large species is often the only dragonfly flying late in the evening—in the far north occasionally under the weak rays of the midnight sun.

### 9. *Aeshna interrupta* Walker

Southern boreal

*Distribution:* Alaska east through the Northwest Territories to Newfoundland, south to New Hampshire, Michigan, North Dakota, and in the western mountains to New Mexico and California.

*Yukon records:* Old Crow Basin (6), Selwyn Mountains (11), Klondike Plateau (12), Ruby Ranges (14), Yukon Plateau-Central (15), Yukon Plateau-North (16), Yukon Southern Lakes (17), Pelly Mountains (18).

*Biological information:* This darter, the dominant *Aeshna* Fabricius of the Prairie Provinces, is common in the prairie-like ponds of the southern Yukon, but is unknown in the central mountains and rare in the low, northern valley of the Porcupine River. The adults fly primarily at sedge ponds or lakes (Fig. 1), but also live at sedge/moss peatland sites. The recorded flight period is 26 June to 22 August, with most emerging in the last half of July.

*Taxonomic notes:* The form in the Yukon is *A. i. lineata* Walker.

### 10. *Aeshna juncea* Linnaeus

Holarctic, Widespread boreal (Fig. 7)

*Distribution:* Alaska east through the Mackenzie Delta to Labrador, south to Newfoundland and New Hampshire, Ontario, Manitoba, and in the mountains from Alberta and British Columbia to Colorado; Eurasia.

*Yukon records:* British-Richardson Mountains (5), Old Crow Basin (6), Old Crow Flats (7), North Ogilvie Mountains (8), Eagle Plains (9), Selwyn Mountains (11), Klondike Plateau (12), Saint Elias Mountains (13), Ruby Ranges (14), Yukon Plateau-Central (15), Yukon Plateau-North (16), Yukon Southern Lakes (17), Pelly Mountains (18), Liard Basin (21).

*Biological information:* The most common *Aeshna* in the Yukon, *A. juncea* lives in virtually every sedge pothole and marsh in the forested regions of the Territory. It seems to drop out a little south of treeline, however, where *A. septentrionalis* assumes dominance. Although it is most abundant in sedge ponds and marshes, it also occurs in meandering streams and a variety of mossy fens, as long as sedges are present. The recorded flight period is 26 June to 2 September, although in favourable years adults would undoubtedly survive well into September. Emergence has been recorded throughout July; a peak evidently occurs near the end of the month, because adult collection frequency increases markedly in early August. Oviposition has been recorded from 14 July to 19 August.

### 11. *Aeshna palmata* Hagen

Cordilleran

*Distribution:* Southern Alaska and Yukon south through British Columbia and western Alberta (and Cypress Hills of Saskatchewan) to California, Utah, and Colorado.

*Yukon records:* Selwyn Mountains (11), Yukon Plateau-Central (15), Yukon Plateau-North (16), Pelly Mountains (18), Liard Basin (21).

*Biological information:* *Aeshna palmata* is perhaps the most common dragonfly of the Cordillera. This darter, so widespread farther south, is restricted to small, warm lakes in the valleys of south-central and southeastern Yukon. It has not been collected in the Shakwak Trench. The lakes it patrols are usually characterized by marl bottoms and edges with scattered sedge clumps. The recorded flight period is 12 July to 6 August, but is probably wider than these figures indicate.

*Taxonomic notes:* Despite being described from Kamchatka by Hagen (Walker 1958; Belyshev 1973), it has never subsequently been recorded in the Palaearctic. Belyshev (1973) suggests the type specimen was erroneously attributed to Kamchatka and believes the occurrence of *Aeshna palmata* there is doubtful. We are here considering it a Nearctic species only.

**12. *Aeshna septentrionalis* Burmeister**

Northern boreal (Fig. 8)

*Distribution:* Yukon east to the Mackenzie Delta, Hudson Bay, Ungava, and Labrador, south to Newfoundland, New Hampshire, James Bay, Great Slave Lake, central British Columbia, and south in the Rocky Mountains to 51°N.

*Yukon records:* Yukon Coastal Plain (1), British-Richardson Mountains (5), Old Crow Basin (6), North Ogilvie Mountains (8), Eagle Plains (9), Mackenzie Mountains (10), Selwyn Mountains (11), Saint Elias Mountains (13), Ruby Ranges (14), Yukon Plateau-North (16), Yukon Southern Lakes (17), Pelly Mountains (18), Liard Basin (21).

*Biological information:* The most boreal of the boreal *Aeshna* species, *A. septentrionalis* is probably the most widespread large dragonfly in the Yukon. In the southern valleys it is uncommon, but it is common in the scattered ponds and fens of the surrounding hills and mountain valleys. In the Ogilvie Mountains and in the bogs and fens of the northern valleys, it is the dominant *Aeshna*. Records from Herschel Island and the White Mountains probably represent wandering, wind-blown individuals that originated in the Mackenzie Delta or the Old Crow Flats. In the Firth River valley, larvae were taken in shallow, sedge-bordered ponds; this is the most northerly breeding record for Odonata in the Yukon. Larvae live in a variety of habitats, many characterized by aquatic moss (deep mossy fen, *Carex/Eleocharis* fen, *Carex*/moss marsh, *Eleocharis*-bordered pond, shallow, mud-bottomed polygon fen). Adult males have been collected patrolling a much wider range of waters, including bog pools and marl-bottomed lakes. The recorded flight period is 19 June to 22 August, but some individuals probably survive well into September in favourable seasons. Emergence has been recorded on 7 July (Old Crow) and 12 July (S. Canol Rd.), but probably extends from mid-June to mid-July. Oviposition and copulation have been observed from 2 July to 26 July; females oviposited in sedge/moss and sedge/horsetail habitats. At a deep fen pond at Old Crow, males patrolled both the floating mats of moss in the centre of the pond and its sedge borders. The moss in the breeding habitats is not necessarily acid-loving *Sphagnum*; rather, it is usually *Drepanocladus*, *Scorpidium*, or some other moss associated with near-neutral waters. Recorded pH of larval habitats in the Yukon ranges from 4.0 to 6.0, with most in the 5.3 to 5.6 range.

**13. *Aeshna sitchensis* Hagen**

Widespread boreal

*Distribution:* Alaska east to Hudson Bay, Labrador, and Newfoundland, south to Maine, central Ontario, Michigan, southern Manitoba, the Alberta Rocky Mountains, and southern British Columbia. *Yukon records:* British-Richardson Mountains (5), Old Crow Basin (6), North Ogilvie Mountains (8), Selwyn Mountains (11), Pelly Mountains (18), Liard Basin (21).

*Biological information:* This small darner is a common inhabitant of shallow, evenly vegetated sedge or sedge/moss fens in the Yukon. In these habitats open water is restricted to very small puddles, if it is present at all (Fig. 4). In the Yukon, this species almost invariably flies with *Somatochlora franklini*. Although there are fewer records, the range of *A. sitchensis* in the Yukon closely matches that of its close relative, *A. septentrionalis*. Whitehouse (1941) states that in Atlin, British Columbia (just south of the Yukon border), *A. sitchensis* emerges 2 to 3 weeks later than *A. septentrionalis*; there are no comparable data for a Yukon locality, but ovipositing females on 6 July (at timberline in the northern Richardson Mts., km 450 Dempster Hwy.) indicate an emergence in late June, perhaps ten days later than the earliest *A. septentrionalis* emergence. Whitehouse recorded emergence at Atlin on 14 July. The recorded flight period is 6 July to 5 August, but probably ranges from late June to late August.

**14. *Aeshna subarctica* Walker**

Holarctic, Widespread boreal

*Distribution:* Yukon east to the Mackenzie Delta, James Bay and Newfoundland, south to Nova Scotia, Quebec, central Ontario, northern Michigan, Manitoba, and southern British Columbia; Eurasia.

*Yukon records:* Old Crow Basin (6), Old Crow Flats (7), North Ogilvie Mountains (8), Selwyn Mountains (11), Yukon Plateau-North (16).

*Biological information:* This Holarctic darner is closely related to *A. juncea* and has a range similar to it in the Yukon, although it is much less common. It is restricted to larval habitats such as *Sphagnum* bogs and deep fens that are dominated by aquatic moss (Fig. 3). The moss need not be *Sphagnum* and the water not necessarily very acidic; other aquatic mosses such as *Drepanocladus* and *Scorpidium* are more commonly associated with this dragonfly. The pH of various *A. subarctica* sites in the Yukon ranges from 4.0 to 6.5. On 23 July 1984, males at a deep fen at Old Crow patrolled only over the floating mats of moss in the middle of the pond; they never followed the edge as *A. juncea* would. One of these males clasped a female *A. septentrionalis* in tandem, but was rejected. The recorded flight

period is limited by few data; it ranges from 20 July to 3 August. Oviposition has been recorded on 2 and 4 August; females laid eggs directly into floating moss.

**15. *Aeshna umbrosa* Walker**

Transition

*Distribution:* Yukon east to Hudson Bay, Labrador, and Newfoundland, south to Alabama, Oklahoma, Utah and California.

*Yukon records:* Klondike Plateau (12)?, Liard Basin (21).

*Biological information:* Little is known of the distribution of this dragonfly in the Yukon, perhaps because its preferred habitat is relatively rare along roads in the southern Yukon. However, patrolling males were common at the outlet stream of a beaver pond just south of Watson Lake on 23 July 1981 (Fig. 5). Nearby in northern British Columbia, the species was common along a slow stream crossing the Stewart-Cassiar Highway on 25 August 1981. The only other Yukon record is from a vague area outlined by latitudes and longitudes, indicating the Dawson region.

**Family Corduliidae**

The Corduliidae are medium-sized dragonflies, usually with dark, somewhat metallic bodies and brilliant green eyes. There are 49 species in 7 genera in North America. In the north, it is one of the dominant families: ten species are known from the Yukon, one in the genus *Cordulia* and nine in *Somatochlora*. The genus *Somatochlora* is most diverse in more temperate areas such as southeastern North America, but has also successfully populated northern marshes and peatlands. The larvae are sprawlers in bottom debris where, camouflaged by algal coats, they wait in ambush for prey. Adult males patrol for mates in a similar manner to aeshnids, but females drop eggs by tapping the water with their abdomens.

**16. *Cordulia shurtleffi* Scudder**

Widespread boreal

*Distribution:* Alaska east through the Northwest Territories to Newfoundland, south to Pennsylvania, Ohio, and Saskatchewan, and in the mountains to Utah and California.

*Yukon records:* Old Crow Basin (6), Old Crow Flats (7), Eagle Plains (9), Klondike Plateau (12), Ruby Ranges (14), Yukon Plateau-Central (15), Yukon Plateau-North (16), Yukon Southern Lakes (17), Liard Basin (21).

*Biological information:* This common emerald lives throughout the forested regions of the Yukon; the most northerly records are from the Old Crow area. Larvae and adults have been captured in a variety of habitats, including sedge marshes and fens, shallow lakes, deep ponds with wooded margins, and sedge-lined, silt-bottomed oxbows. Adults emerge relatively synchronously in the first 2 weeks of June, although exuviae found on 31 May indicate that some emerge earlier. It is an early summer species—the recorded flight period is 2 June to 18 July. On 27 June 1979 a female oviposited in open water at a wooded pond near the Donjek River.

**17. *Somatochlora albicincta* (Burmeister)**

Widespread boreal (Fig. 16)

*Distribution:* Alaska east to Labrador and Newfoundland, south to New Hampshire, Lake Superior, and north of the Great Plains to the Rocky Mountains, south through British Columbia and Alberta to Washington.

*Yukon records:* Old Crow Basin (6), North Ogilvie Mountains (8), Eagle Plains (9), Selwyn Mountains (11), Klondike Plateau (12), Saint Elias Mountains (13), Ruby Ranges (14), Yukon Plateau-Central (15), Yukon Plateau-North (16), Yukon Southern Lakes (17), Pelly Mountains (18), Liard Basin (21).

*Biological information:* This emerald is common throughout much of the Yukon. In the south, it is widespread in the mountains and valleys; in the north it is more scattered in the low valleys of the Ogilvie, Eagle and Porcupine rivers. Although its habitats are varied, they share the feature of relatively open, unvegetated, shallow water. In the southern valleys, for example, *S. albicincta* is most common along marl- or rock-bottomed lakeshores with only scattered sedges. In the mountains and in the north the species favours mud-bottomed, mossy, fen ponds. The recorded flight period is 19 June to 19 August; most emergence occurs in late June and early July. Oviposition has been observed from 9 July to 5 August. In the northern Yukon, *S. albicincta* hybridizes with *S. sahlbergi* (Fig. 16).

**18. *Somatochlora franklini* (Selys)**

Widespread boreal

*Distribution:* Yukon and Northwest Territories east to Labrador, south to Maine, Minnesota, southern Manitoba, and British Columbia.

*Yukon records:* British-Richardson Mountains (5), Old Crow Basin (6), North Ogilvie Mountains (8), Eagle Plains (9), Selwyn Mountains (11), Yukon Plateau-North (16), Yukon Southern Lakes (17), Pelly Mountains (18).

*Biological information:* This slender, delicate emerald, found across the boreal regions of North America, is common throughout the forested regions of the Yukon, north to the lower Porcupine River. Its habitat requirements are very similar to, but perhaps stricter than, those of *Aeshna sitchensis*, and it is almost invariably found flying with that damer. In the Yukon, it has been found exclusively at shallow, moss-bottomed, evenly vegetated fens and bogs (Fig. 4); the acidity of waters measured ranges from pH 4.0 to 5.3. Usually, no open patches of water are visible from a distance. The dominant vegetation carpeting these fens and bogs is usually *Carex*, but *Equisetum* is occasionally present, and males have also been observed patrolling over thick *Menyanthes* patches in a *Sphagnum* bog and water-soaked moss in a level fen. In Walker and Corbet (1975), no mention is made of this distinctive, evenly vegetated characteristic of this species' habitat; they describe preferred sites as "spring-fed sphagnum bogs" (which are actually fens). The recorded flight period is 23 June to 5 August, but patrolling males have been captured on 9 August just south of the border with British Columbia. Copulation and oviposition have been observed from 1 July to 5 August. The males evidently patrol only when the sun shines, and they hover a great deal (more so than *S. kennedyi* males in the same situation), turning one way and then the other while stationary.

**19. *Somatochlora hudsonica* (Selys)** Western boreal (Fig. 16)

*Distribution:* Alaska east through the Northwest Territories to northwestern Ontario, south to southern British Columbia and in the Rocky Mountains to Colorado.

*Yukon records:* British-Richardson Mountains (5), Old Crow Basin (6), Klondike Plateau (12), Saint Elias Mountains (13), Ruby Ranges (14), Yukon Plateau-Central (15), Yukon Plateau-North (16), Yukon Southern Lakes (17), Pelly Mountains (18).

*Biological information:* This species, the emerald of the Cordillera and western boreal regions of North America, lives throughout the valleys of the Yukon (common in the south, less so in the north) in deep, sedge-bordered lakes and ponds (Fig. 1). Walker and Corbet (1975) give a contrasting habitat description: "Slow streams and bog-margined ponds." Like those of *S. albicincta*, the males patrol the edge of the vegetation and often are easily captured. The recorded flight period for the Yukon is 9 June to 2 August; emergence has been observed as late as 20 June. In the low, northern valleys, *S. hudsonica* often hybridizes with *S. sahlbergi* where the habitat requirements of the 2 species overlap (Fig. 16).

**20. *Somatochlora kennedyi* Walker** Southern boreal

*Distribution:* Yukon east to the Northwest Territories, James Bay, southern Quebec and New Brunswick, south to New York, Michigan, Wisconsin, and southern Manitoba.

*Yukon records:* Old Crow Basin (6), North Ogilvie Mountains (8), Liard Basin (21).

*Biological information:* *S. kennedyi* occurs only in scattered localities in the Yukon, but these range from sedge/rush and polygon sedge fens along the Porcupine River at Old Crow to a deep sedge/moss marsh in the southeast. There has also been a sight record at a *Sphagnum* bog (pH 4.0) near Mount Sheldon on the North Canal Road. Males patrol and females oviposit in shallow, open puddles underlain by moss. We have never found them at "flowing water in the open" as Walker and Corbet (1975) report, quoting Robert (1953). The recorded flight period is 2 July to 29 July, but undoubtedly extends into August. Oviposition has been observed on 2 and 7 July.

**21. *Somatochlora minor* (Calvert)** Southern boreal (Fig. 9)

*Distribution:* Southern Yukon and British Columbia east to James Bay and Nova Scotia, south to New York, Michigan, Wyoming, and Washington.

*Yukon records:* Yukon Plateau-Central (15), Yukon Plateau-North (16), Liard Basin (21).

*Biological information:* In the Yukon, this small emerald has been found only at 5 small, slowly moving streams in southern valleys (Fig. 5). The streams are usually bordered by *Carex* stands, sometimes mixed *Carex/Hippurus*. The few capture records range from 23 July to 2 August; oviposition has been observed at Tuchtua on 1 August.

**22. *Somatochlora sahlbergi* Tryböm** (Frontispiece) Palaearctic-East Beringian (Figs. 11, 16)

*Distribution:* Central Alaska east through the northern Yukon to the Mackenzie River Delta; northern Eurasia.

*Yukon records:* British-Richardson Mountains (5), Old Crow Basin (6), North Ogilvie Mountains (8), Eagle Plains (9).



**Biological information:** *S. sahlbergi* has the most northerly breeding range of any odonate. In Eurasia it ranges from northern Norway, Sweden and Finland (d'Aguilar et al. 1985) eastward through Siberia (Belyshev 1973; Cannings and Cannings 1985) (Fig. 11). In its entirety, its distribution can be termed Palaearctic-East Beringian. Although in North America it might not range as far north as *Aeshna septentrionalis* or *Enallagma boreale*, the southern margin of its range is very far north. It has not been found south of the Blackstone River (on the northward slope of the Ogilvie Mts.) in the Yukon or Dot Lake and the Kuskokwim River in Alaska. In the Yukon it is found within 100 km or so of the latitudinal treeline and is usually within 300 m of the altitudinal treeline (Fig. 3) (Cannings and Cannings 1985). There it "inhabits a variety of ponds and bog pools, from narrow roadside ditches and pools in low-centre polygons to small (150 m diameter), moss-margined lakes. Both minerotrophic (fens) and ombrotrophic (bogs) waters are represented. We have found this species in slowly moving waters only once, in a fen pond where there was a perceptible current through the saturated moss and sedges. There seem to be 2 main characteristics that unite all the sites—the occurrence of an aquatic moss as the dominant vegetation and deep, cold water" (Cannings and Cannings 1985). This preference for deep, mossy ponds separates *S. sahlbergi* somewhat from its 2 closest relatives, *S. hudsonica* and *S. albicincta*. Male *S. sahlbergi* also behave differently from the other 2 species: rather than patrolling the edge of the vegetation, they tend to stay out over open water, often criss-crossing over the surface. This behaviour corresponds with that of the ovipositing females, which stay away from the shoreline sedges, dropping their eggs into open water underlain by aquatic moss. The recorded flight period in the Yukon is 30 June to 10 August, but the observation of abundant, mature adults (some in copulation) in the Blackstone River and Engineer Creek valleys on the former date indicates that, at least in some years, emergence occurs as early as 25 June. Emergence has been recorded only on 3 July, but this record was for a treeline pond in the Richardson Mountains, where one would expect the season to be later than in the Ogilvie and Blackstone valleys.

**Taxonomic notes:** In the low valleys of the northern Yukon, *S. sahlbergi* hybridizes with both *S. hudsonica* and *S. albicincta* where their habitat requirements overlap and the species are found together (Fig. 16) (Cannings and Cannings 1985).

**23. *Somatochlora semicircularis* (Selys)** Cordilleran (Fig. 13)

**Distribution:** Southern Alaska and Yukon south through British Columbia and the Rocky Mountains of Alberta to Colorado, Utah, and California.

**Yukon records:** Liard Basin (21).

**Biological information:** The range of this emerald of the western mountains barely reaches the Yukon—it is known from only one marsh in the southeast, just north of the British Columbia border, similar to the one shown in Fig. 2. On 28 July 1986 a female oviposited in a sedge/moss marsh at Loon Lake, east of Iron Creek. At the same marsh, *S. kennedyi* were patrolling and ovipositing. The flight period probably extends back into mid-June; at Blue Lakes, in nearby northern British Columbia, a teneral adult was captured on 19 June 1987.

**24. *Somatochlora septentrionalis* (Hagen)** Northern boreal

**Distribution:** Yukon east to the Northwest Territories, Hudson Bay, and Labrador, south to Newfoundland, James Bay, and central British Columbia.

**Yukon records:** Selwyn Mountains (11).

**Biological information:** Although this species is found across the boreal regions of Canada, it is known in the Yukon from only one larval skin; this was collected on 29 June 1985 on a sedge at the edge of a shallow pool in a fen along the Nahanni Range Road, in the Selwyn Mountains. The fen consisted of *Sphagnum capillifolium* (Weiss) Schrank hummocks amongst shallow pools with aquatic mosses (primarily *Scorpidium scorpioides* (Hedw.) Limpr.) and scattered sedges; the water was pH 5.6. The moulted skin was on a sedge at the edge of a shallow pool. In nearby northern British Columbia, Whitehouse (1941) estimated that the flight period began in mid-June in Atlin; his latest record was August 22.

**25. *Somatochlora whitehousei* Walker** Widespread boreal

**Distribution:** Yukon east to Hudson Bay and Labrador, south to central Quebec, northern Ontario, northern Prairie Provinces, and central British Columbia.

**Yukon records:** Old Crow Basin (6), North Ogilvie Mountains (8), Selwyn Mountains (11).

**Biological information:** *S. whitehousei* has been found at only 3 widely scattered localities in the Yukon from the Bluefish River in the north to the Hyland River in the southeast. It prefers level sedge/moss

fens; *Menyanthes* is sometimes present as well. One of these fens had a pH of 5.5. The males patrol shallow puddles, flying slowly about 20–30 cm above the water. The females oviposit in these puddles; one, at a fen beside the Bluefish River on 8 July 1983, dipped its abdomen 1–2 times/sec, while holding its cerci upright. The recorded flight period in the Yukon is 1 to 30 July; oviposition has been observed throughout this period.

### Family Libellulidae

This, one of the world's most diverse dragonfly families, is represented in North America by 105 species in 25 genera. In the Yukon there are eight species in three genera: four in the circumboreal genus *Leucorrhinia*, three in the widespread *Sympetrum*, and one Holarctic species in the diverse genus *Libellula*. The somewhat squat larvae are very similar in appearance and habits to those of the Corduliidae. The small to medium-sized adult males do not patrol, but usually defend a territory by sallying out from a prominent perch. The females, like corduliids, lay eggs by dropping them in the water.

#### 26. *Leucorrhinia borealis* Hagen

Western boreal (Fig. 10)

*Distribution:* Alaska and the Yukon east to northwestern Ontario, south to Manitoba, Saskatchewan, Alberta, and southern British Columbia.

*Yukon records:* Old Crow Basin (6), Eagle Plains (9), Klondike Plateau (12), Ruby Ranges (14), Yukon Plateau-Central (15), Yukon Plateau-North (16), Yukon Southern Lakes (17), Pelly Mountains (18).

*Biological information:* This is a common dragonfly of northern prairie marshes in North America. In the Yukon it is common in the southern valleys, but is less widespread in the north. It prefers deep, sedge marshes, but lives in a variety of fens, including those with aquatic moss and *Potentilla palustris* (L.) Scop. as the dominant plants. In the Yukon its recorded flight period is early and short, from 2 June to 12 July. Emergence has been noted from 2 June to about 21 June, and copulations have been observed from 21 June to 12 July.

#### 27. *Leucorrhinia hudsonica* (Selys)

Widespread boreal

*Distribution:* Alaska east through the Northwest Territories to Newfoundland, south to New England, Michigan, Nebraska, Utah, and California.

*Yukon records:* British-Richardson Mountains (5), Old Crow Basin (6), Old Crow Flats (7), North Ogilvie Mountains (8), Eagle Plains (9), Mackenzie Mountains (10), Selwyn Mountains (11), Klondike Plateau (12), Ruby Ranges (14), Yukon Plateau-Central (15), Yukon Plateau-North (16), Yukon Southern Lakes (17), Pelly Mountains (18), Liard Basin (21).

*Biological information:* Probably the most widespread libellulid in the Yukon, this small dragonfly is common at shallow mossy fen pools, deep sedge fens, *Sphagnum* bogs, sedge-rimmed rock-bottomed lakes, and deep lakes with tall sedge borders. Emergence has been observed from 29 May to 26 June; the recorded flight period lasts until 12 August, with a noticeable decline in numbers after mid-July. Copulations and ovipositions have been observed from 27 June to 18 July.

#### 28. *Leucorrhinia patricia* Walker

Northern boreal

*Distribution:* Alaska and Yukon east through the Northwest Territories to Hudson Bay and northern Quebec, south to southern Quebec, northern Ontario, the northern Prairie Provinces, and central British Columbia.

*Yukon records:* Old Crow Basin (6), North Ogilvie Mountains (8), Selwyn Mountains (11), Yukon Plateau-Central (15), Yukon Plateau-North (16), Pelly Mountains (18).

*Biological information:* This, the smallest anisopteran in the Yukon, has a narrower ecological distribution than *L. hudsonica*—it is restricted to water bodies with mats of aquatic moss floating on or near the surface. In a fen at km 206.5, Dempster Highway, *L. patricia* dominated the floating moss edge of a deep pool, whereas *L. hudsonica* was common in the *Carex* stands nearby. Capture dates range from 16 June (“slightly teneral”) to 4 August; emergence probably occurs throughout the second half of June (there is a record of a teneral on 1 July). Copulation and oviposition have been observed from 1 July to 30 July. At the fen at km 206.5 Dempster Highway on 1 July 1982, females oviposited into open water at the edge of the floating moss.

#### 29. *Leucorrhinia proxima* Calvert

Southern boreal

*Distribution:* Alaska east through the Northwest Territories to Nova Scotia, south to Pennsylvania, Wisconsin, the Prairie Provinces, and British Columbia, and, in the mountains, south to Wyoming and Utah.

*Yukon records:* Old Crow Basin (6), Yukon Plateau-Central (15), Yukon Plateau-North (16), Yukon Southern Lakes (17), Liard Basin (21).

*Biological information:* This species is uncommon in the Yukon; it prefers more southerly latitudes, as it is one of the commonest members of its genus in British Columbia. It is found, however, in scattered populations in all the main valleys of the Territory, where it lives in sedge marshes or ponds. The recorded flight period is from 11 June to 28 July.

**30. *Libellula quadrimaculata* Linnaeus**

Holarctic, Widespread

*Distribution:* Southern Alaska east to the Northwest Territories, Hudson Bay, Labrador, and Newfoundland, south to New Jersey, Pennsylvania, Tennessee, Nebraska, New Mexico, Nevada, and California; Eurasia.

*Yukon records:* North Ogilvie Mountains (8) (sight record only), Yukon Plateau-Central (15), Yukon Plateau-North (16), Yukon Southern Lakes (17).

*Biological information:* This dragonfly, known for its mass movements elsewhere in its range (Walker and Corbet 1975), lives throughout the southern half of the Territory in lakes and marshes. The flight period is early and very short (whether the adults die or wander away is unknown). Capture dates range from 2 June to 12 July, although there is only one July record. There are indications of long-distance movement: one individual was seen north of the usual range at the fen at km 206.5, Dempster Highway, on 7 July 1982.

**31. *Sympetrum danae* (Sulzer)**

Holarctic, Widespread boreal

*Distribution:* Alaska east to the Northwest Territories and Newfoundland, south to Maine, Kentucky, Manitoba, Saskatchewan, Alberta, and California; Eurasia.

*Yukon records:* Old Crow Basin (6), Mackenzie Mountains (10), Klondike Plateau (12), Saint Elias Mountains (13), Ruby Ranges (14), Yukon Plateau-Central (15), Yukon Plateau-North (16), Yukon Southern Lakes (17).

*Biological information:* *S. danae* lives throughout the forested parts of the Yukon, north to the Old Crow area, in a variety of fens, marshes and bogs. In the adjacent Northwest Territories, it has been collected north of treeline on the Tuktoyaktuk Peninsula (Royal British Columbia Museum specimens). The flight period is late for these northern latitudes; capture records range from 17 July to 2 September. Flight probably lasts until the onset of continuous, cold weather, because emergence records range from 17 July (Old Crow) to 26 August (Kluane). Copulations have been observed from 3 August to 2 September.

**32. *Sympetrum internum* Montgomery**

Transition (Fig. 12)

*Distribution:* Alaska east to the Northwest Territories and Newfoundland, south to Pennsylvania, Missouri, Utah, and California.

*Yukon records:* Klondike Plateau (12), Ruby Ranges (14) (sight record only), Yukon Plateau-Central (15), Yukon Plateau-North (16), Yukon Southern Lakes (17), Liard Basin (21).

*Biological information:* *S. internum* lives in sedge and sedge/moss marshes (Fig. 2) throughout the dry valleys of the southern Yukon, although it is very rare in the Shakwak Trench. The flight period ranges from 28 June to 2 September (sight record), with most captures coming after mid-July. Emergence and teneral records range from 28 June to 22 July; copulations and ovipositions have been observed from 22 July to 11 August. Unlike most of the other dragonflies found in the Yukon, the Territory's population of *S. internum* is made up of remarkably small individuals. Specimens from the Yukon have hindwing lengths ranging from 21 mm to 24 mm, with a mean of 23 mm ( $n = 23$ ), whereas a selection of specimens of *S. internum* from populations in southern British Columbia have hindwings ranging from 23 to 27 mm, with a mean of 25 mm ( $n = 25$ ). Specimens from east of the Rocky Mountains are larger still; 15 specimens measured range from 27–29 mm with a mean of 28 mm.

**33. *Sympetrum madidum* (Hagen)**

Western (Fig. 14)

*Distribution:* Southern Yukon and Northwest Territories south through British Columbia to California, east to Manitoba in the north and Missouri in the south.

*Yukon records:* Selwyn Mountains (11).

*Biological information:* *S. madidum* is known from the southeastern Yukon at only one locality, a shallow, sedge/moss fen (pH 5.5) in the Hyland River valley of the Selwyn Mountains. There, pairs were copulating and ovipositing on 30 and 31 July.

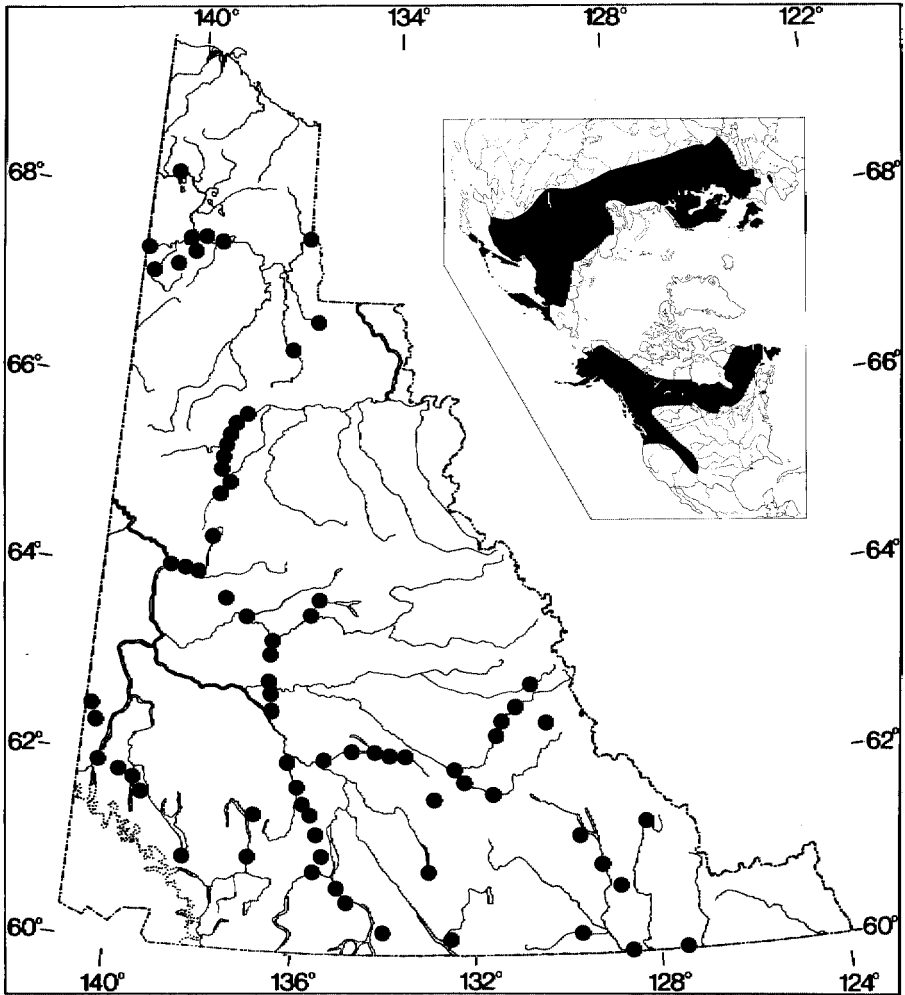


FIG. 7. Distribution of *Aeshna juncea* Linnaeus (10), an Holarctic species and a member of the Widespread boreal element.

### Analysis of the Fauna

Species making up the various faunal elements are listed below. The Figures cited are maps showing the Yukon and world distribution of species that exemplify the elements.

#### 1. Boreal (23 spp., 70%)

i. Widespread boreal (13 spp., 40%) (Fig. 7). *Coenagrion resolutum* (4), *Enallagma boreale* (5), *Enallagma cyathigerum* (6), *Aeshna eremita* (8), *Aeshna juncea* (10), *Aeshna sitchensis* (13), *Aeshna subarctica* (14), *Cordulia shurtleffi* (16), *Somatochlora albicincta* (17), *Somatochlora franklini* (18), *Somatochlora whitehousei* (25), *Leucorrhinia hudsonica* (27), *Sympetrum danae* (31).

ii. Northern boreal (4 spp., 12%) (Fig. 8). *Coenagrion interrogatum* (3), *Aeshna septentrionalis* (12), *Somatochlora septentrionalis* (24), *Leucorrhinia patricia* (28).

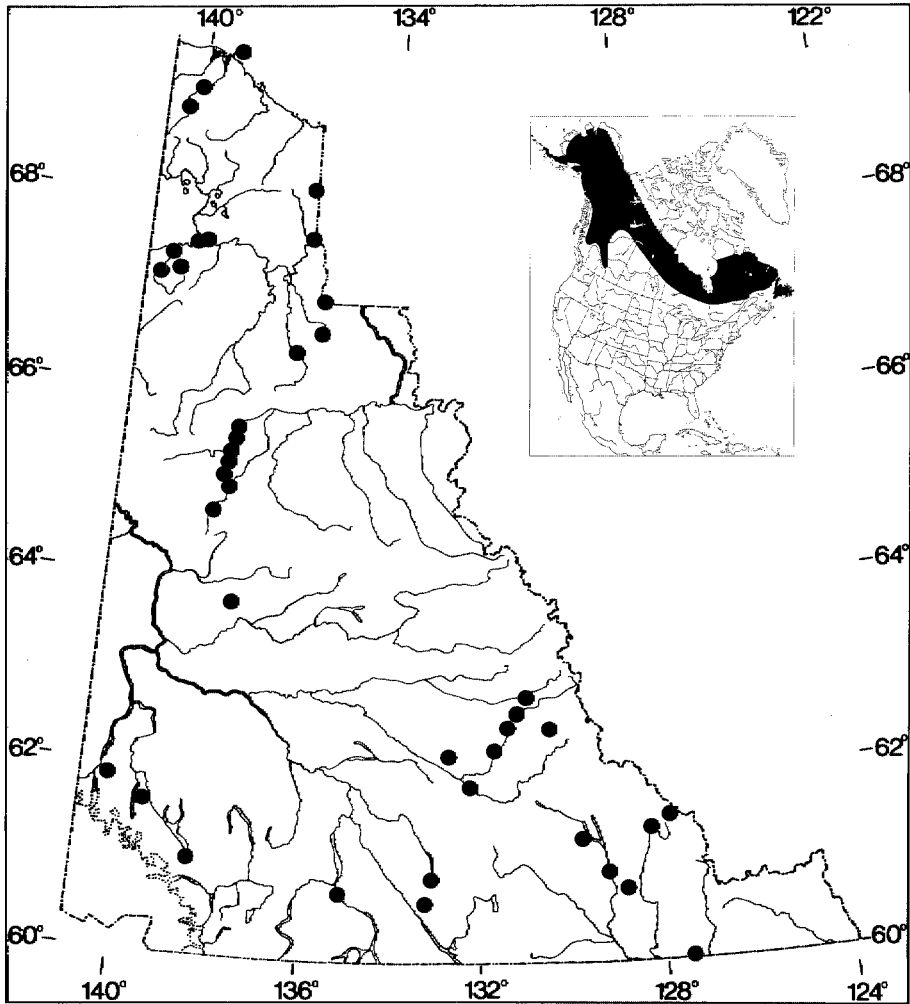


FIG. 8. Distribution of *Aeshna septentrionalis* Burmeister (12), a species of the Northern boreal element.

iii. Southern boreal (4 spp., 12%) (Fig. 9). *Aeshna interrupta* (9), *Somatochlora kennedyi* (20), *Somatochlora minor* (21), *Leucorrhinia proxima* (29).

iv. Western boreal (2 spp., 6%) (Fig. 10). *Somatochlora hudsonica* (19), *Leucorrhinia borealis* (26).

Sixteen species in the Boreal element range south of 51°N along the higher mountains and plateaus of the Cordillera: *Coenagrion resolutum*, *Enallagma boreale*, *E. cyathigerum*, *Aeshna eremita*, *A. interrupta*, *A. juncea*, *A. sitchensis*, *A. subarctica*, *Cordulia shurtleffi*, *Somatochlora albicincta*, *S. hudsonica*, *S. minor*, *Leucorrhinia borealis*, *L. hudsonica*, *L. proxima* and *Sympetrum danae*. These could also be termed boreomontane species.

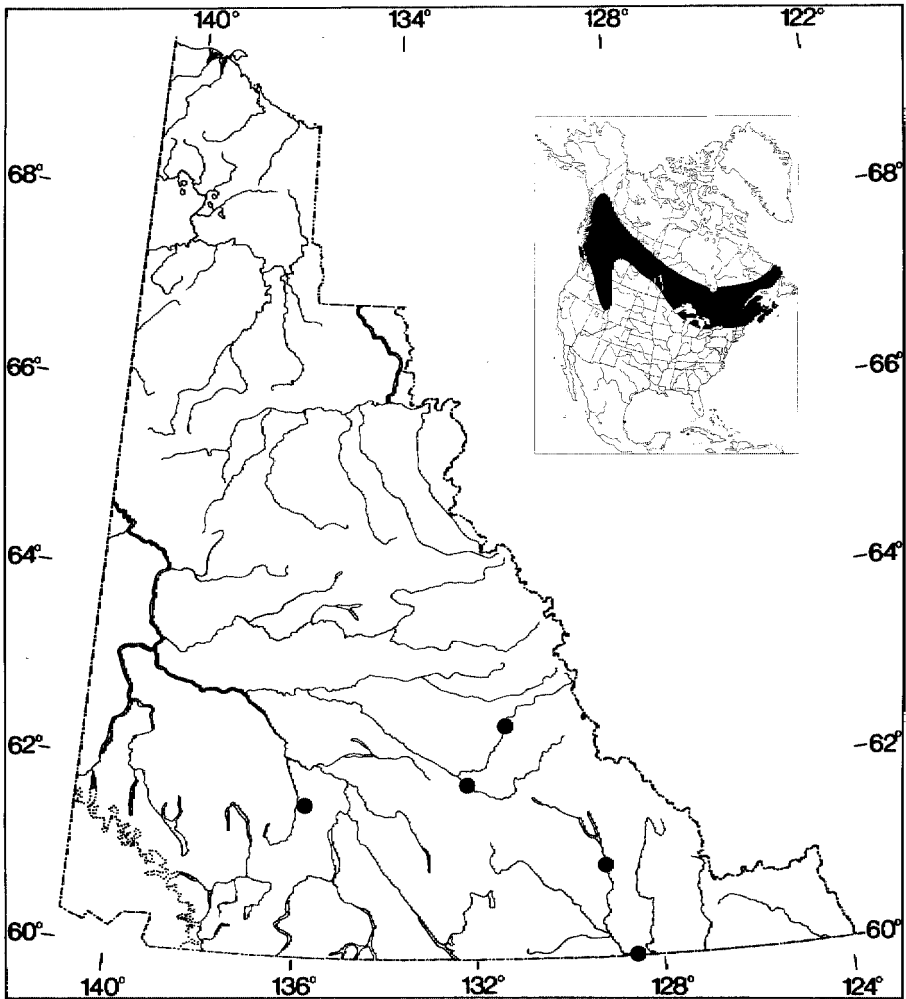


FIG. 9. Distribution of *Somatochlora minor* (Calvert) (21), a species of the Southern boreal element.

2. East Beringian (Palearctic-East Beringian) (1 sp., 3%) (Fig. 11). *Somatochlora sahlbergi* (22). In an ecological context, this species is equivalent to those in the Northern boreal element.
3. Transition (3 spp., 9%) (Fig. 12). *Aeshna canadensis* (7), *Aeshna umbrosa* (15), *Sympetrum internum* (32).
4. Cordilleran (2 spp., 6%) (Fig. 13). *Aeshna palmata* (11), *Somatochlora semicircularis* (23).
5. Western (1 sp., 3%) (Fig. 14). *Sympetrum madidum* (33).
6. Widespread (3 spp., 9%) (Fig. 15). *Lestes disjunctus* (1), *Lestes dryas* (2), *Libellula quadrimaculata* (30).

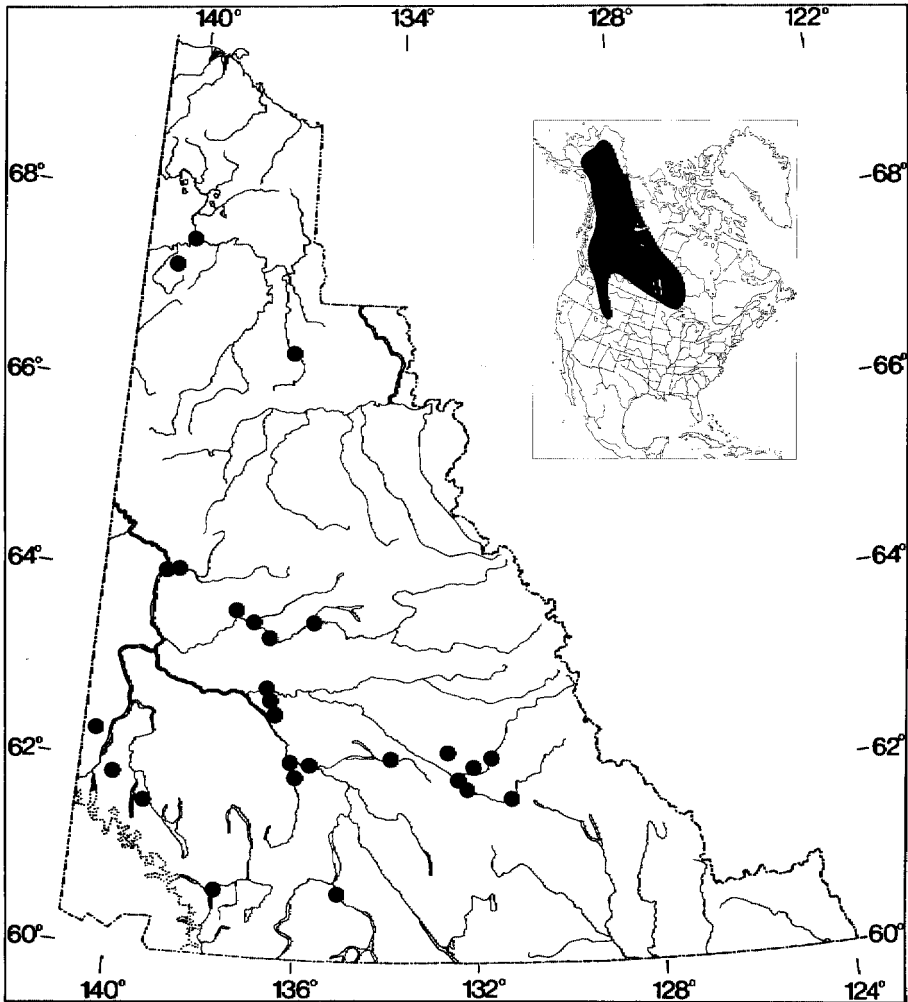


FIG. 10. Distribution of *Leucorrhinia borealis* Hagen (26), a species of the Western boreal element.

Six (18%) of the Yukon species have Holarctic ranges spanning both Eurasia and North America. Fig. 7 shows *Aeshna juncea* as an example. The species are *Lestes dryas* (2), *Enallagma cyathigerum* (6), *Aeshna juncea* (10), *Aeshna subarctica* (14), *Libellula quadrimaculata* (30) and *Sympetrum danae* (31). *Somatochlora sahlbergi* (22) occurs on both continents, but only in Beringia in North America. All 6 Holarctic species must, of course, have passed through Beringia at some period in their history, but now go beyond that region both eastward and westward. These Holarctic species, by definition, have huge longitudinal ranges. Indeed, 27 of the 33 species found in the Yukon have virtually transcontinental ranges; this includes species from all but the Beringian, Cordilleran and Western faunal elements. Odonata seem to be insects that can usually transcend mere distance and have species ranges that are habitat or life-zone limited rather than geographically limited.

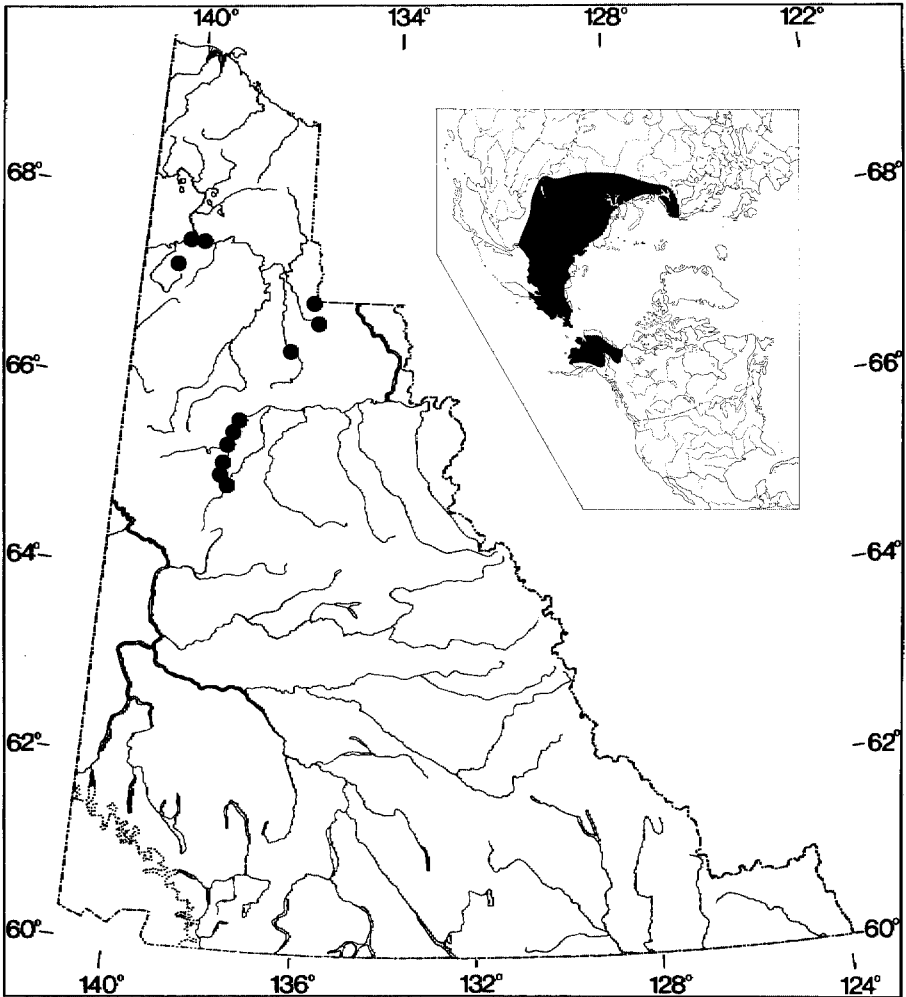


FIG. 11. Distribution of *Somatochlora sahlbergi* Tryböm (22), a species of the East Beringian (Palearctic-East Beringian) element.

All but 2 of the 23 species in the Boreal element range as far east at least as eastern Quebec; only *Somatochlora hudsonica* (19) and *Leucorrhinia borealis* (26) do not live east of Hudson Bay. It is unclear why this is so; only the elucidation of the phylogenies of the genera involved will provide clues to the answers. One possibility is that, unlike their relatives, these 2 species were restricted to the Beringian refugium during the Pleistocene and have yet to complete their range expansion eastward. In *Somatochlora*, however, this possibility does not fit with the hybridization scenario discussed below.

Almost three-quarters of the dragonfly fauna of the Yukon is largely associated with the boreal forest. Species originating in the western Cordillera, the Great Plains, and the southern mixed forests make up roughly equal parts of the remainder. Table 1 emphasizes that the faunas of the Yukon, Alaska, northern British Columbia, and the Northwest Territories are very similar.



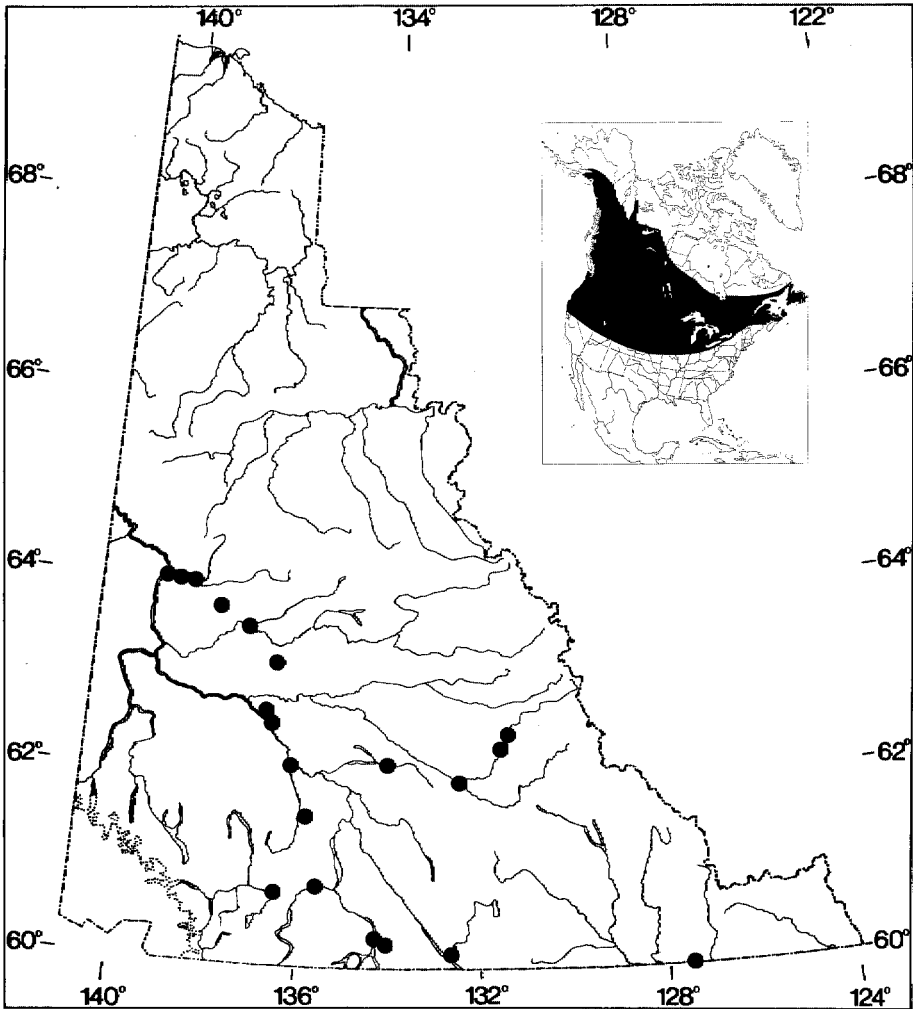


FIG. 12. Distribution of *Sympetrum internum* Montgomery (32), a species of the Transition element.

This predominance of the Boreal element is readily explained by the great expanse of the boreal forest in the Yukon. However, it is worth noting that dragonflies exhibit a typical Boreal/Cordilleran distribution in which “eastern” boreal species occur far into the northwestern Cordillera, while only a few western Cordilleran species occur in the Yukon, these being restricted to the southern section. This same pattern is seen in Boreal/Cordilleran species or subspecies pairs from a wide variety of animal and plant groups. In the birds the Yellow-shafted and Red-shafted flickers (*Colaptes auratus auratus* L. and *C. a. cafer* (Gmelin)) provide the classic example (Short 1965). This pattern results from the relative ease and speed with which eastern boreal species were able to recolonize the northern part of the continent following the retreat of the Pleistocene glaciers, while their western, Cordilleran counterparts were blocked from moving north by extensive icefields in central British Columbia that were much slower to disappear than the eastern, continental glaciers (Remington 1973).

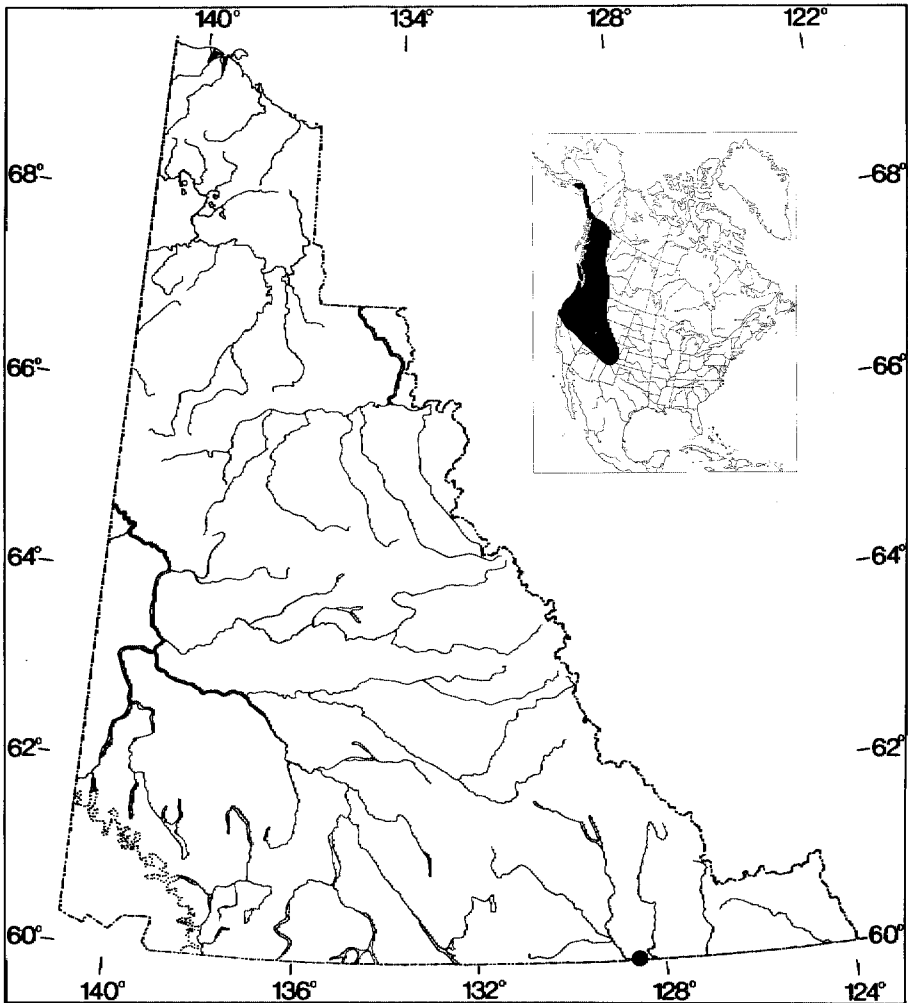


FIG. 13. Distribution of *Somatochlora semicircularis* (Selys) (23), a species of the Cordilleran element.

No dragonflies have yet been collected in the larger streams and rivers of the Yukon. *Ophiogomphus colubrinus* and *O. severus* will undoubtedly be found in these habitats sooner or later, because they are known from the Liard River system in British Columbia. The paucity of species living in the streams and rivers of the Canadian Cordillera is not typical of the rest of Canada, especially eastern Canada. The mountains have probably prevented the postglacial reinvasion of some species generally distributed to the south and east. But more importantly, many of the streams are rapidly flowing and cold, having their sources in the mountains, and sustain only a few species (Cannings and Stuart 1977).

For a number of species, the southern Yukon represents the northern or northwestern limit of their range, probably because of temperature requirements. For example, *Sympetrum internum* (32) is restricted in the Yukon to the ponds of the Territory's warm southern valleys (Fig. 12). The small size of this species in the Yukon (see species account) may be attributed

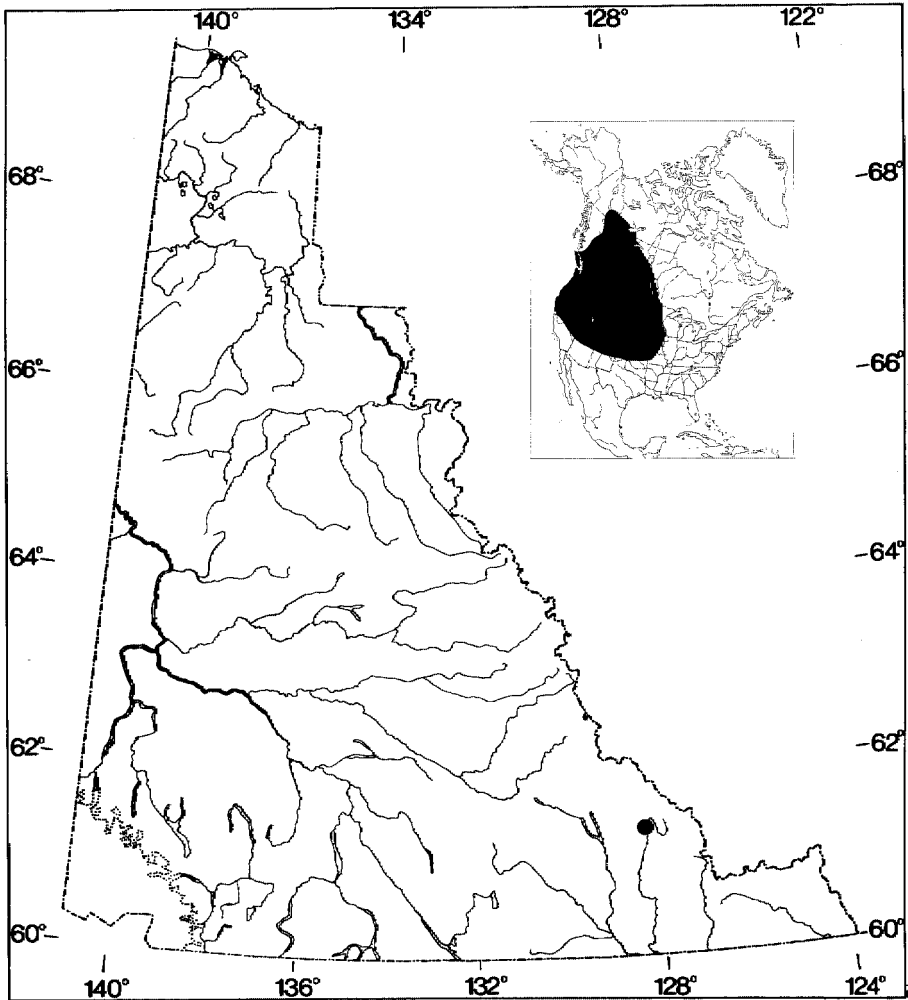


FIG. 14. Distribution of *Sympetrum madidum* (Hagen) (33), a species of the Western element.

to the short growing season in this area, but it is noteworthy that no other Yukon species shares this feature.

Life cycles and phenology of Yukon dragonflies (and dragonflies of the northern Nearctic in general) are inadequately known. However, some species, at least in the southern part of the Territory, apparently have one generation a year. In 1979 *Coenagrion interrogatum* (3) and *C. resolutum* (4) populations in a pond at Koidern in the Shakwak Trench emerged in late May and early June and, although attempts to collect larvae after this emergence were not exhaustive, no larvae were found (Cannings and Cannings 1980). This contrasts with *C. hastulatum* (Charpentier), which has a mixed 1–2-year development time in southern Sweden (Norling 1984) that is complicated because fast and slowly growing larval cohorts are split at the time of overwintering. In northern Sweden, *C. hastulatum* has a life cycle of 3 to 4 years. *Lestes disjunctus* (1) and *L. dryas* (2), at least in the southern

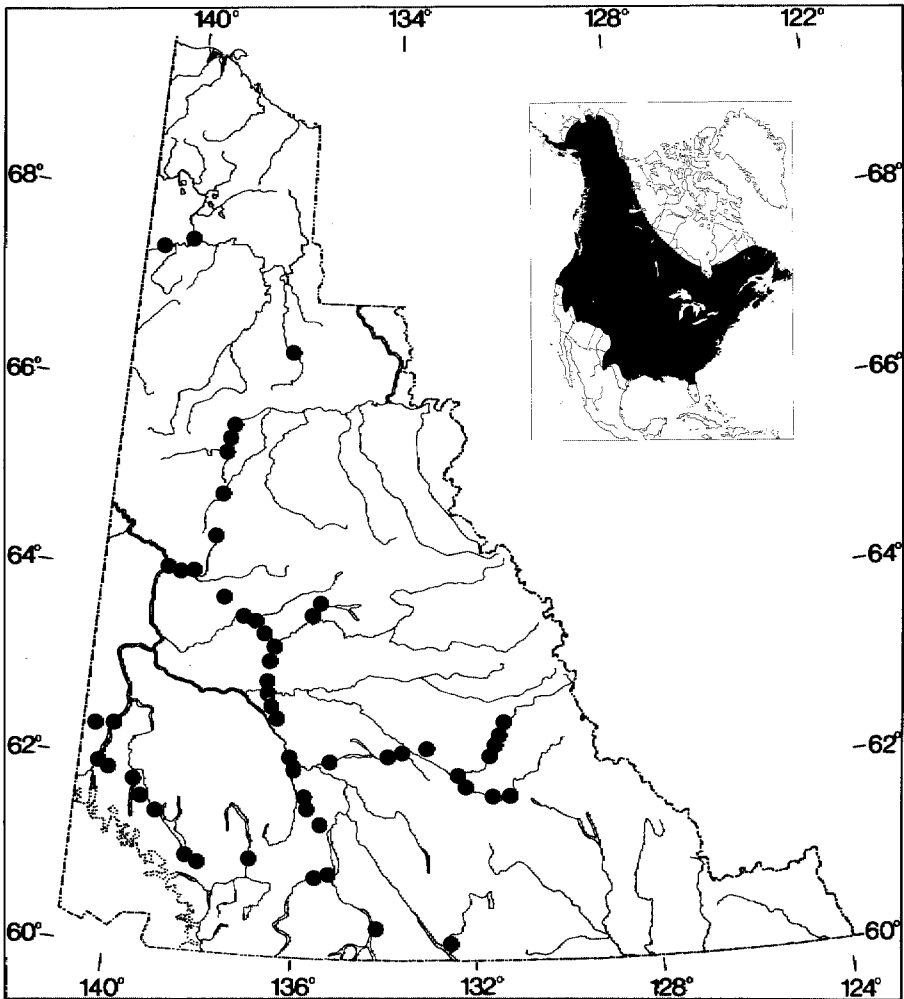


FIG. 15. Distribution of *Lestes disjunctus* Selys (1), a species of the Widespread element.

Yukon, likely have an annual life cycle similar to the one they exhibit in some other Canadian localities; they overwinter in the egg stage and rapid larval growth allows emergence the first summer (Sawchyn and Gillott 1974; Cannings et al. 1980). Cannings and Cannings (1985), studying *Somatochlora sahlbergi* (22) in the Yukon, showed that larvae can be placed in 5 size groups, perhaps representing yearly cohorts; this would suggest that the larvae take 5 years to mature. Populations of *Aeshna juncea* (10) in Sweden had development times ranging from 2–3 years in the south to 5 years north of the Arctic Circle (Norling 1984). Similarly, in the Yukon, northern populations probably take longer to develop than those in the south, although we have no data to show this.

Table 2 illustrates the decreasing diversity of dragonfly species with increasing latitude. Only 29 species live north to 64°N in the central Yukon whereas 72 species inhabit the

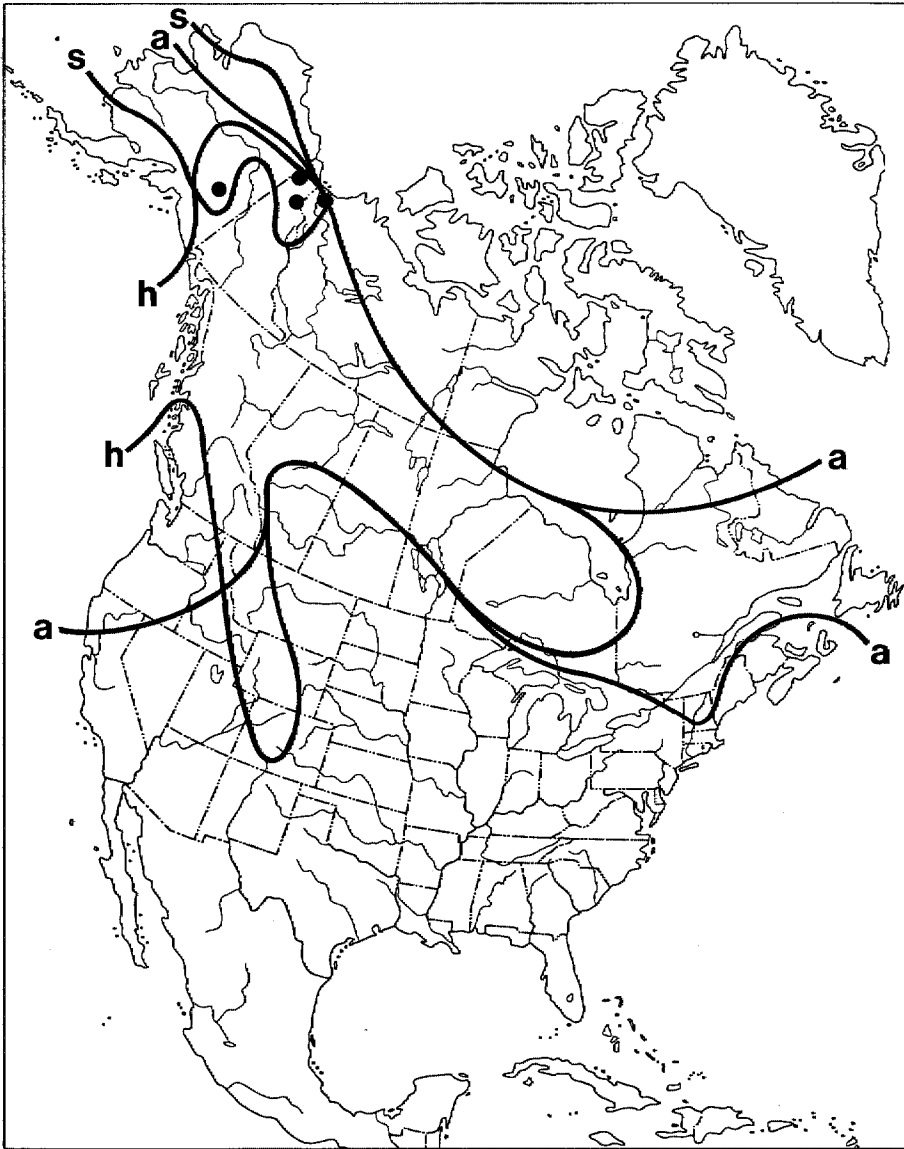


FIG. 16. The distributions of *Somatochlora sahlbergi* Tryböm, *S. albicincta* (Burmeister), and *S. hudsonica* (Selys) (22, 17, 19) showing localities where hybrids between *S. sahlbergi* and the other species have been collected.

southern interior valleys and southwestern coast of British Columbia. Only 4 genera, *Coenagrion*, *Enallagma*, *Aeshna*, and *Somatochlora*, have been recorded at the latitudinal (arctic) treeline in the Yukon, although *Sympetrum* has been found to the east on the shrub tundra of the Tuktoyaktuk Peninsula in the Northwest Territories.

The analysis also shows that only one species, *Somatochlora sahlbergi* (22), has what can be termed a Beringian distribution (Fig. 11) (Cannings and Cannings 1985). Such small

TABLE 1. Distribution of Yukon Odonata in neighbouring jurisdictions. +, present; -, absent; ?, probably present but no evidence available. YT, Yukon Territory; BC, British Columbia; NT, Northwest Territories; AK, Alaska.

Species	YT	BC	NT	AK
1. <i>Lestes disjunctus</i> Selys	+	+	+	+
2. <i>Lestes dryas</i> Kirby	+	+	+	+
3. <i>Coenagrion interrogatum</i> (Hagen)	+	+	+	?
4. <i>Coenagrion resolutum</i> (Hagen)	+	+	+	+
5. <i>Enallagma boreale</i> Selys	+	+	+	+
6. <i>Enallagma cyathigerum</i> (Charpentier)	+	+	+	+
7. <i>Aeshna canadensis</i> Walker	+	+	-	-
8. <i>Aeshna eremita</i> Scudder	+	+	+	+
9. <i>Aeshna interrupta</i> Walker	+	+	+	+
10. <i>Aeshna juncea</i> Linnaeus	+	+	+	+
11. <i>Aeshna palmata</i> Hagen	+	+	-	+
12. <i>Aeshna septentrionalis</i> Burmeister	+	+	+	+
13. <i>Aeshna sitchensis</i> Hagen	+	+	+	+
14. <i>Aeshna subarctica</i> Walker	+	+	+	?
15. <i>Aeshna umbrosa</i> Walker	+	+	+	?
16. <i>Cordulia shurtleffi</i> Scudder	+	+	+	+
17. <i>Somatochlora albicincta</i> (Burmeister)	+	+	+	+
18. <i>Somatochlora franklini</i> (Selys)	+	+	+	?
19. <i>Somatochlora hudsonica</i> (Selys)	+	+	+	+
20. <i>Somatochlora kennedyi</i> Walker	+	?	+	?
21. <i>Somatochlora minor</i> (Calvert)	+	+	?	?
22. <i>Somatochlora sahlbergi</i> Tryböm	+	-	+	+
23. <i>Somatochlora semicircularis</i> (Selys)	+	+	?	+
24. <i>Somatochlora septentrionalis</i> (Hagen)	+	+	+	?
25. <i>Somatochlora whitehousei</i> Walker	+	+	?	?
26. <i>Leucorrhinia borealis</i> Hagen	+	+	+	+
27. <i>Leucorrhinia hudsonica</i> (Selys)	+	+	+	+
28. <i>Leucorrhinia patricia</i> Walker	+	+	+	?
29. <i>Leucorrhinia proxima</i> Corbet	+	+	+	+
30. <i>Libellula quadrimaculata</i> Linnaeus	+	+	+	+
31. <i>Sympetrum danae</i> (Sulzer)	+	+	+	+
32. <i>Sympetrum internum</i> Montgomery	+	+	+	+
33. <i>Sympetrum madidum</i> (Hagen)	+	+	+	-

representation of Beringian species might be expected, because dragonflies have excellent dispersal abilities and because the postulated cold, dry nature of Beringia would have made it inhospitable territory for most Odonata (Matthews 1982). *S. sahlbergi* regularly breeds farther north than any other dragonfly species.

Whether *S. sahlbergi* inhabited Beringia in the Pleistocene is unknown, but it probably did. In any event, its present distribution is unique in the Odonata. Species of dragonflies are, by and large, conservative when it comes to hybridizing with their sister species; in fact, there are extremely few examples of extensive hybridization in odonates. However, hybrids between *S. sahlbergi* and 2 of its North American relatives, *S. albicincta* and *S. hudsonica*, have been found over a broad swath of the North American range of *S. sahlbergi*, from Reindeer Station on the Mackenzie Delta and the Eagle River to Old Crow on the Porcupine River and mountainous areas south of Big Delta, Alaska (Cannings and Cannings 1985) (Fig. 16). Although they are largely separated by habitat preferences, these species evidently

TABLE 2. Decreasing diversity of Odonata with increasing latitude in the western Canadian Cordillera.

Approximate maximum latitude (°N)	Geographical limit	Number of species	Genera reaching northern limit
>68(variable)	Arctic treeline	4	<i>Coenagrion</i> , <i>Enallagma</i> , <i>Aeshna</i> , <i>Somatochlora</i>
68	Far northern valleys (Old Crow Flats)	24	<i>Lestes</i> , <i>Cordulia</i> , <i>Leucorrhinia</i> , <i>Sympetrum</i>
64	Southern Ogilvie Mountains (Dawson)	29	<i>Libellula</i>
62	Southern valleys and lakes of Yukon	40	<i>Ischnura</i> , <i>Ophiogomphus</i> (both are unknown in Yukon, but range almost to the B.C./Yukon border)
55	Fraser watershed (Prince George, Nechako, southern Bulkley Valley)	58	<i>Argia</i> , <i>Nehalemia</i> , <i>Anax</i> , <i>Cordulegaster</i> (Alaskan coast to 57°N), <i>Epithea</i>
51	Southern Interior valleys and southwest coast of British Columbia	72	<i>Amphiagrion</i> , <i>Gomphus</i> , <i>Octogomphus</i> , <i>Tanypteryx</i> , <i>Cordulegaster</i> (Interior), <i>Macromia</i> , <i>Erythemis</i> , <i>Pachydiplax</i>

hybridize rather freely whenever habitat structure allows them to come into contact. The phylogenetic relationship of these 3 species has not been determined; nevertheless, the situation suggests that contact between the Beringian and Nearctic boreal faunas has occurred relatively recently (Cannings et al. 1991).

The story of *Somatochlora sahlbergi* and its 2 North American congeners is perhaps symbolic of Yukon zoogeography; here the faunas of Siberia and North America join and mix in often unpredictable ways.

### Acknowledgements

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