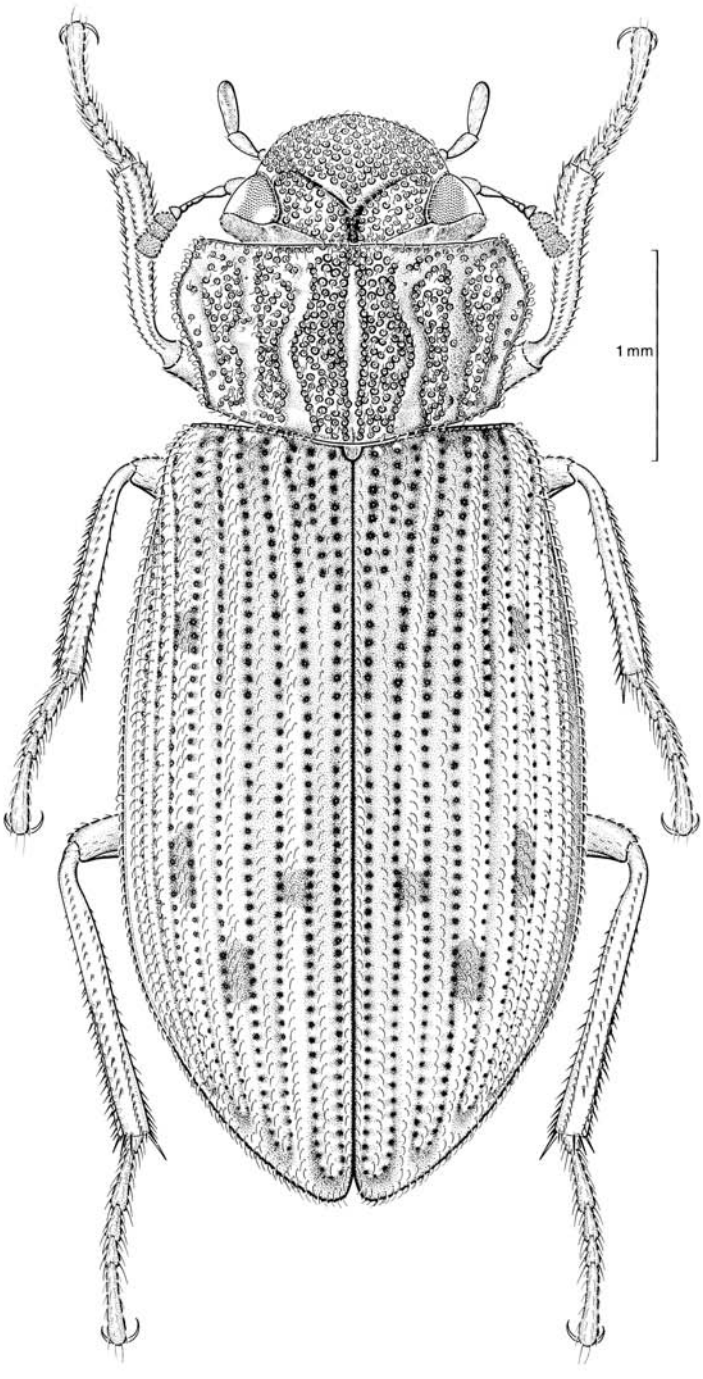

Frontispiece. *Helophorus sibiricus* (Motschulsky), a distinctive hydrophilid beetle associated with shallow waters in northwestern North America (Yukon, Alaska, Northwest Territories) and across northern Eurasia. Illustration courtesy of Ales Smetana.

An Overview of the Beetles (Coleoptera) of the Yukon

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Abstract. Nine hundred and thirteen species (or subspecies) placed in 57 families of Coleoptera are recognized from the Yukon Territory. An additional 822 species are recorded from neighbouring Alaska and the Northwest Territories and may also occur in the Yukon. The most diverse families in the Yukon are Carabidae (209 species), Staphylinidae (179 species), Dytiscidae (113 species), and Curculionidae (59 species).

Two hundred and sixty-two Yukon species (28.7% of the fauna) are found in both Nearctic and Palaearctic regions while the remaining 651 species (71.3% of the fauna) are exclusively Nearctic. Most of the species that also occur in the Palaearctic region (203 of 262; 77.8%) are widespread in North America. Thirty-five species are widespread in the Palaearctic region but restricted in their Nearctic distribution to Beringia or marginally beyond. Within the exclusively Nearctic species, most are widespread Nearctic (66; 7.2% of the total fauna), transcontinental and western montane (129; 14.1%), or transcontinental (258; 28.1%). Remaining Nearctic species are western montane (94; 10.3%) or widespread western (45; 4.9%) in distribution. Relatively few Yukon beetle species are restricted in their distributions to Beringia; 23 species (2.4% of the fauna) are found in both East and West Beringia, and 56 Nearctic species (6.2%) are East Beringian in distribution. Most of these species are in relatively widespread speciose northern genera and are likely late-Pleistocene Beringian isolates (e.g. Dytiscidae: *Agabus*; Curculionidae: *Dorytomus*, *Ceutorhynchus*). Some taxa are structurally rather distinct from their relatives and appear to have existed, undifferentiated, in Beringia for long periods of time (e.g. Curculionidae: *Connatichela*, *Vitavitus*). In one instance, the taxa are members of a diverse species complex which appears to have undergone isolation and differentiation over a long period of time within Beringia (Carabidae: *Pterostichus* subgenus *Cryobius*). A number of recently described species currently regarded as endemic to Beringia may be more widespread than current collection records indicate (Staphylinidae: various arctic Aleocharinae).

Almost 60% of the 913 species of beetles found in the Yukon are predators, primarily in the families Carabidae, Staphylinidae, Dytiscidae and Coccinellidae. Phytophagous taxa (mostly Curculionidae, Chrysomelidae, Elateridae, Scolytidae and Cerambycidae) make up about 20% of the fauna. Many phytophages are widespread species associated with the woody plant families Salicaceae and Pinaceae. The remaining 20% of the Yukon beetle fauna comprises taxa with a variety of habits, most notably fungivores (Leiodidae) and saprophages (Scarabaeidae).

Résumé. *Aperçu global des coléoptères (Coleoptera) du Yukon.* Neuf cent treize espèces (ou sous-espèces) de coléoptères appartenant à 57 familles sont actuellement connues au Yukon. Un grand nombre d'espèces additionnelles (822) ont été récoltées en Alaska et dans les Territoires du Nord-Ouest et elles risquent d'être éventuellement trouvées aussi au Yukon. Les familles les plus diversifiées du Yukon sont les Carabidae (208 espèces), les Staphylinidae (179 espèces), les Dytiscidae (113 espèces) et les Curculionidae (59 espèces).

Deux cent soixante-deux des espèces du Yukon (28,7%) se trouvent à la fois dans la zone paléarctique et dans la zone néarctique alors que les 651 autres (71,3) sont exclusivement néarctiques. La majorité des espèces holarctiques (203 sur 262; 77,8%) sont bien répandues en Amérique du Nord. Trente-cinq espèces sont répandues dans la région paléarctique, mais ont une répartition néarctique restreinte à la Béringie ou un peu au-delà. Parmi les espèces exclusivement néarctiques, la plupart (66; 7,2%) sont répandues dans toute la zone, ou sont transcontinentales et se trouvent aussi dans les montagnes de l'ouest (129; 14,1%), ou sont transcontinentales (258; 28,1%). Les autres espèces néarctiques habitent les montagnes de l'ouest (94; 10,3%) ou sont répandues dans tout l'ouest (45; 4,9%). Relativement peu des espèces du Yukon sont exclusivement béringiennes; 23 espèces (2,4%) vivent aussi bien en Béringie orientale qu'en Béringie occidentale et 56 (6,2%) vivent en Béringie orientale. La plupart de ces espèces appartiennent à des genres relativement diversifiés répandus dans le nord et ont probablement été isolées en Béringie à la fin du Pléistocène (e.g. Dytiscidae: *Agabus*; Curculionidae: *Dorytomus*, *Ceutorhynchus*). Certains taxons sont morphologiquement distincts de leurs congénères et semblent avoir vécu indifférenciés en Béringie pour de longues périodes (e.g. Curculionidae: *Connatichela*, *Vitavitus*). Dans un cas, les taxons appartiennent à un complexe d'espèces diverses qui semble avoir été isolé et s'être différencié pendant une longue période en Béringie (Carabidae: *Pterostichus*, sous-genre *Cryobius*). Un certain nombre d'espèces décrites récemment et généralement considérées comme endémiques en Béringie s'avéreront peut-être plus répandues que ne le permettent de conclure nos connaissances actuelles (Staphylinidae: certains Aleocharinae arctiques).

Près de 60% des 913 espèces de coléoptères du Yukon sont des prédateurs qui appartiennent principalement aux familles Carabidae, Staphylinidae, Dytiscidae et Coccinellidae. Les taxons phytophages (surtout des Curculi-

pp. 405–444 in H.V. Danks and J.A. Downes (Eds.), Insects of the Yukon. Biological Survey of Canada (Terrestrial Arthropods), Ottawa. 1034 pp.

onidae, Chrysomelidae, Elateridae, Scolytidae et Cerambycidae), constituent environ 20% de la faune. Plusieurs phytophages sont des espèces répandues associées à des plantes ligneuses des familles Salicaceae et Pinaceae. Le reste de la faune des coléoptères du Yukon (20%) se compose de taxons aux moeurs variées, en particulier des fongivores (Leiodidae) et des saprophages (Scarabaeidae).

Introduction

Beetles, or the order Coleoptera, are the most diverse group of organisms on Earth. With more than 350 000 described species, there are more species of beetles than all vascular plants combined; there are 6 or 7 beetle species for every known species of vertebrate. One in 5 of Earth's living species is a beetle. Recent extrapolations of total world biodiversity estimate that there may be as many as 5 million species of beetles.

Known beetle species are placed in 156 families, some of which include very few species and are very restricted in their geographic distributions. In North America, there are 125 families of beetles, 112 of which occur in Canada. Beetles are found throughout the world although by far they are most diverse in tropical latitudes; consequently both family occurrence and species diversity drop off in northern regions.

Beetles are endopterygotes and as such have complete metamorphosis, proceeding in development through egg, larval, pupal and adult stages. Most people are familiar with the adult stage characterized by the presence of heavily sclerotized forewings called elytra, which cover and protect the membranous hindwings used in flight as well as prevent water loss from the underlying abdomen. Many groups of beetles are known only from the adult stage; immature stages of some groups are entirely unknown. The presence of elytra and complete metamorphosis are 2 key adaptations which may have led to the great diversity and apparent success of the Coleoptera.

Beetles are one of the most ecologically complex groups of organisms on Earth. Beetles have a great ability to adapt to exceedingly narrow niches and many individual species are extreme microhabitat specialists. In general, distributions of beetles are affected more by characteristics of the habitat than by any other single ecological feature. They are found in nearly all terrestrial habitats eating a very wide range of foods. A few families, such as Dytiscidae and Hydrophilidae, consist of species which are exclusively or primarily aquatic as both immatures and adults. Few beetles are associated with marine habitats, although some members of Staphylinidae and Carabidae live in intertidal zones. Beetles seem to do well in arid situations and are one of the most diverse groups of insects in desert habitats. They are one of the most important plant-feeding groups of insects, although they do not appear to include as many serious pests as other orders of insects such as Homoptera. They are also important scavengers, feeding on and breaking down various kinds of animal and plant debris, especially dung, carrion, wood and leaf litter. Many species are important predators on other invertebrates and some larger aquatic species even prey on small vertebrates such as frogs and fish. A few species are parasites, generally of other insects. Other species, particularly of Staphylinoidea, live in the nests of social insects, especially ants. Some species of Leiodidae are associated with beavers and other small rodents although the association is not parasitic. Beetles are also commonly found in caves where they have adapted to subterranean life by loss of body pigment, loss of the ability to fly, and loss or reduction of eyes. While much is known of the general habits of beetles as a whole, little or nothing is known of the details of natural history for certain groups of beetles.

Body size ranges greatly from small species such as some featherwing beetles (Ptiliidae), which may be smaller than 1 mm in length, to the large tropical goliath and hercules

scarab beetles (Scarabaeidae) which can reach 15 cm in length. The diversity of forms, colours, sizes, and habits has led to a wide general interest in beetles.

This pervasive general importance and interest in beetles means that substantial information is available, chiefly from collection of adults, about Canadian beetle taxonomy, distribution and natural history. This chapter uses such general information to present an outline of the coleopterous fauna of the Yukon Territory, to summarize general geographical distribution patterns, to summarize patterns in habitat occurrence and other ecological information, and finally to note taxa of special biogeographic significance in considering the geographical relationships and origins of the insect fauna of the Yukon. Other chapters provide more detailed treatments of Trachypachidae and Carabidae (Ball and Currie 1997), Dytiscidae (Larson 1997) and the curculionoid families Anthribidae, Brentidae and Curculionidae (Anderson 1997).

Methods

Sources of Data. The recently published "Checklist of the Beetles of Canada and Alaska" (Bousquet 1991) provides the primary basis for this overview of the Coleoptera of the Yukon Territory. According to Bousquet (1991), 7447 species (or subspecies) in 112 families of Coleoptera occur in Canada. These are represented by as few as a single species in a variety of families to as many as 1129 species for Staphylinidae, the most diverse beetle family in Canada. These numbers do not include undescribed taxa or taxa expected to be recorded in Canada; these are estimated for each family in Danks (1979).

The results presented and discussed here are based almost entirely on the distributional data in Bousquet (1991) with some recent additions (e.g. Oygur and Wolfe 1991: *Gyrinus*; Baranowski 1993: *Leiodes*; Peck and Stephan 1996: *Colon*). In addition, Dr. Volkar Puthz (Germany) was especially helpful in providing unpublished data on *Stenus* species (Staphylinidae) and Dr. Stewart Peck (Canada) provided unpublished data on *Catops* species (Leiodidae). Information for the families Carabidae (including Trachypachidae), Dytiscidae and Curculionoidea (excluding Scolytidae and Platypodidae) are taken from contributions to this book and, as these contributions incorporate new data, their tabulations differ variously from tabulations presented in Bousquet (1991). For ease of cross-reference, family-group classification of all Coleoptera follows Bousquet (1991), resulting in slight differences between the classification used here and the classifications used in the other Coleoptera contributions to this book.

Terms. Geographic terms and distributional summaries are those used in Anderson (1997) but also are explained here. "Widespread North American" species are found throughout most of North America (Anderson, 1997, fig. 12). Some of these species may extend south into Mexico. "Northern transcontinental" species are found or expected to be found more or less from coast to coast in Canada, extending marginally into any or all of the northern United States (Anderson, 1997, fig. 11). These species can occur at high or low latitudes in Canada and can thus occur in arctic through boreal life zones. There may be disjunct populations at higher elevations in mountains of the southeastern United States. "Western montane" species are found in the western mountains of Canada and the United States (Anderson, 1997, fig. 8). They may extend south as far as California and even Mexico in the far west and New Mexico and Colorado to the east. "Widespread western North American" species are those found in that region from 95°W longitude west to the Pacific Ocean (Anderson, 1997, fig. 9). "Beringian" species are restricted to that area of Alaska, the Yukon

and the Northwest Territories in northwestern North America (delimited to the east by the Mackenzie Mountains) and eastern Siberia in northeastern Asia (delimited to the west by the Lena River), that remained unglaciated during the last glacial advance (Anderson, 1997, figs. 2–7). A species found only in the Nearctic portion of Beringia is considered as found in "East Beringia" (Anderson, 1997, figs. 3–7); a species found only in Palaearctic Beringia is considered as found in "West Beringia". The distribution of some of these species in North America may extend marginally beyond the unglaciated region into British Columbia, the Northwest Territories and even Alberta (Anderson, 1997, figs. 2, 4–5). Distributions of species occurring more widely in the Palaearctic Region than just West Beringia are not subdivided further because of a lack of readily accessible distributional information.

Composition of the Coleoptera Fauna of the Yukon

Diversity. In total, 838 species or subspecies of Coleoptera are recorded from the Yukon by Bousquet (1991); these are placed in 56 families. Based on subsequent additions at least 913 species in 57 families (Cicindelidae are treated as having family status distinct from Carabidae) have been recorded from the Yukon. An additional 822 species are recorded from neighbouring Alaska and the Northwest Territories (432 from Alaska, 301 from the Northwest Territories, and 89 from both) and also are likely to occur in the Yukon. Total known beetle faunas of adjacent areas are slightly more diverse than the beetle fauna of the Yukon, with 1205 species recorded from Alaska and 1031 recorded from the Northwest Territories. These differences likely reflect larger land areas as well as greater habitat diversity and perhaps also a greater sampling effort, particularly for Alaska.

Appendix 1 lists the genera occurring in the Yukon and adjacent areas and summarizes distributional patterns of constituent species. Numbers of species present in the Yukon are given as are numbers of species found in the adjacent areas of the Northwest Territories and Alaska but not found in the Yukon. Summaries of the distributional patterns of the Yukon-inhabiting species are shown in Table 1. Appendix 2 lists those species (or in some cases subspecies) restricted in their distributions to Beringia, and provides information about their natural history.

The most diverse families in the Yukon in terms of recorded species are Carabidae (209 species), Staphylinidae (179 species), Dytiscidae (113 species), Curculionidae (59 species), and Chrysomelidae (41 species). Not surprisingly, these figures generally reflect diversity measures for these families in Canada as a whole. For example, based on Bousquet (1991), the most diverse families of beetles in Canada are the Staphylinidae with 1129 recorded species, Carabidae with 946 recorded species, Curculionidae with 609 recorded species and Chrysomelidae with 569 recorded species. For these diverse families, the Yukon fauna represents from 7.2% to 22.1% of the Canadian fauna (Chrysomelidae, 7.2%; Curculionidae, 8.8%; Staphylinidae, 15.9%; and Carabidae, 21.9%). On the other hand, the Dytiscidae with 262 species in Canada appears especially well represented in the Yukon because 113 species or 43.1% of the Canadian fauna are found there. In contrast, the Scarabaeidae with 248 species in Canada has only 10 species recorded from the Yukon (4.0%). Representation in the Yukon of remaining families of intermediate Canadian diversity ranges from 8.7% (Elateridae) to 19.1% (Coccinellidae) of the Canadian species diversity for those families. Most families have less than 5 species known from the Yukon and many of these are similarly sparsely represented in Canada as a whole.

It should be noted that there are an additional 822 beetle species recorded from areas bordering the Yukon. Clearly, many of these taxa, particularly those found in both Alaska

TABLE 1. Summary of distributional patterns of Yukon Coleoptera.

Distribution type (Abbreviation)	No. of species	Percent of Yukon species
Palaearctic and Nearctic	262	28.7
Palaearctic-Western Nearctic (P-WN)	34	3.8
Palaearctic-Transcontinental/ Western montane Nearctic (P-TR/WM)	37	4.0
Palaearctic-Transcontinental Nearctic (P-TR)	133	14.6
Palaearctic-East Beringian (P-EB)	35	3.9
East-West Beringian (E-WB)	23	2.4
Nearctic only	651	71.3
Western (WN)	66	7.2
Transcontinental/Western montane (TR/WM)	129	14.1
Transcontinental (TR)	258	28.2
Western montane (WM)	94	10.3
Widespread western (WW)	45	4.9
East Beringian (EB)	56	6.1
Unknown	3	0.5

and the Northwest Territories, will eventually be found in the Yukon. Thus the total beetle fauna of the Yukon may approach 1500 species.

Especially diverse beetle genera in the Yukon are the carabids *Bembidion* (58 species), *Pterostichus* (29 species), *Amara* (26 species), and *Agonum* (15 species); the dytiscids *Hydroporus* (28 species) and *Agabus* (35 species); and the staphylinid *Stenus* (35 species). Only 8 additional genera, 3 of which are carabids, are represented in the Yukon by 10 or more species.

Biogeographic Patterns

Distributional patterns of the Yukon-inhabiting species are summarized in Table 1. Of the 913 species of beetles recorded from the Yukon, 262 species (28.7% of fauna) are found in both Nearctic and Palaearctic regions while the remaining 651 species (71.3% of fauna) are Nearctic. Most of the species that also occur in the Palaearctic region (203 of 262; 77.8%) are relatively widespread in North America and more than half of these widespread taxa are transcontinental in North America. Thirty-five species are widespread in the Palaearctic region but restricted in their Nearctic distribution to Beringia or marginally beyond. Twenty-three species are found only in East and West Beringia. For exclusively Nearctic species, about half are widespread. Most of these taxa are transcontinental (258; 28.1% of fauna) or transcontinental and western montane (129; 14.1% of fauna); a smaller number are even more widespread (66; 7.2% of fauna). Remaining Nearctic species are western montane (94; 10.3% of fauna) or widespread western (45; 4.9% of fauna). Fifty-six species are known to be restricted to East Beringia which, with the 23 East-West Beringian species, means that 79 species of beetles have restricted Beringian distributions.

Patterns of geographic distribution within families are generally similar to those for the Coleoptera as a whole (Table 2). For example, based on the numbers of species shown in Table 2, 33.9% of Yukon curculionids also occur in the Palaearctic region compared with 28.4% for the beetles in their entirety, about half the total species of both weevils (47.5%) and all beetles (49.3%) are widespread in North America, and 11.9% of all weevils and 8.6% of all beetles are restricted to Beringia. For carabids the patterns are similar: 35.6% of the fauna also occurs in the Palaearctic region; however, only 35.6% of the total species are

TABLE 2. Numbers of species and distributional patterns for families of Coleoptera in theYukon with more than 20 known species (for abbreviations see Table 1). Complete information is not given for beetle taxa treated elsewhere in this volume in more detail.

Family	No. of species in the Yukon	No. of species Palaearctic and Nearctic					No. of species Nearctic					
		P-WN	P-TR/WM	P-TR	P-EB	E-WB	WN	TR/WM	TR	WM	WW	EB
Leiodidae	28	0	2	4	1	0	3	7	6	4	1	0
Staphylinidae	179	7	16	31	9	5	5	35	33	10	3	25
Elateridae	32	0	2	2	1	0	1	2	18	5	0	1
Coccinellidae	31	2	0	1	0	0	8	5	9	4	2	0
Cerambycidae	27	2	0	1	0	0	6	11	3	2	2	0
Chrysomelidae	41	2	0	2	0	1	2	9	13	5	3	4
Scolytidae	33	2	0	0	0	0	7	7	7	8	0	2
Carabidae	209[1]	4	0	49	8	13	2	2	70	29	14	15
Dytiscidae	113[2]	1	9	24	5	2	2	12	43	7	5	2
Curculionidae	59	7	1	6	4	2	8	11	9	3	3	5

[1]Total includes 2 species of uncertain distribution outside the Yukon Territory. [2]Total includes one species of uncertain distribution outside the Yukon Territory.

TABLE 3. Numbers of species associated with different habitats for selected terrestrial families of Yukon Coleoptera. Habitat descriptors follow Ball and Currie (1997).

Family	Riparian	Open, wet [1]	Open, dry [2]	Shrub	Forest	Tundra	General
Carabidae (209)[3]	67	31	30	5	23	25	25
Leiodidae (28)	1	0	2	0	22	3	0
Staphylinidae (179)	24	73	n/a	n/a	61	16	5
Buprestidae (13)	n/a[4]	0	0	n/a[4]	13	0	0
Elateridae (32)	0	7	0	0	21[5]	0	4
Coccinellidae (31)	0	0	1	n/a[4]	18	4	8
Cerambycidae (27)	0	0	0	2	25	0	0
Chrysomelidae (41)	n/a[4]	8	4	n/a[4]	23	3	3
Curculionidae (59)	n/a[4]	12	5	n/a[4]	24	5	13
Scolytidae (33)	0	0	0	0	33	0	0

[1]Includes all wetlands. [2]Includes southern steppe and dune communities. [3]Habitat data for three of these species are not available. [4]Shrub zone and riparian species are classified with forest species. [5]Includes 7 species which are ecotonal (open, wet / forest).

widespread in North America, and 13.5% are Beringian endemics. The patterns for Staphylinidae are comparable: 37.4% of the species are also found in the Palaearctic region, 40.2% of the total species are widespread in North America, and 16.8% of the species are restricted to Beringia. Dytiscidae follow these general patterns although Beringian endemism at 3.5% is much lower than expected. Other particularly anomalous figures are the apparently low numbers of species shared with the Palaearctic region for Scolytidae (6.1%), Chrysomelidae (12.2%), Cerambycidae (11.1%) and Coccinellidae (9.7%); perhaps the taxonomic relationships of the Palaearctic and Nearctic species in these taxa need further scrutiny. Beringian endemism is also slightly higher than expected in Staphylinidae (17.9%) and, like Dytiscidae, very low in the remaining families tabulated. Recorded endemism in Staphylinidae may well be high because an intense sampling effort has been made in the Yukon and Alaska (but not other regions of arctic Canada) for Aleocharinae (Lohse et al. 1990). Low endemism in some of the families may be due to their associations with habitats that are widely available in the north, for example lentic habitats (Dytiscidae), and boreal forest (phytophages such as Scolytidae and Cerambycidae, both associated with Pinaceae).

Speciation Patterns and Endemism

Seventy-nine species of Coleoptera currently are known to be restricted to Beringia (Appendix 2), representing 8.6% of the Yukon beetle fauna. Only 9 families are represented by these endemic taxa. These families are Staphylinidae (30 species in 17 genera), Carabidae (28 species in 8 genera), Curculionidae (7 species in 7 genera), Chrysomelidae (5 species in 3 genera), Dytiscidae (4 species in 3 genera), Scolytidae (2 species in 2 genera), and Elateridae, Scarabaeidae and Anthicidae (each with 1 species in 1 genus). In general, these are the most diverse beetle families in the Yukon, so the presence of endemic species in these taxa is not surprising.

Twenty-three of the Beringian species are found in both West and East Beringia and perhaps marginally beyond in either area (likely as a result of postglacial dispersal from a Beringian origin). Among exclusively Nearctic species, the 56 restricted to Beringia occur in various parts of Alaska, the Yukon and the extreme western Northwest Territories (or marginally beyond). Most of these species probably are relatively recent Beringian isolates within speciose, primarily northern genera. Examples, listed in Appendix 2, include 5 species of the carabid genus *Bembidion*, the dytiscids *Agabus mackenziensis* and *A. coxalis*, the staphylinids *Stenus pubescens sandersonianus*, *S. kamtschaticus* and *S. paululus*, and the weevils *Dorytomus lecontei* and *Ceutorhynchus barkalovi*. On the other hand, the carabid genus *Pterostichus* (particularly the species placed in the subgenus *Cryobius*), has 16 closely related species restricted to Beringia. These species appear to have undergone isolation and differentiation over a long period of time within Beringia (Ball and Currie 1997). Also proposed as existing, although undifferentiated, in Beringia for a long period of time are 2 structurally rather distinct weevil species of uncertain phylogenetic relationships (Anderson 1997). These species are the weevils *Connatichela artemisiae* and *Vitavitus thulius*. Lastly, species currently recognized as Beringian endemics may prove to be more widely distributed after additional specialized collection efforts. In particular, among the many recently described arctic species of the staphylinid subfamily Aleocharinae (Lohse et al. 1990) are 23 species in 14 genera currently known only from Beringia.

A number of additional species of Coleoptera are known only from Alaska or from Alaska and the Northwest Territories. While not yet known from the Yukon, some of these taxa will likely prove to be Beringian endemics.

Ecological Considerations

Habitat Associations. Habitat associations of selected families of Yukon beetles are varied but the most basic distinction is between terrestrial and freshwater aquatic species. Among Yukon beetles, species that are terrestrial predominate, making up 85% of the fauna. Among the 15% of the species that are aquatic, all except a very few are found in lentic habitats.

Aquatic beetles in the Yukon belong to 6 families, Haliplidae, Amphizoidae, Dytiscidae, Gyrinidae, Hydrophilidae and Elmidae. Almost all are Dytiscidae or Hydrophilidae. As noted previously, Dytiscidae are exceptionally well represented in the beetle fauna of the Yukon. Yukon species in these families are predominantly lentic, occurring in ponds, lakes, peatlands and marshes (see Larson 1997). Some species in both families, as well as Gyrinidae, do occur in depositional areas along the margins of streams and rivers of various sizes, but only a few occur in rapidly running water. The only beetles known from rapidly flowing lotic aquatic habitats in the Yukon, other than perhaps some dytiscids, are the single species of elmid, *Zaitzevia parvula* (Horn), and the 2 species of amphizoids, *Amphizoa insolens* LeConte and *A. lecontei* Matthews. Yukon hydrophilids in the subfamily Sphaeridiinae are scavengers in marginally wet habitats such as the edges of ponds and marshes; they are not truly aquatic.

Terrestrial habitats in the Yukon can be classified in various ways, but a simple system is used here given the low level of resolution of available information about the habitat associations of most terrestrial beetles from the Yukon (except Carabidae and Curculionidae). Terrestrial habitats include riparian, open wet ground, open dry ground (including southern steppe and dune communities), shrub zone, forest, and tundra. Some species occur in a variety of habitats and are considered generalists. Data on habitat associations for Carabidae and Curculionidae (Ball and Currie 1997 and Anderson 1997) and for additional families for which there is adequate habitat information (Table 3) illustrate some general trends in the fauna. Most notably, these data show a predominance of species associated with boreal coniferous forests (or adjacent woodlands). Most of these species are transcontinental or otherwise widespread in North America and many of the phytophages have various species of conifers (e.g. Buprestidae, Cerambycidae, Scolytidae) or Salicaceae (e.g. Buprestidae) as their foodplants. Aside from Carabidae and Staphylinidae, few beetle species (especially phytophages) are tundra inhabitants; for example, only 8 of the 100 species of Chrysomelidae and Curculionidae are found in tundra. The predatory Carabidae and Staphylinidae are the only 2 families with significant representation in the riparian habitat.

Food Habits. The most diverse families of beetles in the Yukon are the Carabidae (208 species) and Staphylinidae (179 species), composed largely of predatory species. Not unexpectedly, these 2 families are also the 2 most diverse families of beetles in Canada. With the exclusively predatory Dytiscidae (113 species), the third most diverse beetle family in the Yukon, and other significant families such as the Coccinellidae, predators comprise the major portion (almost 60%) of the 913 species of beetles found in the Yukon. While high diversity is expected for Carabidae and Staphylinidae, such a diversity of Dytiscidae is unexpected because the family is much less diverse in Canada than the primarily phytophagous families Elateridae, Cerambycidae, Chrysomelidae and Curculionidae, all of which have significantly fewer Yukon-inhabiting species. As noted elsewhere, 43.1% of Canadian Dytiscidae occur in the Yukon. Whether this apparently abnormally high diversity can be attributed to the aquatic habits of Dytiscidae is uncertain. Temporary meltwater ponds are plentiful, and the abundance of Diptera larvae such as Culicidae and Chironomidae in these

and other lentic freshwater habitats would certainly provide abundant food resources for aquatic predators.

The 7 most diverse Yukon beetle genera (*Bembidion*, 58 species; *Pterostichus*, 29 species; *Amara*, 26 species; *Agonum*, 15 species; *Hydroporus*, 28 species; *Agabus*, 35 species; and *Stenus*, 35 species) are comprised of predatory species. In fact, species in all of the 15 genera represented by more than 10 species (see 'Diversity') are primarily if not exclusively predators.

The next most diverse families after the major families of predators are the Curculionidae (59 species), Chrysomelidae (41 species), Scolytidae (33 species), and Elateridae (32 species). Each of these families is composed largely of phytophagous species, members of which feed largely on various parts of plants or plant products. Phytophages make up approximately 20% of the beetle fauna of the Yukon. Despite the well-known fact that the number of species of available foodplants drops off markedly at northern latitudes, phytophages are still moderately well represented, especially by the Curculionidae and Chrysomelidae. However, few genera of phytophagous beetles have more than 4 species in the Yukon, and so are not represented to the same extent as are predators. Plant associations in many beetle groups are restricted to one or a few related genera of plants and so, given the lower diversity of plant species at northern latitudes, it is to be expected that no one phytophagous genus should be as diverse as the predators. *Dorytomus* and *Ceutorhynchus* (both Curculionidae), with 9 species each, are the most diverse phytophagous genera of beetles; the former is associated with foodplants in the relatively diverse Salicaceae (*Salix* and *Populus*), and the latter primarily with various Cruciferae.

Species feeding on Salicaceae and Pinaceae predominate among phytophagous taxa as would be expected from the abundance of these plants at northern latitudes. For example, within Yukon Curculionidae, 13 species (22%) and 10 species (17%) use Salicaceae and Pinaceae respectively as hosts (Anderson 1997). Similarly within Chrysomelidae, at least 13 species or 32% of Yukon species (genera *Zeugophora*, *Chrysomela*, *Gonioctena* and *Phratora*) are associated with *Salix* and *Populus* (Salicaceae) (Brown 1951, 1956, 1962; Jolivet and Hawkeswood 1995). Within Scolytidae 32 of the 33 Yukon species are associated with Pinaceae; one species is associated with *Alnus* (Betulaceae) and *Populus* (Salicaceae) (Bright 1976). Similar almost exclusive associations with Pinaceae and/or Salicaceae occur for species of Cerambycidae (Pinaceae, 24 species; Salicaceae, 2 species; various hardwoods, 1 species) and also to a lesser extent within Buprestidae (Pinaceae, 8 species; Salicaceae, 5 species). Only one Yukon chrysomelid species (*Syneta pilosa* Brown) is associated with Pinaceae, but this low number is to be expected because plants in this family are not generally fed upon by leaf beetles.

High levels of association with species in Pinaceae and Salicaceae would be predicted among the phytophages because plants in these families are the dominant woody perennials at northern latitudes. Woody plants, due to their architectural complexity, generally possess a more diverse fauna of phytophages than do herbaceous plants. Among the herbaceous flora, species in Cruciferae, Asteraceae, Ranunculaceae and Fabaceae appear to be the hosts primarily used by phytophagous beetles. For example, 7 species of weevils and 3 chrysomelids are associated with Cruciferae. As far as aquatic phytophages are concerned, 8 species of chrysomelids (notably *Plautemaris* and *Donacia*), and 10 weevil species (*Listronotus*, *Lixellus* and various genera of Ceutorhynchini) are associated with species of emergent aquatic macrophytes in such families as Typhaceae, Cyperaceae, Polygonaceae and Nymphaeaceae. The Byrrhidae, which feed on mosses, predominantly *Ceratodon*

purpureus (Hedw.) Brid. and various *Bryum* species, are comparatively well represented in the Yukon with 9 species recorded, 34.6% of the 26 species of byrrhids known from Canada.

Other Yukon beetles have a variety of habits, most notably fungivory and saprophagy. The most diverse group of fungivorous beetles (excluding that portion of Staphylinidae which feed on fungi) is the Leiodidae with 28 species; the leiodid genus *Colon* (10 species) appears to be the most diverse genus of fungivores. Only 10 species of Scarabaeidae, all saprophages in the subfamily Aphodiinae, are known from the Yukon. The leiodid genus *Catops* (8 species) and the scarab genus *Aphodius* (8 species) are the most diverse saprophages. Most species in both *Catops* and *Aphodius* probably are associated with small ground-nesting mammals. It is not known if the Pleistocene extinction of large mammals in Beringia (and indeed in all of North America) was accompanied by reductions in the diversity of dung-associated beetles.

Endemism and Ecology. Only 79 of the 913 species of beetles known from the Yukon are currently restricted in their distributions to Beringia (Appendix 2). Predators dominate the endemic fauna, as already noted, which is in keeping with the predominance of predators in the Yukon and indeed at northern latitudes as a whole. Predominant predators among the endemic species are the Carabidae (27 species) and Staphylinidae (30 species). Most of the carabids are species in the genus *Pterostichus*, 16 of which in the subgenus *Cryobius* are restricted to Beringia. High endemism in Staphylinidae is primarily due to high endemism in the subfamily Aleocharinae (23 species), the subject of intense sampling effort in the Yukon and Alaska (Lohse et al. 1990) and perhaps simply an artifact of this intense effort. Other significant endemic predators are the genera *Bembidion* (5 species) and *Stenus* (3 species-group taxa). Species of both *Bembidion* and *Stenus* generally are associated with riparian habitats.

There are fewer plant-associated than predatory endemic species. Among known Yukon taxa, only 13 species including one elaterid, 4 chrysomelids, 7 weevils and one scolytid are restricted to Beringia (Appendix 2). This contrasts with 60 species of predators and 2 species of scavengers. Among endemic taxa associated with plants, associations with Salicaceae are most evident: *Chrysomela engelhardti*, *Phratora interstitialis* and *Dorytomus lecontei* are associated with *Salix* species. The single endemic scolytid, *Carphoborus andersoni* Swaine, is associated with Pinaceae. Other endemic species appear likely to be associated with Asteraceae, Fabaceae and Cruciferae or other low herbs in tundra or open dry ground. Even considering plant-associated taxa not known from the Yukon but known only from Alaska and/or the Northwest Territories, only 3 species of chrysomelids appear likely to be additional Beringian endemics.

Most Beringian endemic species are found in tundra or dry open habitats such as fell-field and southern steppe (see Appendix 2). The Beringian endemic weevils *Vitavitus thulius* and *Connatichela artemisiae* and most of the species of the carabid genus *Pterostichus* (subgenus *Cryobius*) appear to have differentiated in the region and are now restricted there; these taxa in particular are associated with dry open ground. Other Beringian endemics are in relatively widespread speciose northern genera, are closely related to congeners, and are likely late-Pleistocene Beringian isolates.

No attempt has been made to document the wing condition for all Yukon beetles, but flightlessness is evident, although not widespread, among the beetle species endemic to Beringia. It is found only in taxa of Carabidae, Curculionidae and Chrysomelidae. Only adults of species in the genera *Carabus* (1 subspecies) and *Pterostichus* (16 species) (Carabidae), *Chrysolina* (2 species) (Chrysomelidae), and *Sitona* (1 species), *Lepidophorus*

(1 species), *Vitavitus* (1 species), *Hypera* (1 species) and *Ceutorhynchus* (1 species) (Curculionidae) are brachypterous. All of these species are tundra or dry-habitat inhabitants. Adults of one species each of *Elaphrus* and *Bembidion* (Carabidae) are polymorphic. However, the taxa in which flightlessness occurs within Beringia tend to have congeners which are flightless elsewhere. One exception is the weevil *Ceutorhynchus barkalovi*; flightlessness is rare in other species of this genus. Among the Staphylinidae, adults of all species are macropterous, suggesting that at least some may be more widespread than currently recorded, as has already been suggested for the Aleocharinae.

Discussion and Summary

Beetles are the most diverse order of insects and, arguably, the most successful group of organisms on Earth. They have colonized nearly all terrestrial and freshwater habitats and are found on nearly all mainland and insular land masses. Whereas they are most diverse at lower tropical latitudes, they are represented by many species at northern latitudes as well. In the Yukon, 913 species (or subspecies) placed in 57 families are known.

Beetle families that dominate the Yukon fauna are, for the most part, the same families that are most diverse in Canada as a whole and that are typical of temperate climates. The families Carabidae and Staphylinidae are the 2 most diverse beetle families both in Canada and in the Yukon. Surprisingly, the Dytiscidae is the third most diverse beetle family in the Yukon (but the seventh most diverse in Canada), whereas more diverse families in Canada as a whole such as Curculionidae, Chrysomelidae and Elateridae comparatively are less diverse in the Yukon. Such a discrepancy may be related to the food habits of these taxa. Predators in such families as Carabidae and Staphylinidae dominate the beetle fauna of the Yukon, a fact perhaps explained by the abundance of food, particularly of dipteran larvae in aquatic systems where species of another family, the Dytiscidae, are exceptionally diverse. On the other hand, part of the relative dominance of predatory species may be due to a paucity of phytophages, stemming from decreased floristic diversity and from decreased architectural complexity in available plant taxa because of a lower diversity of woody plants. Whatever the reason, the diversity of phytophages declines quite markedly at northern latitudes, especially beyond the treeline as evidenced by the paucity of phytophages in the tundra habitat.

Among the phytophages in the Yukon, associations with Pinaceae and/or Salicaceae dominate, likely because these plants are abundant and architecturally complex. Yukon beetles associated with these plants generally have widespread, often transcontinental, distributions in the boreal forest (e.g. Buprestidae, Cerambycidae, Scolytidae).

Only 79 species of Yukon beetles (8.6% of the fauna) are restricted in their distributions to Beringia. Again, predators in the Carabidae and Staphylinidae predominate, although some of the currently recognized endemism in the subfamily Aleocharinae (Staphylinidae) may be due to a regional and intense sampling effort in the Yukon. Only thirteen Yukon phytophages are endemic to Beringia. These species are associated with Salicaceae and Pinaceae or likely with low herbaceous plants in such families as Asteraceae, Fabaceae and Cruciferae. Endemic species are found principally in tundra or dry open habitats such as fell-field and southern steppe.

Most Beringian endemic species are in relatively widespread speciose northern genera and are likely late-Pleistocene Beringian isolates (e.g. Dytiscidae: *Agabus*; Curculionidae: *Dorytomus*, *Ceutorhynchus*); however, some taxa are structurally rather distinct from their relatives and appear to have existed, undifferentiated, in Beringia for long periods of time

(e.g. Curculionidae: *Connatichela*, *Vitavitus*). Only in the carabid subgenus *Cryobius* (*Pterostichus*) is there a diverse species complex which appears to have undergone isolation and significant differentiation over a long period of time within Beringia. Brachyptery, and thus flightlessness, occurs in only 24 of 79 species endemic to Beringia (30%), and only in Carabidae (2 genera, 17 species—but 16 species in the subgenus *Cryobius*), Chrysomelidae (1 genus, 2 species), and Curculionidae (5 genera, 5 species). All of the brachypterous forms are tundra or dry-habitat species.

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Appendix 1. Numbers of species and distributional patterns of the Coleoptera known to occur in the Yukon Territory.

Numbers of species in adjacent areas of Alaska and the Northwest Territories but not yet known from the Yukon Territory also are presented. (For abbreviations see Table 1).

		Number of species Palaearctic and Nearctic					Number of species Nearctic						Number of species in adjacent areas but not in Yukon		
	YT	P-WN	P-TR/WM	P-TR	P-EB	W-EB	WN	TR/WN	TR	WM	WW	EB	NT	AK	NT/AK
Suborder Adephaga															
Trachypachidae (1;1)															
Trachypachus	1								1						
Cicindelidae (1; 4)															
Cicindelini															
Cicindela	4						1			1	2		6	1	
Carabidae (31; 209)															
Carabini															
Calosoma													1		
Carabus	5				1				3			1			
Scaphinotus														2	
Nebriini															
Leistus														1	
Pelophila	2	1							1						
Nebria	11			1		1			1	6	2				
Notiophilini															
Notiophilus	4	1							2	1				1	
Loricerini															
Loricera	1	1												1	
Opisthini															
Opisthius	1										1				
Elaphrini															
Diacheila	1				1									1	
Blethisa	3	1					1				1		1	1	
Elaphrus	8			2	1	1	1	2		1					
Clivinini															
Dyschiriodes[1]	6			2					3			1		1	2
Gehringiini															
Gehringia	1										1				
Broscini															

Appendix 1. (*continued*)

		Number of species Palaearctic and Nearctic					Number of species Nearctic						Number of species in adjacent areas but not in Yukon		
	YT	P-WN	P-TR/WM	P-TR	P-EB	W-EB	WN	TR/WN	TR	WM	WW	EB	NT	AK	NT/AK
Miscodera	1			1											
Broscodera														1	
Zacotus														1	
Trechini															
Trechus	3			1						2				1	
Bembidiini															
Asaphidion	2									1		1			
Bembidion	58			12	2	2			21	13	5	3	10	12	2
Tachyta	1								1						
Patrobiini															
Platypatrobus													1		
Patrobus	3			2					1				1	1	
Diplous	1									1					
Platydiolus														1	
Pterostichini															
Poecilus													2		
Pterostichus	29			5	1	8			3	4		8	5	12	
Zabrini															
Amara	26	1?		8	2				13		1	1	2	1	2
Harpalini															
Harpalobrachys	1			1											
Harpalus	10			4		1			4		1		4	3	
Trichocellus	2			2											
Bradycellus	2								2						
Licinini															
Diplocheila													2		
Badister													2		
Callistini															
Chlaenius	1								1				2		1
Platynini															

Calathus	1									1					1			
Sericoda	3			2								1			1			
Agonum	15			5						9		1			4	2		
Platynus	1			1													1	
Lebiini																		
Lebia	1									1								
Syntomus[2]	1									1								
Cymindis	3	1?								2					1			
Haliplidae (1; 4)																		
Haliplus	4			1						3					5			
Amphizoidae (1; 2)																		
Amphizoa	2										2							
Dytiscidae (17; 113)																		
Laccophilinae																		
Laccophilus	1		1															
Hydroporinae																		
Desmopachria															1			
Liodessus	1									1								
Hygrotus	11	1	1				2	3		2		2			4	2		
Hydroporus	28	1?		7		1		1		16	2				3	1		
Potamonectes	3		1					1			1				1			
Oreodytes	4				1					1	1		1		1	1		
Laccornis	1										1				1			
Colymbetinae																		
Agabus	37		3	10	4	1		4		10	1	3	1		1	2		
Carrhydrus	1									1								
Ilybius	6		2	2						2					1	1	1	
Colymbetes	5			3						1	1				1			
Neoscutopterus	2									2								
Rhantus	4							2		2					2			
Dytiscinae																		
Dytiscus	5		1	1				1		2					1		1	
Hydaticus	1			1														
Acilius	1									1						1		
Graphoderus	2									2					1			
Gyrinidae (1; 10)																		
Gyrinus	10			3	1			2		3	1				6			
Suborder Polyphaga																		
Staphylinoidea																		

Appendix 1. (*continued*)

		Number of species Palaearctic and Nearctic					Number of species Nearctic						Number of species in adjacent areas but not in Yukon		
	YT	P-WN	P-TR/WM	P-TR	P-EB	W-EB	WN	TR/WN	TR	WM	WW	EB	NT	AK	NT/AK
Hydraenidae															
Hydraena													1		
Gymnochthebius													1		
Ochthebius													2		
Ptiliidae															
Acrotrichis														4	
Agyrtidae															
Necrophilus														1	
Ipelates															1
Agyrtes														1	
Lyrosoma														1	
Leiodidae (6; 28)															
Hydnobius														1	
Leiodes	7		1	3				2	1				2	3	1
Anisotoma														1	
Agathidium	1									1				8	
Catopocerus														1	
Colon	10		1	1			1	2	3	1	1			2	
Catops	8				1		2	3	1	1				1	
Sciodrepoides															1
Catopotrichus														1	
Leptinillus	1								1						
Platypsyllus														1	
Leptinus	1									1					
Scydmaenidae															
Lophioderus														1	
Euconnus														1	
Stenichnus														2	
Eutheia														1	
Micropeplidae (1; 1)															

Micropeplus	1						1			2	1
Silphidae (3; 6)											
Thanatophilus	2		1					1		1	1
Heterosilpha									1		
Aclypea	1				1				1		
Nicrophorus	3	1		1			1				
Staphylinidae (55; 179)											
Proteininae											
Megarthrus	1					1			3		
Proteinus										3	
Omaliinae											
Eusphalerum										4	
Acrulia										2	
Pycnoglypta	1			1							
Hapalaraea										3	
Omalium	1		1							3	
Phloeonomus	1			1						3	
Micralymma	1				1						
Coryphiomorphus	1				1						
Subhaida										1	
Holoboreaphilus	1			1							
Boreaphilus	1			1							
Acidota	1		1							1	
Olophrum	4		2	1#	1						
Eucnecosum	3			3#							
Amphichroum										1	
Pelecomalium										1	
Phlaeopterus										4	
Artochia										1	
Xylodromus										2	
Anthobium										2	
Deinopteroloma										1	
Tanyrhinus										1	
Porrhodites	1		1								
Geodromicus	1						1			1	
Microedus	1						1			1	
Haida										1	
Olisthaerinae											
Olisthaerus	2			2							
Piestinae											

Appendix 1. (*continued*)

		Number of species Palaearctic and Nearctic					Number of species Nearctic						Number of species in adjacent areas but not in Yukon		
	YT	P-WN	P-TR/WM	P-TR	P-EB	W-EB	WN	TR/WN	TR	WM	WW	EB	NT	AK	NT/AK
Trigonurus														1	
Oxytelinae															
Syntomium														3	
Bledius	9							5	2	2			1	2	
Ochthephilus	1									1				2	
Thinobius														2	
Oxytelus	1							1						1	
Pseudopsis														1	
Vicelva	1									1					
Tachyporinae															
Tachinus	10		2		2	1		2	1	1		1	1	3	
Coproporus													1		
Tachyporus	9	1	1				1	4	2						
Lordithon	2							2					1	1	
Ischnosoma	2		1					1							
Mycetoporus	5							4	1						
Bryophacis	2							2#							
Aleocharinae															
Devia															1
Gnathusa	1											1			
Ocyusa	1											1			
Oxypoda	3								2			1		8	
Pentanota														1	
Brachyusa															1
Hydrosmecta	1											1			
Datomicra														1	
Dimetrota	9			1					3			5		4	
Boreostiba	4			1					1			*2*			
Adota														2	
Atheta	2								1			1			

Liogluta	4								1	1	2		1	
Mocyta	1								1				1	
Alaobia	1				1									
Schistoglossa													2	
Pseudousipalia	1										1			
Boreophilia	6			2	1				1		2		3	3
Dinaraea	1										1			
Microdota													1	
Philhygra	5			1					1		3	1	1	
Xenota													4	
Lypoglossa	1							1						
Tarphiota													2	
Aleochara	6	2					1		3			2	4	
Phloeopora	1										1			
Parocalea	2								1		1			
Drusilla													1	
Gyrophaena	2		1				1						1	
Bolitochara													1	
Homalota													1	
Amblopusa													2	
Diaulota													1	
Liparocephalus													1	
Thinusa													1	
Gymnusa	5							1	4					
Myllaena	1								1			1		
Oxyporinae														
Oxyporus	1							1						
Steninae														
Dianous	1							1						1
Stenus	35	3	4	13	2	3	1	5	4			5	8	9
Euaesthetinae														
Euaesthetus	1							1					1	1
Chionotyphlus													1	
Paederinae														
Medon													1	
Orus													1	
Rugilus													1	
Lathrobium	2							1			1	1	2	2
Lobathrium													1	1
Paederus												1		

Appendix 1. (*continued*)

		Number of species Palaearctic and Nearctic					Number of species Nearctic						Number of species in adjacent areas but not in Yukon		
	YT	P-WN	P-TR/WM	P-TR	P-EB	W-EB	WN	TR/WN	TR	WM	WW	EB	NT	AK	NT/AK
Staphylininae															
Erichsonius															1
Philonthus	5		1#	1				1			2		3	11	1
Gabrius	1							1						1	1
Cafius														2	
Creophilus	1						1								
Ontholestes													1		
Hadrotes														1	
Platydracus														1	
Heterothops													1		1
Quedius	11	1	1	2					2	4#	1		1	9	2
Acylophorus															1
Xantholininae															
Atrecus															1
Nudobius															1
Neohypnus													1		
Scaphidiidae (1; 1)															
Scaphium	1								1						
Pselaphidae (1; 1)															
Megarafonus														1	
Sonoma														2	
Actium														1	
Cupila														1	
Batrisodes														1	
Rybaxis															1
Reichenbachia	1								1					2	
Decarthron													1		
Lucifotychus														1	
Tyrus													1		

Hydrophiloidea													
Hydrophilidae (7; 20)													
Helophorinae													
Helophorus	10		2#	2	2		3	1			5		
Berosus											2	1	
Laccobius	2						2				3		
Hydrobius	1	1											
Ametor												1	
Paracymus	1					1							
Crenitis	2								2#				
Hydrobiinae													
Enochrus											3		
Cymbiodyta	1							1			1	1	
Hydrochara											1		
Sphaeridiinae													
Cercyon	3			1				1	1			4	5
Megasternum													1
Sphaeritidae													
Sphaerites													1
Histeridae (2; 2)													
Saprinus	1				1?					1			
Xerosaprinus											1		
Hister												1	
Psiloscelis	1								1				
Eucinetoidea													
Eucinetidae (1; 1)													
Eucinetus	1					1					2		
Clambidae													
Calptomerus												1	
Scirtidae (1; 1)													
Cyphon	1					1					1		
Scarabaeoidea													
Lucanidae (1; 1)													
Platycerus	1							1			1		
Scarabaeidae (2; 10)													
Aphodiinae													
Aegialia	2						2					2	
Aphodius	8			1				3		3	1	4	3
Troginae													

Appendix 1. (*continued*)

		Number of species Palaearctic and Nearctic					Number of species Nearctic						Number of species in adjacent areas but not in Yukon		
	YT	P-WN	P-TR/WM	P-TR	P-EB	W-EB	WN	TR/WN	TR	WM	WW	EB	NT	AK	NT/AK
Trox													1		
Melolonthinae															
Serica													3		
Diplotaxis														1	
Phyllophaga													1		
Dichelonyx													1		
Trichiinae															
Trichiotinus													1		
Byrrhoidea															
Byrrhidae (6; 9)															
Curimopsis	1									1			1		2
Byrrhus	4			1				1	1	1					2
Porcinolus	1						1								
Simplocaria	1			1									1		
Lioligus														1	
Lioon														1	
Exomella														1	
Listemus														1	
Morychus														1	1
Tylicus	1								1						
Cytilus	1						1								
Buprestoidea															
Buprestidae (8; 13)															
Dicerca	3						1	1	1				2		
Descarpentriesina	1						1								
Buprestis	2							1			1		1		
Cypriacis													1	1	
Melanophila	2							1	1						
Oxypteris	1	1													

Anthaxia	2					1		1					
Chrysobothris	1				1						3		
Agrilus	1				1							1	
Dryopoidea													
Heteroceridae (4; 4)													
Explorator	1								1				
Lanternarius	1								1		2		
Neoheterocerus	1					1							
Lapsus	1				1								
Elmidae (1; 1)													
Optioservus											1		
Zaitzevia	1							1					
Psephenidae													
Macropogon											1		
Elateroidea													
Elateridae (14; 32)													
Danosoma	2						2						
Drasterius	1						1						
Aeolus											1		
Limonius	1						1						
Athous												2	
Harminius	1						1						
Denticollis	1									1	1		
Berninelsonius	1			1									
Ligmargus	1							1					
Ascoliocerus	1		1										
Margaiostus												1	
Hypolithus												1	
Hypnoidus	5	1	1		1	1		1					
Negastrius	3						2	1				1	
Ctenicera	8						7	1			6	6	5
Eanus	2						2					1	
Hemicrepidius												1	
Sericus	1					1							
Agriotes											1		
Ampedus	4	1					2	1			3	1	4
Megapenthes												1	
Cardiophorus											1		

Appendix 1. (*continued*)

		Number of species Palaearctic and Nearctic					Number of species Nearctic						Number of species in adjacent areas but not in Yukon		
	YT	P-WN	P-TR/WM	P-TR	P-EB	W-EB	WN	TR/WN	TR	WM	WW	EB	NT	AK	NT/AK
Throscidae															
Trixagus													2		
Eucnemidae															
Epiphanis														1	
Cantharoidea															
Lycidae (1; 1)															
Dictyopterus	1						1							2	
Lampyridae															
Pyractomena													2		
Cantharidae (4; 8)															
Podabrus	5							1	3		1			4	2
Cantharis	1								1				1		
Rhagonycha	1								1				1	3	
Silis	1							1					1	1	
Dermestoidea															
Derodontidae															
Peltastica														1	
Derodontus														1	
Dermestidae (3; 3)															
Dermestes	1						1						1		
Trogoderma	1								1						
Reesa													1		
Megatoma	1							1						2	
Pseudohadrotoma														1	
Thylodrias													1		
Bostrichoidea															
Bostrichidae (1; 1)															
Stephanopachys	1		1										1		
Amphicerus													1		

Anobiidae (5; 5)											
Stegobium										1	
Hemicoelus	1				1					1	
Desmatogaster	1					1					
Ptilinus	1							1			
Xyletinus	1					1			1		
Lasioderma										1	
Caenocara	1				1						
Ptinidae											
Ptinus										1	
Cleroidea											
Trogossitidae (3; 4)											
Calitys	1				1					1	
Ostoma	2		1		1						
Temnochila									1		
Tenebroides	1			1							
Cleridae (3; 4)											
Phyllobaenus											1
Thanasimus	2			1	1						
Trichodes	1						1				
Necrobia	1	1									
Melyridae (2; 2)											
Collops									2		
Attalus	1					1					
Hoppingiana	1					1					
Cucujoidea											
Nitidulidae (5; 10)											
Cateretes											1
Brachypterus									1		
Colopterus	1			1							
Carpophilus										2	
Epuraea	4	1	1	1		1			1	4	2
Omosita										1	
Nitidula	2	1						1	1		
Thalycra	1					1					
Pocadius									1		
Meligethes	2		1	1							
Glischrochilus										1	

Appendix 1. (*continued*)

		Number of species Palaearctic and Nearctic					Number of species Nearctic						Number of species in adjacent areas but not in Yukon		
	YT	P-WN	P-TR/WM	P-TR	P-EB	W-EB	WN	TR/WN	TR	WM	WW	EB	NT	AK	NT/AK
Rhizophagidae (1; 1)															
Rhizophagus	1						1							2	
Cucujidae (1; 1)															
Cucujus														1	
Pediacus	1						1								
Dendrophagus														1	
Cathartosilvanus													1		
Cryptophagidae (1; 1)															
Antherophagus														1	
Henotiderus														1	1
Henoticus														1	
Salebius														1	
Cryptophagus														9	1
Myrmedophila	1							1							
Caenoscelis														2	
Atomaria													1	8	
Cerylonidae															
Murmidius														1	
Cerylon													1		
Corylophidae (1; 1)															
Orthoperus													1		
Sacium	1								1						
Coccinellidae (18; 31)															
Didion	1										1		1		
Scymnus	1							1					1		
Nephus	1							1						1	
Hyperaspidius	1										1				
Hyperaspis	1									1			2		
Brachiacantha													1		
Brumoides	1							1							

Coccidula	1						1				
Anisosticta	2						2				
Macronaemia	1					1					
Ceratomegilla	1						1				
Hippodamia	8		1#		3	1		3	4		
Anatis	1						1				
Myzia	1				1						
Calvia	1	1									
Adalia	1	1									
Coccinella	5				2		3#		1	1	1
Mulsantina	2				1		1				
Psyllobora	1				1						
Endomychidae											
Endomychus									1		
Lathridiidae (3; 5)											
Enicmus											2
Lathridius										2	
Stephostethus	1					1				3	
Corticaria	3			2				1		3	2
Corticarina	1						1			1	
Byturidae (1; 1)											
Byturus	1				1						
Tenebrionoidea											
Tetratomidae (1; 1)											
Tetratoma	1							1			
Eupisenus										1	
Ciidae											
Cis									4	4	
Dolochocis									1		
Orthocis											1
Octotemnus										1	
Melandryidae (2; 2)											
Hallomenus										1	
Orchesia									1		
Lederia										1	
Phryganophilus									1		
Ziloria	1						1				
Prothalpia										1	
Xylita	1		1								

Appendix 1. (*continued*)

		Number of species Palaearctic and Nearctic					Number of species Nearctic						Number of species in adjacent areas but not in Yukon		
	YT	P-WN	P-TR/WM	P-TR	P-EB	W-EB	WN	TR/WN	TR	WM	WW	EB	NT	AK	NT/AK
Serropalpus													1	1	
Mordellidae (1; 1)															
Tomoxia	1								1						
Mordella													3		
Mordellistena													3		
Colydiidae															
Lasconotus													1		
Tenebrionidae (3; 3)															
Phaleromela														1	
Scaphidema	1								1						
Corticeus	1								1						
Eleodes													4		
Blapstinus													1		
Upis	1	1													
Lagriidae															
Paratenetus													1		
Cephaloidae (1; 1)															
Stenotrachelus	1								1						
Anelpistus													1		
Meloidae (1; 1)															
Eurymeloe														1	
Meloe	1								1				1	1	
Tricrania													1		
Oedomeridae															
Ditylus														2	
Boridae															
Lecontia													1		
Pythidae (2; 3)															
Pytho	2						1		1				1		
Priognathus	1								1						

Pyrochroidae												
Schizotus										1	1	
Dendroides											1	
Salpingidae (1; 1)												
Sphaeriestes	1					1						
Vincenzellus											1	
Rhinosimus											1	
Aegialites											1	
Anthicidae (1; 2)												
Notoxus										1		
Anthicus	2					1			1	2		
Scraptiidae (1; 1)												
Anaspis	1						1				2	
Chrysomeloidea												
Cerambycidae (22; 27)												
Prioninae												
Prionus											1	
Tragosoma										1		
Spondylinae												
Spondylus											1	
Aseminae												
Arhopalus	1				1					1		
Asemum	1	1										
Tetropium	2					2						
Cerambycinae												
Opsimus											1	
Rosalia											1	
Pronocera	1			1								
Semanotus										1	1	
Meriellum	1				1							
Callidium	1						1					
Phymatodes	2				2							
Xylotrechus	2					1		1		2		
Neoclytus	1				1							
Lepturinae												
Pachyta	1				1							
Evodinus												1
Rhagium	1		1									
Acmaeops	1			1								

Appendix 1. (*continued*)

		Number of species Palaearctic and Nearctic					Number of species Nearctic						Number of species in adjacent areas but not in Yukon		
	YT	P-WN	P-TR/WM	P-TR	P-EB	W-EB	WN	TR/WN	TR	WM	WW	EB	NT	AK	NT/AK
Leptalia														1	
Gnathacmaeops	1	1													
Grammoptera	1						1								
Julodia	3						1	1			1				
Pygoleptura														1	
Typocerus													1		
Leptura														1	
Trachysida	1									1					
Pidonia														1	
Anastrangalia	1							1							
Xestoleptura	1							1							
Brachyleptura														1	
Cosmosalia	1							1							
Lamiinae															
Plectrura														1	
Monochamus	1						1						2		
Pogonocherus	1						1						1		1
Neacanthocinus														1	
Saperda	1							1							
Bruchidae (1; 1)															
Kytorhinus	1								1						
Acanthoscelides													1		
Chrysomelidae (20; 41)															
Donaciinae															
Plateumaris	4							4					3	1	1
Donacia	2							1	1				3		
Orsodacninae															
Orsodacne	1						1								
Zeugophorinae															
Zeugophora	3							2	1						

Clytrinae														
Coleothorpa												1		
Cryptocephalinae														
Pachybrachis	1									1				
Diachus												1		
Synetinae														
Syneta	1							1					1	
Eumolpinae														
Bromius	1	1												
Chrysomelinae														
Calligrapha												3		
Chrysolina	4				1				1		2	1	3	
Gastrophysa												2		
Phaedon	2			1				1						1
Hydrothassa	1							1				1		
Prasocuris														1
Chrysomela	5							2	1	1	1	2	1	2
Gonioctena	4							2	2			1		
Phratora	3							2			1		2	
Entomoscelis	1									1				
Galerucinae														
Galerucella	2		1					1						
Ophraella												1		
Galeruca	1								1					
Alticinae														
Phyllotreta	1					1						1	1	
Longitarsus												1		
Altica	2						1	1				2		
Hippuriphila													1	1
Crepidodera												2	1	
Chaetocnema	1						1					2		
Disonycha												3		
Kuschelina												2		
Cassidinae														
Cassida	1			1										
Curculionoidea														
Anthribidae (2; 2)														
Trigonorhinus												1		
Allandrus	1						1							

Appendix 1. (*continued*)

		Number of species Palaearctic and Nearctic					Number of species Nearctic						Number of species in adjacent areas but not in Yukon		
	YT	P-WN	P-TR/WM	P-TR	P-EB	W-EB	WN	TR/WN	TR	WM	WW	EB	NT	AK	NT/AK
Tropideres	1			1											
Rhynchitidae															
Pselaphorhynchites													1		
Merhynchites													2		
Apionidae (1; 3)															
Nanophyes													1		
Apion	3								1	2					
Curculionidae (34; 59)															
Brachyderinae															
Sitona	2	1										1	1	2	
Tanymecus													1		
Otiorhynchinae															
Otiorhynchus	1	1												1	
Evotus													1		
Lepidophorus	1					1								1	
Vitavitus	1											1			
Trichalophus	1									1			1	3	
Connatichela	1											1			
Ophryastes													1		
Rhytirrhininae															
Listronotus	1						1							1	
Lixellus	1						1								
Byrsopages														1	
Hyperinae															
Hypera	1											1	1	1	
Cleoninae															
Stephanocleonus	1				1								3		
Lixus													1		
Molytinae															
Emphyastes														1	

Lepyrus [3]														
Hylobius	2								2					
Steremnius													2	
Sthereus													4	
Pissodinae														
Pissodes	3								2	1		1	1	
Erirhininae														
Dorytomus	9		1	1	1			5			1	1	1	
Erirhinus	1			1										
Grypus	1			1										
Notaris	1			1								1	1	
Procas	1								1					
Acalyptus	1				1									
Magdalinae														
Magdalis	4							3	1#				1	
Anthonominae														
Anthonomus												1		
Pseudanthonomus	1						1							
Rhynchaeninae														
Rhynchaenus													1	
Tachyerges	1						1							
Isochnus	1				1									1
Tychiinae														
Elleschus	1						1							
Proctorus	1							1						1
Tychius	1	1												
Ceutorhynchinae														
Cnemogonus	1							1						
Auleutes	1	1												
Perigaster	1								1					
Ceutorhynchus	9	2			1	1	1		1		3			
Rutidosoma	1			1										
Phytobius	1	1												
Euhrychiopsis	1								1			1		
Rhinoncus												1		
Pelenomus	3						2			1				
Cossoninae														
Rhyncolus	1							1						
Carphonotus													1	

Appendix 1. (*continued*)

		Number of species Palaearctic and Nearctic					Number of species Nearctic						Number of species in adjacent areas but not in Yukon		
	YT	P-WN	P-TR/WM	P-TR	P-EB	W-EB	WN	TR/WN	TR	WM	WW	EB	NT	AK	NT/AK
Scolytidae (17; 33)															
Scierus	1									1					1
Hylurgops	1									1			2	1	
Hylastes	1									1			1		
Alniphagus														1	
Pseudohylesinus														4	
Xylechinus														1	
Dendroctonus	2						1		1				1		1
Phloeotribus	1								1						
Phloeosinus	1								1					3	
Carphoborus	2								1			1		1	
Polygraphus	2						1	1							
Scolytus	1						1								
Pityogenes	1									1					
Orthotomicus	1						1								
Ips	5						2		2	1				2	
Lymantor														1	
Dryocoetes	2	1					1							1	
Crypturgus															1
Dolurgus														1	
Trypodendron	3	1						1	1				1		
Trypophloeus	1							1							
Procryphalus														2	
Cryphalus	1							1							
Pityophthorus	7							3		3		1	2	2	1

With disjunct populations.
? Distribution outside Yukon Territory uncertain: see *Amara, Cymindis* (Carabidae), *Hydroporus* (Dytiscidae).
[1] Formerly *Dyschirius*.
[2] Formerly *Metabletus*.
[3] Taxonomy of the species of the genus *Lepyrus* (Curculionidae) is unresolved (see Anderson 1997).

Appendix 2. Coleoptera restricted to the Yukon Territory and adjacent regions.

Family Carabidae

Tribe Carabini

Carabus Linnaeus. *Carabus truncaticollis truncaticollis* Eschscholtz is known only from Alaska, the Yukon and the Northwest Territories. Adults are brachypterous.

Tribe Nebriini

Nebria Latreille. *Nebria frigida* Sahlberg is known only from West Beringia and Alaska, the Yukon, the Northwest Territories and British Columbia. Adults are macropterous.

Tribe Elaphrini

Elaphrus Fabricius. *Elaphrus angusticollis angusticollis* Sahlberg is known only from West Beringia and Alaska, the Yukon and the Northwest Territories. Adults are either macropterous or brachypterous.

Tribe Clivinini

Dyschiriodes Dejean. *Dyschiriodes subarcticus* Lindroth is known only from West Beringia and Alaska, the Yukon and the Northwest Territories. Adults are macropterous.

Tribe Bembidiini

Asaphidion Gozis. *Asaphidion alaskanum* Wickham is known only from West Beringia and Alaska, the Yukon and the Northwest Territories. Adults are macropterous.

Bembidion Latreille. Five species of *Bembidion* are restricted in their distributions to Beringia. These are *Bembidion arcticum* Lindroth in West Beringia, Alaska and the Yukon; *B. sulcipenne hyperboroides* Lindroth in Alaska, the Yukon and British Columbia; *B. mckinleyi mckinleyi* Fall in Alaska and the Yukon; *B. lenae* Csiki in West Beringia, Alaska, the Yukon and the Northwest Territories; and, *B. umiatense* Lindroth in Alaska and the Yukon. Adults of *B. umiatense* are brachypterous or macropterous; adults of the 4 remaining species are macropterous.

Tribe Pterostichini

Pterostichus Bonelli. Sixteen species in *Pterostichus* are restricted in their distributions to Beringia. Eight taxa are restricted to East Beringia and 8 taxa are found in both East and West Beringia. East Beringian taxa are *Pterostichus woodi* Ball and Currie from the Yukon; *P. nearcticus* Lindroth and *P. bryanti bryanti* Van Dyke from the Yukon and the Northwest Territories; *P. circulosus* Lindroth, *P. kotzebuei* Ball and *P. bryanti bryantoides* Ball from Alaska and the Yukon; and *P. soperi* Ball and *P. sublaevis rufofemoralis* Van Dyke from Alaska, the Yukon and the Northwest Territories. Species found in both East and West Beringia are *P. tareumuit* Ball, *P. ventricosus ventricosus* Eschscholtz, *P. agonus* Horn and *P. costatus* Ménétries from West Beringia and Alaska, the Yukon and the Northwest Territories; *P. similis* Mannerheim, *P. parasimilis* Ball and *P. nivalis* Sahlberg from West Beringia and Alaska and the Yukon; and *P. rubripes* Motschulsky. Many of the species of *Pterostichus* are associated with tundra habitats. Adults of all 16 endemic species are brachypterous.

Tribe Zabrini

Amara Bonelli. *Amara browni* Lindroth is known only from the Yukon and the Northwest Territories. Adults are macropterous.

Family Dytiscidae

Subfamily Hydroporinae

Hydroporus Clairville. *Hydroporus sibericus* Sahlberg is known only from West Beringia, Alaska, the Yukon and the Northwest Territories. This species is found in small, grassy tundra pools.

Oreodytes Seidlitz. *Oreodytes leechi* Zimmerman is known only from the Yukon and eastern Alaska. No information on natural history is available.

Subfamily Colymbetinae

Agabus Leach. *Agabus mackenziensis* Larson is known only from the Yukon and the western Northwest Territories. No information on natural history is available. *Agabus coxalis* Sharp is known from the West Beringia, Alaska, the Yukon, Northwest Territories and northern British Columbia. This species is found in marshes and the emergent zone of shallow, sandy-bottomed, mineral-enriched grassland lakes.

Family Staphylinidae

Subfamily Tachyporinae

Tachinus Gravenhorst. Two species of *Tachinus* are restricted in their distributions to Beringia. These are *Tachinus jacuticus jacuticus* Poppius (in both East and West Beringia) and *T. beckeri* Campbell (found only in the Yukon and northern British Columbia) (Campbell 1973, 1988); adults of both are macropterous. All specimens of *T. beckeri* were collected from the entrances of ground squirrel burrows (Campbell 1988).

Subfamily Aleocharinae

Twenty-three species in 14 genera of the subfamily Aleocharinae are known only from the East Beringian area. Twenty-one of these 23 species were described in a recent paper on arctic Aleocharinae (Lohse et al. 1990). These staphylinids are small, very inadequately known, and inadequately collected. Many of these recently described species are likely more widely distributed than is currently known. Adults of all of the species given below are macropterous. A number of additional species described by Lohse (Lohse et al. 1990) are known from the Yukon and other distantly disjunct localities in eastern arctic Canada; a number of other species are known only from East Beringia but have not been recorded from the Yukon.

Gnathusa Fenyes. *Gnathusa caribou* Lohse is known only from the Yukon, Northwest Territories and Alaska. Adults have been collected under moss and leaf litter on tundra (Lohse et al. 1990).

Ocyusa Kraatz. *Ocyusa canadensis* Lohse is known only from the Yukon and Alaska. This species is noted as not exclusively arctic (Lohse et al. 1990).

Oxypoda Mannerheim. *Oxypoda leechi* Lohse is known only from the Yukon.

Hydrosmecta Thomson. *Hydrosmecta pseudodiosica* Lohse is known only from the Yukon. The holotype was collected under stones along the edge of a stream (Lohse et al. 1990).

Dimetrota Mulsant and Rey. Five Yukon species in this genus are known only from East Beringia. These are *D. caribou* Lohse and *D. venti* Lohse known only from the Yukon, *D. campbelli* Lohse and *D. prudhoensis* Lohse known from the Yukon and Alaska, and *D. nearctica* Lohse known from the Yukon, Northwest Territories and Alaska. Specimens of a number of the species were collected by sifting *Salix* or *Alnus* litter (Lohse et al. 1990).

Boreostiba Lohse. Two species of *Boreostiba* are known from the Yukon. These are *B. campbelliana* Lohse from the Yukon and Alaska and *B. lagunae* from only the Yukon. Specimens were collected by sifting litter and in moss (Lohse et al. 1990).

Atheta Thomson. *Atheta martini* Lohse is known only from the Yukon.

Liogluta Thomson. Two species of Yukon *Liogluta* are found only in East Beringia. *Liogluta trapezicollis* Lohse is known only from the Yukon and *L. vasta* (Mäklin) is known only from the Yukon and Alaska.

Pseudousipalia Lohse. *Pseudousipalia microptera* Lohse is known only from the Yukon and Alaska. Specimens were collected in moss, grass and leaf litter on tundra (Lohse et al. 1990).

Boreophilia Benick. *Boreophilia caseyiana* Lohse is known only from the Yukon and *B. caseyi* Lohse is known from the Yukon, Northwest Territories and Alaska.

Dinaraea Thomson. *Dinaraea planaris* (Mäklin) is known only from Alaska and the Yukon.

Philhygra Mulsant and Rey. Three species of Yukon *Philhygra* are known only from East Beringia. These are *P. junii* Lohse and *P. pseudoboreostiba* Lohse from the Yukon, and *P. ripicoloides* Lohse known from the Yukon and the Northwest Territories.

Phloeopora Erichson. *Phloeopora arctica* Lohse is known only from the Yukon and the Northwest Territories.

Parocalea Bernhauer. *Parocalea nearctica* Lohse is known from the Yukon, Northwest Territories and Alaska.

Subfamily Steninae

Stenus Latreille. Three species-group taxa of Yukon *Stenus* are found in both East and West Beringia. These taxa are *S. pubescens sandersonianus* Puthz, *S. kamtschaticus* Motschulsky and *S. paululus* Benick (Puthz in. litt.); adults of all are macropterous.

Subfamily Paederinae

Lathrobium Gravenhorst. *Lathrobium sollicitum* Fall is known from the Yukon, Alaska and Alberta. While no information is available on the natural history of this species, other members of the subgenus *Tetartopeus* are found in riparian habitats (Watrous 1980). Adults of this species are macropterous.

Family Scarabaeidae

Subfamily Aphodiinae

Aphodius Illiger. In Bousquet's (1991) list, the species *Aphodius yukonensis* Robinson (Robinson 1948) inadvertently was omitted. This species is known only from the Yukon. Adults are macropterous.

Family Elateridae

Denticollis Piller and Mitterpacher. *Denticollis varians* (Germar) is known only from the Yukon, Alaska, Northwest Territories and British Columbia. Adults are macropterous. Nothing is known of the natural history of this species.

Family Anthicidae

Anthicus Paykull. *Anthicus nigritus* Mannerheim is known only from the Yukon, Alaska and the Northwest Territories (Werner 1964). Adults are macropterous.

Family Chrysomelidae

Subfamily Chrysomelinae

Chrysolina Motschulsky. Two species of Yukon *Chrysolina* are restricted in their distributions to the East Beringian area. These are *C. finitima* Brown and *C. subsulcata* (Mannerheim); each is known only from the Yukon and Alaska. A third species, *C. cavigera* (Sahlberg), is known from both East and West Beringia. Adults of both *C. subsulcata* and *C. cavigera* are brachypterous (Brown 1962). All 3 species are found in arctic tundra; nothing specific is known of their food habits although Jolivet and Hawkeswood (1995) suggest most *Chrysolina* species will be found on low herbs due to their brachypterous condition and note such plant families as Lamiaceae and Asteraceae as important hosts. Two additional species, *C. caurina* Brown and *C. magniceps* (Sahlberg) are known only from arctic Alaska.

Chrysomela Linnaeus. *Chrysomela engelhardti* (Hatch) is known only from the Yukon, Alaska and the Northwest Territories. Larvae have been collected on decumbent *Salix* sp. growing on tundra at Eskimo Point, Northwest Territories (Brown 1956). *Chrysomela engelhardti* is very closely related to *C. blaisdelli* (Van Dyke), another tundra species suspected to feed also on *Salix*; *C. blaisdelli*, while not recorded from the Yukon, is known only from Alaska and the Northwest Territories. Adults of both species are macropterous but rarely fly (Brown 1956).

Phratora Chevrolat. *Phratora interstitialis* Mannerheim is known only from the Cariboo district of British Columbia, the Mackenzie River basin (Yukon and Northwest Territories) and Alaska. Adults feed on species of *Salix* and are macropterous. This species is very closely related to the Old World species *P. vulgatissima* (L.) and excepting male tarsal and aedeagal structure the 2 species are inseparable (Brown 1951).

Family Curculionidae

Subfamily Brachyderinae

Sitona Germar. *Sitona aquilonius* Bright, closely related to *Sitona cylindricollis* (Fahraeus), is known from various sites in the Yukon and the extreme western mainland Northwest Territories. Adults of this species have been collected on *Hedysarum alpinum* L. var. *americanum* Michx. and *H. boreale* Nutt. var. *mackenzii* (Richardson) C.L. Hitchc. (Fabaceae) in the Northwest Territories. All specimens of this species from the Yukon are brachypterous.

Subfamily Otiorhynchinae

Lepidophorus Kirby. *Lepidophorus lineaticollis* Kirby is found in Chukotka (Siberia), Alaska, Yukon, western mainland Northwest Territories, and extreme northern British Columbia. Habitat of the species appears to be wet to dry tundra (including fell-field) and southern steppe (including river shorelines). Adults of this common species have been collected in alder leaf litter in Alaska and in various other treeless habitats throughout the species range. This species is likely parthenogenetic as no males have yet been found. Adults are all brachypterous. Larvae are not known but are likely general root feeders. Adults are all brachypterous. Fragments of adults are very common as late-Pleistocene fossils at numerous sites in Alaska and the Yukon; however, they are not known from Siberia (Matthews 1974, 1975, 1982; Morlan and Matthews 1983). In fossil deposits, this species is a common associate of *Amara alpina* (Paykull) and various *Cryobius* species (Coleoptera: Carabidae), taxa that are generally regarded as indicative of wet to dry tundra habitats (Matthews 1982). The absence of fossils from Siberia would seem to indicate that the species is a recent arrival in that area.

Vitavitus Kissinger. *Vitavitus thulius* Kissinger, the only species in the genus, is known only from the Yukon and northwestern mainland Northwest Territories. Habitat of this species appears to be dry tundra and southern steppe. Until recently only a single living specimen of this species was known. Adults have now been collected in an upland dolomitic fell-field area in association with *Morychus* (Coleoptera: Byrrhidae) and *Lepidophorus lineaticollis*, and on a south-facing gravel *Artemisia* slope with *Lepidophorus lineaticollis* and *Hypera seriata*. *V. thulius* apparently is a rare dry-habitat associate of *L. lineaticollis*. No males of this species have yet been collected and it may prove to be parthenogenetic. Adults are all brachypterous. *Vitavitus thulius* is relatively abundant in early-Pleistocene deposits of the Kolyma Basin (eastern Siberia) and Cape Deceit, Alaska (Matthews 1974; Morgan et al. 1983). It has also been found in Pliocene samples from Lava Camp, Alaska (Matthews 1977), mid-Wisconsinan samples from the Bell and Old Crow Basins, northern Yukon (Matthews 1975; Morlan and Matthews 1983), early Wisconsinan? samples from Minnesota (Ashworth 1980), and Holocene samples from Columbia Bridge, Vermont and Brampton, Ontario (Morgan et al. 1983).

Connatichela Anderson. *Connatichela artemisiae* Anderson, the only species in the genus, is known only from the Yukon and extreme eastern Alaska. Habitat of the species appears to be southern steppe (including river shorelines). Adults of *C. artemisiae* have been collected along dry river banks and on dry south-facing slopes from plants of a small species of *Artemisia* (Asteraceae), probably *A. frigida* Willd. Presence of copulating adults on the *Artemisia* suggests that larvae feed on the roots of this plant (Anderson 1984). Adults are brachypterous. Fossil specimens, mostly of mid-Wisconsinan age, are known from the extreme western Northwest Territories, Alaska and the Yukon (Anderson 1984). They are generally associated with sites representative of dry steppe-tundra habitats dominated by grasses, Chenopodiaceae, and *Artemisia* (Asteraceae). Specimens are

frequently found in deposits containing numerous *Lepidophorus lineaticollis* and *Morychus* sp. (Byrrhidae), species that currently are found in dry tundra habitats, along river shorelines, or on xeric south-facing slopes (Matthews 1982).

Subfamily Hyperinae

Hypera Germar. *Hypera seriata* (Mannerheim) in known only from Alaska, extreme western mainland Northwest Territories and the Yukon. Habitat of the species appears to be dry tundra and southern steppe. Adults of this species have been collected in pitfall traps in dry tundra habitat and on south-facing gravel, *Artemisia*-dominated slopes. Hostplants are not known but may be Fabaceae or Polygonaceae. Adults are brachypterous. Matthews (1974) records fossils of this species from Holocene deposits at Cape Deceit, Alaska.

Subfamily Erirhininae

Dorytomus Germar. *Dorytomus lecontei* O'Brien is known only from Alaska and the Yukon. Habitat of the species appears to be boreomontane forest. No information on the natural history of this species is available but as all other *Dorytomus* species are associated with Salicaceae this species is likely similarly associated with these plants. Adults are macropterous.

Subfamily Ceutorhynchinae

Ceutorhynchus Germar. *Ceutorhynchus barkalovi* Korotyaev is known only from Wrangel Island (Siberia) and the Yukon. Habitat of the species appears to be dry tundra (including fell-field). In the Yukon 2 adults were collected in pan traps set in a dry, dolomitic fell-field slope. The type series of 6 specimens from Wrangel Island represent the only other known specimens of this species; 4 living and 2 dead specimens were found in a tundra-steppe community of a floodplain and 2 of the living specimens were collected under *Parrya nudicaulis* (L.) Regel. (Cruciferae). Adults are brachypterous, an uncommon occurrence in species of this genus.

Family Scolytidae

Carphoborus Eichhoff. *Carphoborus andersoni* Swaine is known only from the Yukon, Northwest Territories, Alaska and Alberta. Adults have been reared from *Picea glauca* (spruce) branches (Wood 1982). Adults are macropterous. Fossils of this species are known from lake deposits of estimated age 10 000–70 000 yr B.P. in Ontario, Minnesota and New York (Wood 1982).