Chironomids (Diptera: Chironomidae) of the Yukon Arctic North Slope and Herschel Island

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Abstract. More than 100 taxa, consisting of 68 named species and at least 32 unnamed taxa, are reported from the Yukon arctic North Slope and Herschel Island in an annotated checklist. Five subfamilies, Podonominae, Tanypodinae, Diamesinae, Orthocladiinae and Chironominae, are represented with Orthocladiinae having more than 50 percent of the taxa. Most (80%) of the named species occur in both the Nearctic and Palaearctic regions, but only 15 are circumpolar. Thirty percent of the named species are restricted to the arctic zone and about one-half of these do not extend into the Arctic Archipelago. In a number of Beringian species the adult males show antennal reduction, which ranges from slight plume reduction to complete loss and female-like appearance.

Résumé. *Les chironomides (Diptera: Chironomidae) du versant arctique nord du Yukon et de l'île Herschel.* Plus de 100 taxons, 68 espèces identifiées et au moins 32 autres taxons encore indéterminés, vivent sur le versant arctique nord du Yukon et dans l'île Herschel; on en trouvera ici une liste commentée. Cinq sous-familles, Podonominae, Tanypodinae, Diamesinae, Orthocladiinae et Chironominae, sont représentées et les Orthocladiinae composent plus de 50% de la faune. La majorité (80%) des espèces déterminées habitent les régions néarctiques et paléarctiques, mais seulement 15 ont une répartition circumpolaire. Trente pourcent des espèces déterminées sont confinées à la zone arctique, dont environ la moitié n'atteignent pas l'Archipel arctique. On note une réduction des antennes chez les mâles adultes de plusieurs espèces béringiennes; chez certains, elles sont légèrement moins plumeuses, chez d'autres, elles ont complètement perdu leur aspect plumeux et ressemblent aux antennes des femelles.

Introduction

Chironomidae are one of the major and successful families of insects in the arctic zone. In the relatively well studied high arctic of the Queen Elizabeth Islands they comprise from one-fifth to one-half of the total number of species of insects (Danks 1980; McAlpine 1965; Oliver 1968). By comparison the chironomids of the low arctic are inadequately known. Wet tundra extends along the northern part of the North America mainland westward from Hudson Bay to the Chukchi Sea. This area with abundant pools, ponds, lakes, flowing water of all orders, seepage zones and marshes provides an almost continuous range of habitats for chironomids. This paper reports on 3 small collections of chironomids from the wet tundra on the Yukon arctic North Slope and Herschel Island. The taxa collected probably represent only a small proportion of the species that live in the arctic zone of the Yukon Territory, but the number is larger than that known from all of the Queen Elizabeth Islands. It emphasizes the richness of the chironomid fauna of the wet tundra habitat.

Materials and Methods

This study is based on chironomid collections from 3 localities: the northeastern corner of Herschel Island, within walking distance of Herschel (69°34′N 138°54′W); and 2 areas on the mainland, one between Trout Lake (68°49′N 138°43′W) and Philip Creek (68°52′N 138°47′W), and the other along the Blow River (68°43′N 137°25′W) about 2 km northeast of the junction with Purkis Creek. These collections comprise nearly all of the chironomids

pp. 615–635 in H.V. Danks and J.A. Downes (Eds.), Insects of the Yukon. Biological Survey of Canada (Terrestrial Arthropods), Ottawa. 1034 pp.

that have been collected in the northern Yukon, except for a few collected from Herschel Island by C.D. Bird in 1953. Wet tundra, the major habitat in the 3 areas, was adjacent to large rivers and/or lakes in the mainland sites, and in all 3, but especially on Herschel Island, it graded into drier upland areas.

Most of the specimens were collected by the senior author in wet tundra, using sweep and dip nets. The collections from Herschel Island were made on 29 June and 7–9 July 1971, from Trout Lake on 9–10 July 1984, and from Blow River on 14–16 July 1984. Some specimens were collected from Herschel Island by Malaise traps operated by W.R.M. Mason and D.M. Wood (29 June–7 July 1971). On Herschel Island (20 July 1983) and near Philip Creek (19 July 1983) S. Cannings used sweep and dip nets. In total the collections numbered less than 500 specimens. The chironomid habitats included permanent and temporary pools and ponds, sedge meadows, tussock tundra, first-order streams and seepage zones receiving water from the melting of permafrost and snow banks. Throughout the wet tundra areas peat was the common substrate. At the time of sampling chironomid emergence had generally been completed from the larger aquatic habitats such as lakes and rivers.

The morphological terms used in this paper are defined and illustrated in the 3 volumes of the "Chironomidae of the Holarctic Region" edited by Wiederholm (1983, 1986, 1989), or in Sæther (1980). Additional terms used for the gonocoxal lobes of the adult male hypopygium of the Chironominae are illustrated in Reiss and Fittkau (1971, see fig. 1).

Annotated List of Species

The following list gives a few brief notes on the chironomids occurring in the Yukon Arctic Slope and Herschel Island. The species and information on their wider distributions are listed in Table 1. Unless mentioned otherwise details of the distribution of Holarctic species in the Palaearctic region are found in Fittkau and Reiss (1978), and Ashe and Cranston (1991). Five of the 8 chironomid subfamilies were represented. Most of the species belong to the 2 major subfamilies of Chironomidae, the Orthocladiinae and the Chironominae. Only one species of another relatively major subfamily, the Tanypodinae, was collected and a few species each of the Podonominae and Diamesinae. Based on the occurrence of Tanypodinae and Diamesinae (Hansen and Cook 1976; Roback 1971; Oliver et al. 1990) in adjacent areas of Alaska and the Northwest Territories, these subfamilies, especially the Tanypodinae, are under-represented in the collections.

Subfamily Podonominae

Larvae of the Podonominae are primarily rheophilic and cold-adapted. The subfamily is much commoner in the Southern Hemisphere. Only 2 species occurred in the collections but several more species of *Trichotanypus* and *Boreochlus* might occur. *Parochlus kiefferi* (Garret), which ranges from Alaska to Greenland and southward, probably occurs in the Yukon.

1. ***Lasiodiamesa sphagnicola*** **(Kieffer)**

Adult males were swept from sedge growing in the bog/fen complex area near Trout Lake. Although widespread in the boreal zone of Europe this species was known previously, in the Nearctic region, only from a northern Ontario fen (Rosenberg et al. 1988). Larvae live in a variety of habitats, sphagnum bogs, tarns, pools, in springs and spring runs in the birch zone of Swedish Lapland, but the species also occurs above treeline (Brundin 1966). Farther south in Europe it is confined to sphagnum bogs. South of the treeline in the Yukon, near the junction of Caribou Bar Creek with the Porcupine River, larvae live in small sphagnum pools in a black spruce bog.

2. ***Trichotanypus foliaceus* Wirth and Sublette**

Adults of *T. foliaceus* were collected beside a slow flowing first-order stream running into the Blow River. This Nearctic species along with 2 Palaearctic species, *T. arctoalpinus* Makarchenko and *T. admirabilis* Brundin, and an Holarctic species, *T. posticalis* (Lundbeck), make up a circumpolar aggregate of morphologically similar species.

Subfamily Tanypodinae

The larvae of most Tanypodinae are essentially thermophilous and adapted to living in standing water, though some species live in cool habitats and in running water. Members of the subfamily are common in warmer parts of the Holarctic region but decrease in number with increasing latitude or its climatological equivalent.

Only one taxon was represented in the collections. Roback (1971) lists a number of genera (*Derotanypus*, *Ablabesmyia*, *Arctopelopia*, *Conchapelopia*, *Thienemannimyia* and especially *Procladius*) from Alaska and the Northwest Territories. It is likely with more collecting that most of these genera would be found in the northern Yukon Territory.

3. ***Psectrotanypus* cf. *pictipennis* (Zetterstedt)**

A single adult male from Trout Lake keys to *P. pictipennis* in Roback (1971) but differs from it in distribution of setae on the gonostylus, shorter wing length (2.72 mm) and lower antennal ratio (2.0). However, the range of variation in *P. pictipennis* is not known as the taxon is based on one specimen from Greenland. From the Palaearctic region *P. pictipennis* is recorded from Finland and Novaya Zemlya.

Subfamily Diamesinae

The Diamesinae are a rheophilic and cold-adapted subfamily, though a few genera occur in standing water. They inhabit the colder parts of the circumpolar lands and the mountain ranges throughout the world.

Few Diamesinae were present in the collections. *Diamesa arctica* (Boheman) and *D. simplex* Kieffer occur in adjacent areas of Alaska and the Northwest Territories (Hansen and Cook 1976). These 2 taxa, as well as members of the genera *Pagastia*, *Pseudodiamesa* and *Protanypus*, are expected to occur in the arctic zone of the Yukon Territory. Only the 4 following taxa were collected.

4. ***Diamesa amplexivirilia* Hansen**

This species, collected at Trout Lake, ranges from the Kolyma area and Wrangel Island in eastern Russia (Makarchenko 1980) to mountains in southwestern Canada and the northwestern United States (Hansen and Cook 1976). *Diamesa amplexivirilia* is one of 7 species of the circumpolar *Diamesa davisi* Edwards group (Willassen 1985). This group, which exhibits many structural modifications associated with mating on the ground or other substrate, ranges throughout the low arctic and mountain regions of the northern Holarctic region. Larvae of most of the species live in cold, small bodies of flowing water including streams originating from glaciers.

5. ***Diamesa* sp.**

An adult male collected near Trout Lake resembles *Diamesa aberrata* Lundbeck, but differs in some hypopygial structures. A pars ventralis is absent, the aedeagal lobe is narrower, and the anal point ends in a weakly sclerotized, spatulate flap.

6. ***Protanypus tshereshnevi* Makarchenko**

A single adult male from Herschel Island is the first Nearctic record for this species, which was described from the Chukchi peninsula (Makarchenko 1982). It differs in a few minor details including a shorter wing length (3.5 mm), fewer preepisternals (28 or 31), and a larger foreleg ratio (0.68).

7. ***Pseudokiefferiella* sp.**

An adult male collected off a small stream-seepage zone west of Trout Lake area differs from *Pseudokiefferiella parva* (Edwards) (Serra-Tosio 1971) by having a strongly hooked medial aedeagal lobe. Pupal exuviae collected from a nearby foothill stream, with pronged posterior tergal spines, are distinctly different from *P. parva*. The exuviae at least represent an undescribed species, but it is not known if the adult and the pupal exuviae belong to the same taxon.

Subfamily Orthocladiinae

Larvae of the Orthocladiinae occupy the widest range of habitats of all chironomids. It is a primarily cold-adapted subfamily and, in contrast to the Chironominae and Tanypodinae, decreases in numbers in warmer regions, though orthoclads are not uncommon in many warm habitats. Larvae live in all types of running and standing water. Orthocladiinae is the only subfamily with larvae that live in terrestrial habitats. Because the larvae have a primary adaptation to cold and an ability to live in a wide variety of habitats, Orthocladiinae is the dominant subfamily in the arctic zone.

A number of genera (*Abiskomyia*, *Doncricotopus*, *Mesocricotopus*, *Nanocladius*, *Oliveridia* and *Parametriocnemus*) occurring in adjacent parts of the arctic zone are expected to occur in the arctic zone of the Yukon Territory.

8. ***Acricotopus lucens* (Zetterstedt)**

A widely occurring circumpolar species (Fittkau and Reiss 1978; Cranston and Oliver 1988). In addition to adult males from Herschel Island we have seen new material from Point Barrow, Victoria Island, Tuktoyaktuk, Chesterfield Inlet, Eskimo Point, and Fort Churchill. *A. lucens* is widespread in Europe but only south of treeline. The larvae live in small bodies of standing water including spring pools, temporary pools, bog pools and brackish water pools (Hirvenoja 1973). In the Canadian northwest larvae live in pools on peaty substrate, often overgrown with emergent *Carex* and patches of *Ranunculus*.

9. ***Apometriocnemus beringensis* Cranston and Oliver**

This species is known only from the type locality, Trout Lake (Cranston and Oliver 1988). Sæther (in Cranston et al. 1989: 178) believes that this species belongs to *Metriocnemus.*

10. ***Bryophaenocladius aestivus* (Brundin)**

In addition to Herschel Island we have seen specimens of this species from south of the treeline at Fort Simpson, Northwest Territories, and in the Old Crow area. The larvae of most species of *Bryophaenocladius* are terrestrial or semi-terrestrial; however, this species may live in small streams and standing water (Fittkau and Reiss 1978).

11, 12. ***Bryophaenocladius* spp.**

Some adult males collected on Herschel Island may represent 2 undescribed species of *Bryophaenocladius*. One specimen is similar to the Palaearctic species *Bryophaenocladius nitidicollis* (Goetghebuer), which occurs in northern Europe (Fittkau and Reiss 1978).

13. ***Chaetocladius perennis* (Meigen)**

Adults of this Holarctic species were collected from Herschel Island and near Trout Lake. It is widespread in Europe, including Spitsbergen, but has been reported only from the arctic zone in the Nearctic region (Oliver 1963; Watson et al. 1966). Adults were captured in emergence traps set on a wet, tufted community of *Deschampsia alpina* (Linn.) R. and S. on Spitsbergen (Sendstad et al. 1976). In the Trout Lake area adults were swept from emergent sedge growing in standing pools of water in the bog/fen areas.

14. ***Chaetocladius* sp.**

This taxon, collected from Herschel Island and near the Blow River, has a reduced antennal plume and long, robust legs. The structure of the slightly enlarged hypopygium is similar to that of *C. melaleucus* (Meigen) (see Pinder 1978, fig. 123D), except that the anal point is more robust. Also we have seen specimens from Point Barrow.

15. ***Corynoneura arctica* Kieffer**

This relatively common arctic species was collected at Herschel Island, Philip Creek and Blow River. It is widespread in the arctic zone of the Nearctic region but is recorded only from Novaya Zemlya in the Palaearctic (Kieffer 1923). At Hazen Camp, Ellesmere Island, larvae live in a variety of permanent ponds. Information on seasonal and diel emergence and sex ratios is given by Danks and Oliver (1972*a*, *b*) and Oliver and Danks (1972).

16. ***Corynoneura celeripes* Winnertz**

This mainly boreal species, collected at Trout Lake, is widespread in central and northern Europe and south of the treeline in eastern North America (Oliver et al. 1990). An early report from Greenland

(Lundbeck 1898) requires confirmation. Larvae live in ponds (Boesel and Winner 1980) and on floating or submerged aquatic plants (Johannsen 1937). Pupae are encased in an ellipsoidal gelatinous mass (Johannsen 1937).

17. ***Cricotopus (Cricotopus) beringensis* Oliver and Dillon**

One adult male of this species, originally described from Point Barrow, was collected at Philip Creek. The structure of the adult male, with reduced antennae, elongated legs, and enlarged hypopygium suggests that this species has lost the aerial mating habit (Oliver and Dillon 1988). Larvae live in permanent tundra ponds.

18. ***Cricotopus (Cricotopus) coronatus* Hirvenoja**

An Holarctic species, collected from Herschel Island, *C. coronatus* is widespread in the Canadian arctic ranging to just south of the treeline in the Northwest Territories and northern Quebec (Oliver and Dillon 1988). It occurs in Fennoscandia (Hirvenoja 1973). The larval habitat is unknown but adults have been collected near large oligotrophic lakes and permanent ponds (Oliver and Dillon 1988).

19. ***Cricotopus (Cricotopus) lestralis* (Edwards)**

Collected at Herschel Island, *C. lestralis* extends from Point Barrow to Pearyland and Svalbard, and possibly occurs in Fennoscandia. Larvae live in permanent and temporary ponds at Hazen Camp where the species took 2 years to complete one life cycle. The sex ratio had a preponderance of adult females (Oliver and Dillon 1988).

20. ***Cricotopus (Cricotopus) patens* Hirvenoja**

This species ranges from Trout Lake in the Yukon Arctic Slope to Hudson Bay, and occurs in northern mainland Europe (Oliver and Dillon 1988). Larvae of this species were associated with moss substrate in lakes and smaller bodies of standing water in Fennoscandia (Hirvenoja 1973).

21. ***Cricotopus (Cricotopus) pilosellus* Brundin**

In the Nearctic region this species ranges across the low arctic from Hudson Bay to Herschel Island and north to Cornwallis Island (Oliver and Dillon 1988). In the Palaearctic it extends from Svalbard south to Germany and the United Kingdom (Fittkau and Reiss 1978). Larvae are believed to be limnobiotic, living in shallow water, including brackish water (Hirvenoja 1973).

22. ***Cricotopus (Cricotopus) tibialis* (Meigen)**

This species is widespread in the Nearctic arctic zone, including Herschel Island, and ranges south to Manitoba and Nova Scotia (Oliver and Dillon 1988). Also widespread in northern and central Europe, it occurs in Novaya Zemlya and Svalbard. Larvae of this species have been reported from a variety of aquatic habitats (Hirvenoja 1973), but in the arctic zone of the Nearctic region they have been found only in permanent ponds (Oliver and Dillon 1988).

23. ***Cricotopus (Cricotopus) tristis* Hirvenoja**

This species extends from Herschel Island east to Hudson Bay and north on the southern arctic islands (Oliver and Dillon 1988). In the Palaearctic region it occurs in northern Finland (Hirvenoja 1973). Larvae live in small, slow-flowing streams in the Canadian northwest.

24. ***Cricotopus (Isocladius) ornatus* (Meigen)**

This halobiotic species ranges along the arctic coast from Point Barrow to Hudson Bay, and inland, from Saskatchewan south and east to New York state. Larvae were collected from saline rock pools on the coast of Herschel Island near Herschel (Oliver and Dillon 1988). In Saskatchewan larvae live in saline bodies of standing water (Swanson and Hammer 1983) and we have collected this species from a saline spring near Ottawa. It is widely distributed in western coastal areas and in inland saline waters of the Palaearctic region (Hirvenoja 1973). Larvae generally reside in permanent waters but Fittkau and Reiss (1978) reported larvae from temporary ponds.

25. ***Cricotopus (Isocladius) sylvestris* (Fabricius)**

The occurrence of this species on Herschel Island is one of the few reports of *Cricotopus sylvestris* north of treeline. It is widespread south of the treeline in the Holarctic region (Hirvenoja 1973; Oliver and Dillon 1988). Larvae have been reported from a wide variety of aquatic habitats (Hirvenoja 1973) but they have been collected only from permanent ponds in the Nearctic arctic zone.

26. ***Cricotopus (Isocladius) sylvestris* group**

Other adult males of the *C. sylvestris* group collected near Trout Lake are similar to the Palaearctic species *C. laetus* Hirvenoja (1973). They are darker, have a shorter wing length (2.7–2.8 vs 3.0–3.3) and no sensilla chaetica on tarsomere 1 of the midleg, but otherwise conform with the description in Hirvenoja. We have reared adult female material, which also key to *C. laetus* in Hirvenoja (1973), from a small stream in Atkinson Point, District of Mackenzie. The associated immature stages differ greatly from *C. laetus*. If these adult male and female specimens are conspecific, characteristics of the immature stages suggest that the Nearctic material represents an undescribed taxon.

27. ***Cricotopus (Isocladius)* sp.**

Distinct adult males were swept from sedges growing in a boggy area on Herschel Island. They have an enlarged hypopygium, strong legs, low antennal ratio, reduced antennal plume, flattened scutum and enlarged antepronotum. These structural modifications are usually associated with loss of the aerial mating habitat. All body setae, including the dorsocentrals, are short, stout, and erect. Although decumbent dorsocentrals are a primary characteristic of adult *Cricotopus* we believe these adult males to be modified members of *Cricotopus*. The eyes are hairy and the general habitus is like other modified *Cricotopus*, e.g. *C. beringensis*. In the latter and other northern species of *Cricotopus*, erect dorsocentrals have been observed (Oliver and Dillon 1988) but they are mixed with decumbent setae.

28. ***Diplocladius cultriger* Kieffer**

Diplocladius cultriger, collected from Herschel Island and Trout Lake, is a widespread circumpolar species. In the Nearctic region it extends north to the high arctic area and as far south as South Carolina (Oliver et al. 1990). It occurs throughout the Palaearctic but is unknown from Svalbard. Larvae usually live in slow-flowing cool streams but also occur in small bodies of still water and spring runs. In north temperate regions *D. cultriger* is univoltine and emergence occurs in the cooler part of the season; in late winter and early spring adults are often found walking on snow beside open bodies of flowing water.

29. ***Heterotrissocladius maeaeri* Brundin**

A single adult male was collected on Herschel Island. This species was previously known from Toolik Lake, Alaska (Hershey 1985) and Fennoscandia. In northern Fennoscandia this cold stenothermic species lives in the littoral and upper profundal zones of lakes (Brundin 1949; Sæther 1975).

30. ***Hydrobaenus conformis* (Holmgren)**

Adults collected near Trout Lake probably emerged from the lake, as larvae of this species are known to live in arctic and subarctic lakes (Sæther 1976).

31. ***Krenosmittia* cf. *camptophleps* (Edwards)**

Adult males from the Blow River area resemble the Palaearctic species *Krenosmittia camptophleps* (Edwards 1929). The possible occurrence of this species in the Nearctic region was previously suggested by Sæther (1969), based on pupal exuviae from a mountain stream entering Marion Lake, British Columbia. Larvae of *Krenosmittia camptophleps* live in springs and small bodies of flowing water, including spring runs (Fittkau and Reiss 1978).

32. ***Lappokiefferiella platytarsus* Tuiskunen**

A single adult male from Herschel Island is the first record for the genus *Lappokiefferiella* in the Nearctic region. This monotypic genus was previously reported from Norway (Tuiskunen and Lindeberg 1986). The immature stages are unknown.

33. ***Limnophyes andersoni* Sæther**

Cranston and Oliver (1988) recorded this species from Herschel Island as *L. ?truncorum* Goetghebuer. It is widespread in the arctic zone of the Nearctic region. The immature stages are unknown.

34. ***Limnophyes asquamatus* Andersen**

Limnophyes asquamatus was recorded from the Trout Lake area as *L. hamiltoni* Sæther by Cranston and Oliver (1988). It is widely distributed in the Nearctic region, ranging from Lake Hazen, Ellesmere Island and Pearyland, Greenland, south to British Columbia and West Virginia (Cranston

and Oliver 1988). It also occurs in northern Europe (Sæther 1990). Larvae live in small streams and this species is one of the few *Limnophyes* known to be truly aquatic (Sæther 1990).

35. ***Limnophyes brachytomus* (Kieffer)**

Cranston and Oliver (1988) recorded this species from Herschel Island as *L. borealis* Goetghebuer. This widespread species occurs in the arctic zone, including Pearyland, Svalbard and Novaya Zemlya. In the Nearctic region it ranges south to Colorado and South Carolina and it occurs in northern Europe. Larvae are unknown but adults have been collected near seepage zones and cold springs south of treeline. In Spitsbergen adults were trapped emerging from moss in wet tundra (Sendstad et al. 1976).

36. ***Limnophyes* cf. *margaretae* Sæther**

An adult male from the Trout Lake area is similar to *L. margaretae*, in particular with the apical flagellomere tapering to a point. It differs by having a lower antennal ratio (0.44) and no squamal setae.

37. ***Limnophyes minimus* (Meigen)**

Limnophyes minimus was collected on Herschel Island and in the bog/fen area near Trout Lake. This species has the greatest range of any that occur in the northern Yukon Territory. It is reported from the Holarctic and Afrotropical regions, and the southern Antarctic Islands. Adults have been reared from wet areas in seepage zones and at the margins of small streams. Facultative parthenogenetic populations occur in New York and the southern Antarctic Islands (Sæther 1990).

38. ***Limnophyes ninae* Sæther**

Adult males were collected from Herschel Island and Philip Creek. They agree well with Sæther's description of *L. ninae* except they tend to have more setae, e.g. lanceolate humeral (5 or 6 vs 1–3) and lanceolate prescutellar (9 vs 1–4) setae. This species is known from the Northwest Territories, Ontario, Manitoba, Norway and England (Sæther 1990). Although previously known from Fort Simpson on the Mackenzie River this is the first record from north of treeline.

39. ***Limnophyes pilicistulus* Sæther**

This western Nearctic species ranges from Trout Lake south to Oregon and South Dakota. A single adult male, reported in Cranston and Oliver (1988), was collected on a north-facing talus slope at the south end of Trout Lake. Meltwater from a large snow bank at the top of the slope produced numerous seepage areas.

40. ***Limnophyes pumilio* (Holmgren)**

An adult male of this distinctive species was collected from Herschel Island. This species is widespread north and south of the treeline in the Holarctic region (Sæther 1990). Larvae have been reported from the littoral zone of lakes, including from a depth of 1.5 m in a marl lake in Scotland (Cranston 1978), and from encrusted stones of the surf spray zone of Bodensee (Reiss 1968). In Pearyland larvae lived in moss between rocks on the bottom of a slow-flowing stream.

41. ***Limnophyes* sp.**

A single adult male, which may be a variant of *L. minimus*, differing by having a small sharp anal point and no virga. It was collected, with *L. pilicistulus*, on the talus slope near Trout Lake.

42. ***Lipurometriocnemus vixlobatus* Sæther**

Cranston and Oliver (1988) recorded this species from the Trout Lake area, greatly extending its range from a previously known record from South Carolina.

43. ***Metriocnemus* cf. *atriclava* Kieffer**

A single adult male from Herschel Island agrees well with the keys and description of *Metriocnemus atriclava* by Sæther (1989). However, until more material is available we refrain from so identifying it as Sæther (1989) comments there are problems with the interpretation of this species. Also it has not been reported previously from the Nearctic region.

44. ***Metriocnemus fuscipes* (Meigen)**

Adults were collected from Herschel Island and a bog near Trout Lake. *Metriocnemus fuscipes* is a common widespread, circumpolar species (Fittkau and Reiss 1978; Sæther 1989). Larvae live in damp soil adjacent to springs, spring runs and small streams, although Thienemann (1944) records it from within springs. It also occurs in madicolous habitats (Oliver and Sinclair 1989).

45. ***Metriocnemus obscuripes*** **(Holmgren)**

Adults of this most common and widespread member of *Metriocnemus* (Sæther 1989) were collected from Herschel Island. Larvae live in moss-covered substrate in small slow-flowing streams. The species is a common component of springs and the madicolous habitat (Oliver and Sinclair 1989, as *M. hygropetricus* Kieffer)

46. ***Metriocnemus*** **sp.**

This taxon from Herschel Island resembles *M. ursinus* (Holmgren), but differs in that the entire wing membrane is covered with setae and the robust legs have long, stout tibial spurs.

47. ***Orthocladius (Eudactylocladius) mixtus*** **(Holmgren)**

This circumpolar species collected from Herschel Island ranges widely throughout the Arctic Archipelago and in the Palaearctic region (Fittkau and Reiss 1978). Larvae live in standing water of all types including temporary ponds and pools (Fittkau and Reiss 1978).

48. ***Orthocladius (Euorthocladius)*** **sp.**

Several adult males from Herschel Island are in too poor a condition to allow identification to species.

49. ***Orthocladius (Orthocladius) hellenthali*** **Soponis**

This western Nearctic species (Soponis 1977) was captured near the Blow River. The larval habitat is unknown but adults usually are captured near running water.

50. ***Orthocladius (Orthocladius) oblidens*** **(Walker)**

Adult males of this circumpolar species were collected from Herschel Island and Trout Lake. The species is widespread in the Palaearctic region but was known previously in the Nearctic only from northern Quebec and adjacent islands in Hudson Strait (Soponis 1977). Larvae live in flowing water and in lakes.

51. ***Orthocladius (Orthocladius) rubicundus*** **(Meigen)**

Adult males were collected near Trout Lake. This species is widespread in the Palaearctic region but known previously in the Nearctic only from southern British Columbia (Soponis 1977, as *O. curtiseta* Sæther). Also we have seen specimens from southern Ontario. Larvae live in a variety of habitats including springs, flowing water and the littoral region of standing water (Fittkau and Reiss 1978; Langton 1991).

52. ***Orthocladius (Orthocladius) smolandicus*** **Brundin**

An adult male was collected in a bog near Trout Lake. This species is known from a few localities in the western Nearctic region and northern Europe (Soponis 1977; Ashe and Cranston 1991). The immature stages are unknown but adults have been captured in emergence traps set on the Bigoray River, an Alberta brownwater stream (Boerger 1981).

53. ***Orthocladius (Orthocladius) trigonolabis*** **Edwards**

This circumpolar species was collected near a lake on Herschel Island. Larvae live in the littoral zones of lakes (Brundin 1956).

54. ***Paracladius quadrinodosus*** **Hirvenoja**

Collected from Herschel Island, this species extends from Alaska (Hershey 1985) to Greenland (Oliver 1976) in the Nearctic region. In the Palaearctic it ranges from north Sweden to France (Ashe and Cranston 1991). Larvae live in standing water including the littoral zone of lakes (Hirvenoja 1973; Oliver 1976).

55. ***Parakiefferiella bathophila*** **(Kieffer)**

An adult male collected at Trout Lake is one of the few Nearctic records of *Parakiefferiella bathophila*. It is widespread south of treeline in Europe (Tuiskunen 1986). According to Tuiskunen (1986) it is one of the most widely distributed species of *Parakiefferiella* and has a wide ecological amplitude. Larvae live in the littoral zone of standing waters, springs and flowing water.

56. ***Parakiefferiella gracillima* (Kieffer)**

Collected from near Trout Lake, this Holarctic species is associated with springs and first-order streams in central Europe and the former USSR (Tuiskunen 1986; Fittkau and Reiss 1978). Butler et al. (1981) reported it from an area with tundra ponds near Point Barrow.

57. ***Parakiefferiella* sp.**

Adult males from the Trout Lake area resemble the Palaearctic species *Parakiefferiella scandica* Brundin but differ from it in hypopygial structure.

58. ***Paralimnophyes* sp.**

The adult males from Herschel Island resemble, especially in the hypopygium, *P. hydrophilus* (Goetghebuer) more than *P. arcticus* Brundin; the latter species has been recorded from adjacent areas of Alaska and the Northwest Territories (Cranston and Oliver 1988). Their colour is pale brown, and differs from the entirely black reported for *P. hydrophilus* (Edwards 1929; Goetghebuer 1944).

59. ***Paraphaenocladius impensus* (Walker)**

Adult males were collected near Trout Lake. In the Palaearctic region *P. impensus* ranges from Spitsbergen to northern Africa (Fittkau and Reiss 1978). It is probably equally widespread in the Nearctic but has been reported only from Greenland and Ontario. Larvae prefer damp, sphagnous soil (Thienemann 1944) but Fittkau and Reiss report them from a variety of wet habitats including springs and small bodies of standing water.

60. ***Psectrocladius limbatellus* (Holmgren)**

Large numbers of adults were collected from the Trout Lake area and Herschel Island. Larvae of this Holarctic species have been reported from a variety of standing-water types ranging from temporary pools to lakes (Fittkau and Reiss 1978). The habitats are sometimes located in sphagnous areas (Brundin 1949).

61. ***Pseudosmittia nanseni* (Kieffer)**

Collected on Herschel Island, this Nearctic species ranges from Alaska to Greenland and south to California in the west, and to New Brunswick in the east (Cranston and Oliver 1988). The immature stages are unknown.

62. ***Rheocricotopus (Rheocricotopus) effusus* (Walker) group**

Adult males from the Trout Lake and Blow River area are probably an undescribed taxon in the *R. effusus* group (Sæther 1985*a*). The humeral pit is small or indistinct and the superior volsella has a long apical projection.

63. ***Smittia aterrima* (Meigen)**

A single adult male of this widespread Holarctic species (Oliver et al. 1990; Ashe and Cranston 1991) was collected on Herschel Island. It was known previously in the arctic zone of the Nearctic region only from Greenland (Oliver et al. 1990). Larvae are terrestrial and often associated with rootlets of plants (Johannsen 1937).

64. ***Smittia polaris* (Kieffer)**

This Nearctic species was collected at all of the northern Yukon localities, though it was recorded previously only from Ellesmere Island (Sæther et al. 1984). It is probably widespread throughout the arctic zone of the Nearctic region.

65. ***Thienemannia* sp.**

This probably undescribed taxon was collected near the Blow River and Trout Lake. The genus was known previously in the Nearctic region by a single record from Tennessee (*T. pilinucha* Sæther 1985*b*). Larvae of *Thienemannia* are found in springs and moss in madicolous zones (Cranston et al. 1983).

66. ***Tokunagaia obriaini* Hayes and Murray**

This Nearctic species extends from Herschel Island and Trout Lake across the Canadian Arctic Archipelago to north Greenland. Larvae are rheophilic occurring in small, slow-flowing streams (Hayes and Murray 1988).

67. ***Tokunagaia* sp.**

Several adult males collected on Herschel Island are similar to *T. obriaini*, except that the antennal plume is reduced.

68. ***Tvetenia duodenaria* Kieffer**

Adult males were collected on Herschel Island. This Holarctic species exhibits considerable morphological variation (Sæther and Halvorsen 1981; Cranston and Oliver 1988). The antennae vary from normal, with 13 flagellomeres and full plume, to antennae with fewer flagellomeres and a reduced plume. Larvae are unknown but pupal exuviae have been collected from a rheocrene in northern Finland (Wülker 1959).

69. ***Vivacricotopus* sp.**

Several adult males from Trout Lake and Herschel Island are similar to *V. piloculus* (Cranston and Oliver 1988), but differ in that the anterior part of the inner lobe of the hypopygium projects as a distinct tubercle. Moreover, the antennal plume is slightly reduced.

70. ***Zalutschia mucronata* (Brundin) group**

The adult males conform best with the characteristics of the *Z. mucronata* group as defined by Sæther (1976). They exhibit some morphological characters associated with non-aerial mating behaviour, such as reduced antenna with a low antennal ratio and the plume composed of short setae, relatively long legs and enlarged genitalia. A pair in copula was captured by sweeping through vegetation near pools and ponds in the Trout Lake area.

71. ***Zalutschia* cf. *trigonacies* Sæther**

An adult male collected in the Trout Lake area is similar to *Z. trigonacies* Sæther (1976), but differs by having a lower antennal ratio, fewer thoracic and wing setae and an anal point without setae. Larvae of *Z. trigonacies* live in the littoral zone of Hazen Lake and a nearby tarn (Oliver, pers. obs.). Trapped adults from the tarn showed a sex ratio biased towards females (Oliver and Danks 1972; reported as *Trissocladius tornetraeskensis* (Edwards)).

72. ***Zalutschia zalutschicola* Lipina**

Adults of this circumpolar species were collected near Trout Lake. Larvae are characteristic of humic lakes (Sæther 1976), but they also occur in oligotrophic lakes.

Subfamily Chironominae

Most species of Chironominae are essentially warm-adapted and live in standing water, though they are not uncommon in cool habitats and in running water. Like the Tanypodinae, and unlike the Orthocladiinae, they decrease in numbers with increasing latitude and cooler temperatures. In the arctic zone they rank second in number of species to the Orthocladiinae.

In the Arctic Archipelago the Tanytarsini usually outnumber the Chironomini, but in the Yukon collections the 2 tribes occurred in about equal numbers.

Tribe Chironomini

Several genera (*Acalcarella*, *Dicrotendipes* and *Polypedilum*), that occur in adjacent areas were not represented in the collections, but would be expected to occur in the arctic zone of the Yukon Territory.

73. ***Chironomus thummi* (Kieffer) group**

Several specimens from Herschel Island and Trout Lake represent one or more species of the *C. thummi* group. The adult males have a club-shaped appendage 1, a basally constricted anal point and no tarsal beard. There are differences from *C. thummi* in body colour pattern and intensity, and in hypopygial structures. In the Nearctic region, *C. riparius* Meigen is the only described taxon with appendage 1 enlarged apically, but in Europe there are several taxa of this type which are not easily separated.

74–81. ***Chironomus* spp.**

A large number of species of *Chironomus* have been recorded from the Nearctic region (Oliver et al. 1990). In the northern Yukon collections we have recognized at least 8 taxa, 4 from Herschel Island, 1 from Blow River, and 3 from Trout Lake, but cannot assign specific names. This genus

requires an Holarctic revision based on characters of both the adult and immature stages, and karyotype analysis.

82. ***Cladopelma bicarinata* (Brundin)**

Adults of this species were collected from a bog near Trout Lake. This is a new record for the Nearctic region. In Europe (Brundin 1947) adults have been captured emerging from a peat bog overgrown with *Carex.*

83. ***Cladopelma edwardsi* (Kruseman)**

An adult male was collected from a bog near Trout Lake. This species is widespread throughout the Palaearctic region and in the Nearctic it has been recorded from British Columbia, and Ontario south to Florida (Oliver et al. 1990). Larvae have been collected from ponds and streams (Beck 1977).

84. ***Parachironomus subalpinus* (Goetghebuer)**

A single adult male from Philip Creek is the first Nearctic record. Larvae live in sublittoral areas of standing waters (Lehmann 1970).

85. ***Parachironomus forceps* (Townes)**

The 2 adult males collected from a bog near Trout Lake provide the first arctic record of this Nearctic species. It has been reported from only a few localities extending from Manitoba east to Massachusetts (Oliver et al. 1990).

86. ***Sergentia (Sergentia) coracina* (Zetterstedt)**

This species found at Trout Lake was originally reported from northern Sweden and is widespread in the Nearctic region, ranging south from Greenland to Ontario and Wisconsin (Oliver et al. 1990). In Fennoscandia larvae are cold stenotherms, living in the littoral and profundal zones of northern subarctic lakes (Brundin 1949).

87. ***Stictochironomus unguiculatus* (Malloch)**

Two adult males were collected from Trout Lake. This species is distributed throughout the arctic zone of the Nearctic region. The larvae are not known.

88. ***Stictochironomus* sp**.

A teneral adult male from Blow River is similar in hypopygial structure to *Stictochironomus unguiculatus* (Malloch) but lacks a darkened RM and foreleg tarsal beard.

89. ***Tribelos atrum* (Townes) group**

Two adult males from Trout Lake have a broad and flat gonostylus similar to *T. subletteorum* Grodhaus (1987). They differ in having a longer, curved appendage 1 and higher antennal ratio (2.0–2.4 vs l.04–1.40). Between these 2 specimens there are differences in the shape of appendage 1, length of tibial spurs and presence or absence of sensilla chaetica, but in other respects they agree with the *T. atrum* group as defined by Grodhaus (1987).

Tribe Tanytarsini

The genus *Corynocera*, not represented in the collections, should occur in the northern Yukon.

90. ***Cladotanytarsus nigrovittatus* (Goetghebuer)**

Adult males were collected from a bog near Trout Lake. Larvae of this circumpolar species live in standing water. Lindeberg (1964) collected adults emerging from Lake Puruvesi in southeastern Finland, during his analysis of swarming behaviour as a taxonomic tool for separating closely related species.

91. ***Cladotanytarsus* sp.**

A single adult male from Trout Lake represents a new taxon. The medially directed appendages 1 and 2, short appendage 1a, and apically nipple-like anal point are distinctive.

92. ***Constempellina brevicosta* (Edwards)**

Collected at Trout Lake and Philip Creek this species is a common univoltine spring species in Fennoscandia. In the Nearctic region it ranges from Alaska, Mackenzie River Delta to Manitoba and Quebec. Larvae construct cases and inhabit the littoral and profundal zones of lakes (Brundin 1948).

93. ***Micropsectra groenlandica* Andersen**

Micropsectra groenlandica, collected near Trout Lake, is widely distributed in the Palaearctic region but has been reported previously only from Greenland and the Yukon Territory in the Nearctic region. Andersen (1937, 1946) reported larvae living in subarctic lakes in Greenland and Sweden.

94. ***Paratanytarsus laccophilus* (Edwards)**

An adult male was collected from Herschel Island. *P. laccophilus* has been recorded in the Nearctic region only from Manitoba but it is widespread in the Palaearctic. It is a typical boreo-alpine species (Thienemann 1951) and lives in all types of standing waters.

95. ***Paratanytarsus lauterborni* (Kieffer)**

Several adult males collected from Trout Lake and Philip Creek are identical to Norwegian material from Heimsdalvatn but differ from southern European material. Southern European populations have an apically pointed gonostylus with strong apical seta, and long appendage 2a with apically rounded lamellae. Norwegian and Yukon populations have an apically rounded gonostylus, no strong seta, and a shorter appendage 2a with apically pointed lamellae. Larvae live in ponds and pools in southern and middle Europe but in northern Europe they are also found in lakes (Reiss and Säwedal 1981).

96. ***Paratanytarsus pencillatus* (Goetghebuer)**

Paratanytarsus pencillatus from Philip Creek is the first Yukon record. It is Holarctic in distribution and is widely distributed in the Canadian arctic zone. Larvae are eurythermous and inhabit shallow, oligotrophic waters (Brundin 1949).

97. ***Tanytarsus gracilentus* (Holmgren)**

This widespread circumpolar species collected from Herschel Island is the first Yukon record. It has been used extensively for zoogeographic analysis and the understanding of variation between and within populations (Lindeberg 1968, 1971). Larvae live in rock pools, brackish water and lakes.

98. ***Tanytarsus gregarius* Kieffer**

Tanytarsus gregarius sensu Reiss is widespread in the Palaearctic region. Two adult males were collected from Herschel Island and Trout Lake area. Larvae live in large bodies of standing water, temporary pools and ponds (Reiss 1968).

99. ***Tanytarsus inaequalis* Goetghebuer**

This Holarctic species collected from Trout Lake and Herschel Island ranges from Alaska to Manitoba and is widespread in Europe. Larvae live in the sublittoral and profundal zones of lakes (Reiss 1968).

100. ***Tanytarsus lapponicus* Lindeberg**

Tanytarsus lapponicus was previously recorded from the Kilpisjarvi area in northern Fennoscandia and Manitoba. The adult male from Trout Lake has 10 spinules on the anal point whereas 6–8 were reported for the species by Lindeberg (1970).

101, 102. ***Tanytarsus lestagei* Goetghebuer aggregate**

Two adult males collected from Trout Lake are assigned to the *T. lestagei* aggregate sensu Lindeberg (1967) and may represent 2 different taxa. The differences are mainly in hypopygial shape. Lindeberg (1967) discusses the problems of delimiting sibling species in this aggregate.

103. ***Tanytarsus* sp.**

Two adult males from Herschel Island resemble the Palaearctic species *T. fimbriatus* Reiss and Fittkau in the *T. holochlorus* (= *mendax* Kieffer) group (sensu Reiss and Fittkau 1971). They differ in that the lamellae on appendage 2a lack a fringe. Middle European *T. fimbriatus* have a weak fringe whereas in southern European and north African specimens the fringe is strongly defined (Reiss and Fittkau 1971).

Summary and Discussion

More than 100 taxa, in 45 genera, were identified in the collections from the Yukon Arctic Slope and Herschel Island (Table 1). Of these species, 68 were named. Many of the

unnamed taxa belong to species groups or genera that need revising, such as *Chironomus*. This number more than doubles the number of 48 species (in 27 genera) previously recorded for all of the Yukon Territory (Oliver et al. 1990).

Most of the specimens were collected in lowland wet tundra areas, over a few days during several years. Chironomids living in large aquatic bodies, i.e. lakes and flowing water greater than second-order streams, as well as alpine, foothill, coastal, orientated-lake and thermal-spring habitats in the arctic zone are almost uncollected. Overall, taxa reported here probably represent less than one-third of the actual fauna of the Yukon arctic zone. Our lack of knowledge is demonstrated by the large number of new records for the Yukon Territory (51, or 75% of the named species). There are also 21 genera (listed in introductory sections of the list above) that probably occur in the Yukon arctic zone, because they are found in adjacent areas of Alaska and/or the Northwest Territories.

Five of the 8 subfamilies of Chironomidae were represented in the arctic-zone collections. These 5 subfamilies, shown in Table 1, range widely throughout the arctic zone of North America, including the Queen Elizabeth Islands and Pearyland (north Greenland). Prodiamesinae is the only other subfamily that might occur, possibly in conjunction with thermal springs. The Orthocladiinae is the dominant subfamily in the arctic Yukon as it is in other parts of the arctic zone (Oliver 1968). The 3 dominant genera, *Cricotopus, Limnophyes* and *Orthocladius*, are all in this subfamily. The Chironominae were second in number of genera to the Orthocladiinae but proportionally were more numerous than in the Queen Elizabeth Islands (see Oliver 1963; McAlpine 1965; Danks 1980). Two genera of the Chironominae, *Parachironomus* and *Tribelos*, are recorded for the first time from the Nearctic arctic zone. Two subfamilies, the Diamesinae and the Tanypodinae, were definitely under-represented in the collections.

Larvae of the primarily cold-adapted Orthocladiinae live in a greater variety of habitats, including wet or damp terrestrial habitats, than those of the other subfamilies (Oliver 1971). They occur in peat bogs (Rosenberg et al. 1988) which are common habitats on the arctic North Slope. Larvae of *Limnophyes*, with few exceptions, are terrestrial, as are the larvae of many members of other orthoclad genera occurring in the northern Yukon, such as *Bryophaenocladius, Chaetocladius, Krenosmittia, Metriocnemus, Paraphaenocladius, Pseudosmittia* and *Smittia*. Larvae of the other orthoclad genera may occur in large aquatic bodies but they are generally well represented in ponds, pools and low-order streams. The Yukon arctic zone abounds in habitats suitable for larvae of the Orthocladiinae.

In the cold-adapted Orthocladiinae, as might be expected, many of the named species (25 of 47) range into the Arctic Archipelago (Table 2). But species that reach their northern limit on the arctic mainland also are an important component of the Yukon arctic-zone fauna. Some species such as *Cricotopus sylvestris* (25) and *Limnophyes ninae* (38) are widespread south of treeline and range only a short distance into the arctic. Others, such as *Bryophaenocladius aestivus* (10) and *Parakiefferiella gracillima* (56), occur south of treeline in Europe but, at least as yet, have not been so reported in the Nearctic region. Some of these species, although belonging to a cold-adapted group, may be limited in their northern spread, in that they are essentially warm adapted. For example, *C. sylvestris* is common in small, shallow and warm ponds in the temperate zone with the adults emerging in the temperate summer; whereas *Diplocladius cultriger* (28), a widespread arctic species which extends into temperate areas, emerges very early in the temperate spring. Yet other widespread species, such as *Cricotopus tibialis* (22), emerge in temperate areas throughout the summer. Obviously information is inadequate to generalize about the factors affecting the northern distribution of this diverse subfamily.

TABLE 1. Chironomidae of the Yukon Arctic Slope and Herschel Island, and their general ranges.**, New Nearctic record; *, New Yukon record. Abbreviations: AK, Alaska; AML, Arctic zone mainland (excluding Alaska and Yukon Territory); AS, Yukon Arctic Slope: E, East of Hudson Bay and Ontario/Manitoba border; GRL, Greenland; HI, Herschel Island; QEI, Queen Elizabeth Islands; SAI, Southern arctic islands; W, West of Hudson Bay and Ontario/Manitoba border.

	Nearctic									Palaearctic		
	Yukon		Arctic zone					South of treeline		Svalbard/ Novaya Zemlya	N. Europe	N. Asia
	HI	AS	AK	AML	SAI	QEI	GRL	W	E			
Subfamily Podonominae												
1. *Lasiodiamesa sphagnicola* (Kieffer)*		+		+				+	+		+	
2. *Trichotanypus foliaceus* Wirth and Sublette*		+	+									
Subfamily Tanypodinae												
3. *Psectrotanypus* cf. *pictipennis* (Zetterstedt)		+					+			+	+	
Subfamily Diamesinae												
4. *Diamesa amplexivirilia* Hansen*		+	+					+				+
5. *Diamesa* sp.		+										
6. *Protanypus tshereshnevi* Makarchenko**	+											+
7. *Pseudokiefferiella* sp.		+										
Subfamily Orthocladiinae												
8. *Acricotopus lucens* (Zetterstedt)*	+		+	+	+			+			+	+
9. *Apometriocnemus beringensis* Cranston and Oliver		+										
10. *Bryophaenocladius aestivus* (Brundin)*	+		+					+			+	+
11, 12. *Bryophaenocladius* spp.	+	+										
13. *Chaetocladius perennis* (Meigen)*	+		+		+	+				+	+	
14. *Chaetocladius* sp.		+										
15. *Corynoneura arctica* Kieffer*	+	+				+				+		
16. *Corynoneura celeripe*s Winnertz*		+					+	+	+		+	
17. *Cricotopus (C.) beringensis* Oliver and Dillon*		+	+									
18. *Cricotopus (C.) coronatus* Hirvenoja*	+			+	+	+		+	+		+	
19. *Cricotopus (C.) lestralis* (Edwards)*		+		+	+	+	+	+			+	?
20. *Cricotopus (C.) patens* Hirvenoja		+		+							+	
21. *Cricotopus (C.) pilosellus* Brundin	+		+	+	+	+	+			+	+	+
22. *Cricotopus (C.) tibialis* (Meigen)	+		+	+	+	+	+	+	+	+	+	+
23. *Cricotopus (C.) tristis* Hirvenoja	+			+	+						+	
24. *Cricotopus (Isocladius) ornatus* (Meigen)	+			+				+	+		+	

25. *Cricotopus (I.) sylvestris* (Fabricius)	+							+	+		+	+
26. *Cricotopus (I.) sylvestris* group		+										
27. *Cricotopus (I.)* sp.		+		+								
28. *Diplocladius cultriger* Kieffer	+	+	+	+	+	+	+	+	+		+	+
29. *Heterotrissocladius maeaeri* Brundin*	+		+								+	
30. *Hydrobaenus conformis* (Holmgren)*		+		+	+	+	+		+	+	+	+
31. *Krenosmittia* cf. *camptophleps* (Edwards)		+										
32. *Lappokiefferiella platytarsus* Tuiskunen**	+										+	
33. *Limnophyes andersoni* Saether*	+			+	+	+	+					
34. *Limnophyes asquamatus* Andersen		+	+	+	+	+	+	+			+	
35. *Limnophyes brachytomus* (Kieffer)	+			+	+	+	+	+	+	+	+	
36. *Limnophyes* cf. *margaretae* Saether		+										
37. *Limnophyes minimus* (Meigen)	+	+			+	+	+	+	+	+	+	
38. *Limnophyes ninae* Saether*		+						+	+		+	
39. *Limnophyes pilicistulus* Saether		+						+				
40. *Limnophyes pumilio* (Holmgren)	+	+		+	+	+	+	+	+	+	+	+
41. *Limnophyes* sp.		+										
42. *Lipurometriocnemus vixlobatus* Saether		+										
43. *Metriocnemus* cf. *atriclava* Kieffer	+											
44. *Metriocnemus fuscipes* (Meigen)*	+	+					+	+	+		+	+
45. *Metriocnemus obscuripes* (Holmgren)*	+		+	+	+	+	+	+	+	+	+	+
46. *Metriocnemus* sp.	+											
47. *Orthocladius (Eudactylocladius) mixtus* (Holmgren)*	+					+	+	+			+	+
48. *Orthocladius (Euorthocladius)* sp.	+											
49. *Orthocladius (O.) hellenthali* Soponis*		+						+				
50. *Orthocladius (O.) oblidens* (Walker)*	+	+		+					+		+	+
51. *Orthocladius (O.) rubicundus* (Meigen)*	+	+						+			+	+
52. *Orthocladius (O.) smolandicus* Brundin*		+		+				+				+
53. *Orthocladius (O.) trigonolabis* Edwards*	+	+			+			+			+	+
54. *Paracladius quadrinodosus* Hirvenhoja*	+		+		+	+	+				+	
55. *Parakiefferiella bathophila* (Kieffer)*		+						+			+	
56. *Parakiefferiella gracillima* (Kieffer)*		+									+	
57. *Parakiefferiella* sp.		+										
58. *Paralimnophyes* sp.	+											
59. *Paraphaenocladius impensus* (Walker)*		+					+		+	+	+	
60. *Psectrocladius limbatellus* (Holmgren)*	+	+			+	+	+	+		+	+	+
61. *Pseudosmittia nanseni* Kieffer	+		+	+	+	+	+	+	+			

TABLE 1. (*continued*)

	Nearctic									Palaearctic		
	Yukon		Arctic zone					South of treeline		Svalbard/ Novaya Zemlya	N. Europe	N. Asia
	HI	AS	AK	AML	SAI	QEI	GRL	W	E			
62. *Rheocricotopus (R.) effusus* group		+										
63. *Smittia aterrima* (Meigen)*	+					+	+	+	+		+	+
64. *Smittia polaris* (Kieffer)*	+	+				+						
65. *Thienemannia* sp.		+										
66. *Tokunagaia obriaini* Hayes and Murray*	+	+		+	+	+	+					
67. *Tokunagaia* sp.	+	+										
68. *Tvetenia duodenaria* Kieffer*	+								+	+		
69. *Vivacricotopus* sp.	+											
70. *Zalutschia mucronata* (Brundin) group		+										
71. *Zalutschia* cf. *trigonacies* Saether*		+	+	+	+	+						
72. *Zalutschia zalutschicola* Lipina*	+	+	+	+				+	+		+	
Subfamily Chironominae												
Tribe Chironomini												
73. *Chironomus thummi* (Kieffer) group	+	+										
74–81. *Chironomus* spp.	+	+										
82. *Cladopelma bicarinata* (Brundin)**		+									+	
83. *Cladopelma edwardsi* (Kruseman)*		+						+	+		+	
84. *Parachironomus subalpinus* (Goetghebuer)**	+											+
85. *Parachironomus forceps* (Townes)*		+						+	+			
86. *Sergentia (S.) coracina* (Zetterstedt)*		+	+	+	+	+	+		+		+	
87. *Stictochironomus uniguiculatus* (Malloch)*		+		+	+	+	+					
88. *Stictochironomus* sp.		+										
89. *Tribelos atrum* (Townes) group		+										
Tribe Tanytarsini												
90. *Cladotanytarsus nigrovittatus* (Goetghebuer)**		+									+	
91. *Cladotanytarsus* sp.		+										
92. *Constempellina brevicosta* (Edwards)*		+	+				+	+		+	+	
93. *Micropsectra groenlandica* Andersen		+					+				+	
94. *Paratanytarsus laccophilus* (Edwards)*	+						+			+		

95. *Paratanytarsus lauterborni* (Kieffer)**	+	+										+
96. *Paratanytarsus pencillatus* (Goetghebuer)*	+	+	+								+	
97. *Tanytarsus gracilentus* (Holmgren)*	+	+	+	+	+	+	+		+	+		+
98. *Tanytarsus gregarius* Kieffer**	+	+										+
99. *Tanytarsus inaequalis* Goetghebuer*	+	+	+	+				+				+
100. *Tanytarsus lapponicus* Lindeberg*		+						+				+
101, 102. *Tanytarsus lestagei* Goetghebuer aggregate		+										
103. *Tanytarsus* sp.	+											

TABLE 2. Summary of the distribution of named species of Chironomidae of the Yukon Arctic Slope and Herschel Island. The arctic zone mainland includes Alaska and the Northwest Territories.

Subfamily	Number of species						
	Nearctic						Palaearctic
	Total in northern Yukon	Restricted to arctic zone	Known in arctic zone mainland	Known in Arctic Archipelago	Known south of treeline	Known in Greenland	
Podonominae	2	1	2	0	1	0	1
Tanypodinae	1	1	0	0	0	1	1
Diamesinae	2	1	1	0	1	0	2
Orthocladiinae	47	18	26	25	31	20	37
Chironominae	16	1	6	3	7	6	14
Total	68	22	35	28	40	27	55

Unlike the Yukon species of Orthocladiinae, only one species of the Chironominae, *Stictochironomus unguiculatus* (87), is restricted to the arctic zone. All of the species of Chironominae that are reported here for the first time from the Nearctic region are found in the temperate zone of Europe. Of the 16 named species of Chironominae only 3 are known to occur in the Arctic Archipelago. As a group the Chironominae are warm-adapted, and most arctic species reach their northern limit on the arctic mainland. Very few species, e.g. *Sergentia coracina* (86) and *Tanytarsus gracilentus* (97), are widespread in the arctic zone. These 2 species also inhabit the deeper parts of oligotrophic lakes south of treeline. Most arctic Chironominae have received little study and further study may reveal species restricted to the arctic zone. For example Butler (1982) described 2 sibling species of *Chironomus* from arctic Alaska.

The treeline, commonly regarded as the southern limit of the arctic zone, is not an important zoogeographical barrier to the northward spread of the Chironomidae. This is true not only in the northwest where alpine and tundra areas interdigitate (Danks 1981) but also in the District of Keewatin where tundra and boreal areas are relatively more clearly defined. For example, *Cricotopus bicinctus* (Meigen), which is widespread in the temperate zone, occurs in the region of Baker Lake, several hundred kilometres north of treeline (Oliver and Dillon 1988). The Arctic Ocean appears to be a much more important northern barrier. Northward flowing rivers such as the Mackenzie, Anderson and Thelon, which might impede lateral spread, may facilitate the spread of some species into the arctic zone.

Many of the adult males of Orthocladiinae and Diamesinae, in particular, have reduced or modified antennae. Antennal reduction ranges from a slight reduction to complete loss of the plume, and may or may not be accompanied by reduction in the number of segments. In extreme cases the antennae become female-like in appearance. Other structural modifications occur in many species with these antennal reductions, such as enlarged and rotated hypopygia, brachyptery, strengthened legs, flattened scutum, and shortened palps (Oliver 1983; Sæther and Willassen 1987). Most of the known Nearctic arctic-zone specimens with antennal reduction occur in Beringia or adjacent areas. Described species with antennal reductions include *Diamesa amplexivirilia* (4), *Diamesa lupus* Willassen (1985) and *Cricotopus beringensis* Oliver and Dillon (1988). In the Canadian National Collection (CNCI) there are at least 10 taxa of undescribed Orthocladiinae, with antennal reductions, from Point Barrow and Tuktoyaktuk. An undescribed species of *Acricotopus* occurs in the Baker Lake area and a species of *Psectrocladius* on Bathurst Island. In the well collected Hazen Lake area, on the other hand, only 2 species, *Oliveridia tricornis* (Oliver) and *Hydrobaenus fusistylus* var. *octomeris* (Sæther) have marked antennal reductions.

None of the Chironominae in the Yukon collections exhibited antennal reduction. Except for *Corynocera* and a species in the *Tanytarsus gregarius* group reported from Point Barrow by Butler et al. (1981), Chironominae with structural modifications are not known in the arctic zone. Strongly modified chironomids occur elsewhere in the Nearctic region; however, they are frequently associated with small restricted habitats, e.g. *Metriocnemus yagina* Cranston and Judd (1987) in rock-pools within the splash zone of the Pacific Ocean, and *Cricotopus macraei* Sæther (1971) and *Cricotopus bifurcatus* Cranston and Oliver (1988) in cold springs.

Species with reduced antennae and enlarged hypopygia mate on the ground near the emergence site (Downes 1962). The loss of the aerial swarming habit would increase the potential for repopulation of the habitat from which they emerged. In the harsh Beringian environment adaptation to non-swarming mating behaviour would be an important survival strategy. Many of the species with modified structures related to loss of the swarming habit

may be Beringian in origin. A study of the circumpolar chironomid fauna such as Willassen's (1985) study of the *Diamesa davisi* complex is needed.

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