

ARCTIC CORNER

News about studies of arctic insects

Introduction

Arctic Corner provides a forum for news of particular arctic interest, replacing the Biological Survey's newsletter *Arctic Insect News* (1990–2000). Contributions to *Arctic Corner* are welcomed by the Editor (see inside front cover).

Update on the "Insects of the Arctic" project: field collecting in 2003 and 2004

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Introduction

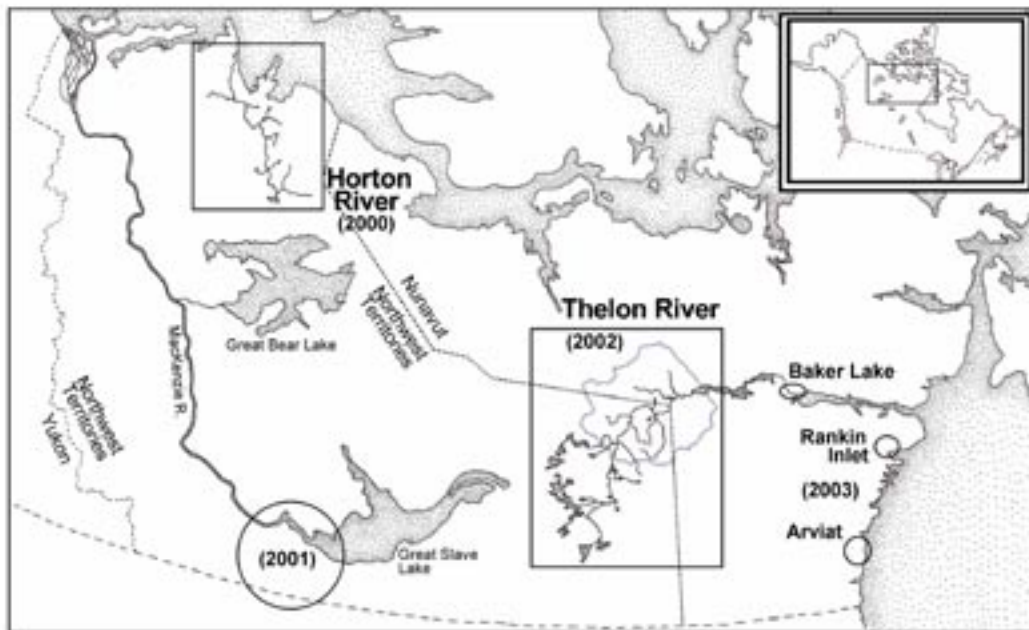
The "Insects of Keewatin and Mackenzie Project" began in 2000 to focus attention on the poorly surveyed arctic zone located on the northern Canadian mainland. The goal of the project was to document insect diversity in and near major rivers in the barrenlands region between the Mackenzie River and Hudson Bay. The project was considered to be a natural extension of the Survey's Insects of the Yukon initiative (see Danks and Downes 1997), and is now being continued under the more inclusive title, "Insects of the Arctic".

The project has consisted of four successive collecting expeditions, starting in 2000 in the northwest Barrens, and extending, in 2003, to northwestern Hudson Bay (see map for sampling locations). Two of the expeditions were

far from any habitation, and involved flying in to a headwater lake or river confluence, then travelling downstream to collect along the river corridor. The other two trips were conducted around existing communities, and so collections were made near roads and trails near the communities. Because of the short collecting periods for each trip, the focus of each survey reflected the interests of the individual participants, so black flies and the aquatic orders, Ephemeroptera, Plecoptera, and Trichoptera, were collected for all trips, and certain Diptera (i.e. Chironomidae, Phoridae) or Lepidoptera were collected on trips where specialists in those groups were included. However, specimens captured from mass collecting methods (e.g. aquatic kick and dip sampling, malaise trapping, sweep netting, beating) have been



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Central barrens 2000 to 2003 sampling areas.

shared with the general entomological community.

The first expedition (July/August 2000) was a river trip along the Horton River (east of the Mackenzie River, and almost due north of Great Bear Lake, see map). Team members (Doug Currie, Donna Giberson, Peter Adler, Brian Brown, and Malcolm Butler) flew into Horton Lake, and paddled 30 to 40 km each day, setting up in a new location nearly every night. This allowed us to collect aquatic and terrestrial insects along approximately 700 km of the river corridor (reports in Currie et al. 2000; Currie and Adler 2000). In the summer of 2001, Doug Currie and Peter Adler traveled north from Edmonton to Yellowknife and collected black flies from streams along roads in southern NWT. For the next expedition (July 2002), another river trip was organized, this time along approximately 325 km of the Thelon River, which straddles the border between NWT and NU. Donna Giberson, Doug Currie, and Peter Adler were joined for this trip by MSc students Lisa Purcell (University of Prince Edward Island) and Amanda Roe (University of Alberta) to collect black flies, general aquatic

insects, and Lepidoptera (reports in Currie et al. 2002; Giberson and Shaverdo 2003; Shaverdo and Giberson in press). The fourth trip in the series, and the main focus of this report, occurred in the region around northwestern Hudson Bay. Doug Currie, Donna Giberson, and Peter Adler flew to Arviat, Baker Lake, and Rankin Inlet during July 2003 and sampled streams and rivers in the vicinity of those three communities.

Summary of results from previous trips

Black flies: Doug Currie and Peter Adler collected black flies during each of the four trips to the arctic for this project. Black flies were collected over nearly 4 weeks from 52 sites along the Horton River in 2000, resulting in 30 species in 4 genera (Currie et al. 2002; Currie and Adler 2000). Two years later, they collected 29 species in 8 genera over a 3-wk sampling period along the Thelon River. Only 17 species were shared between the two drainages, yielding a total of 42 species in the two river systems (Currie et al. 2002). These expeditions resulted in a total of 42 species from the mainland barrenlands zone of Canada

(compared to only 22 species that had been previously reported).

Mayflies: Mayflies were collected from 26 of the 38 main river sites, tributaries, and nearby ponds along the Horton and 31 of the 34 sites along the Thelon River by Donna Giberson and Lisa Purcell. Donna has been working with Steve Burian of Southern Connecticut State University (New Haven) to identify and verify the material from these collections, which have resulted in 22 species in 12 genera and 7 families. The Horton River had higher species diversity than the Thelon, despite a much more northerly location than the Thelon River. Fifteen species were recorded from the Horton River, but a Rarefaction Analysis suggested that the river was under-sampled and more species may be present in that area. Twelve species were recorded from the Thelon corridor, and probably represent the total number available. Only five species were found in both river corridors. Few species had previously been reported in the area now known as Nunavut, although the current Northwest Territories has been relatively well collected. Four of the species found in the Horton and Thelon rivers were new to NWT (compared to 52 previously reported there) and five were new to NU (added to the nine species previously reported there). The mayflies that were found are generally northern or mountain species, and represent a classic "above treeline" fauna. Four species were holarctic in distribution, and only one species found (along the Thelon) is considered to be an eastern species; the remainder appear to have Beringian roots and are also found west of the Mackenzie River.

Stoneflies: Donna Giberson and Lisa Purcell also collected stoneflies from the main river sites, tributaries and associated ponds along the two large river corridors, and Donna has been working with Ken Stewart of the University of North Texas to identify the collections. Stoneflies were found in 17 of the 38 Horton sites and 28 of the 34 Thelon River sites.

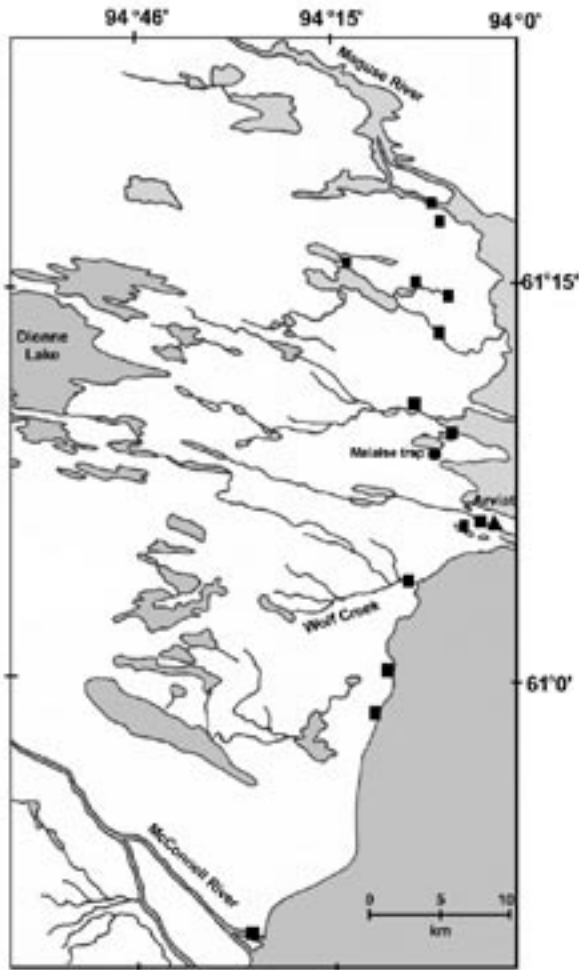
Species diversity was similar in the two rivers, with 9 species in the Horton and 7 in the Thelon. Overall, 13 species were collected, in 11 genera and 4 families, and only three were common to both drainages. Nineteen species had previously been reported in NWT and at least 5 in NU, and these collections have added 5 species to NWT and 3 to NU. Three of the species are Holarctic in distribution, and all have also been collected west of the Mackenzie River.

Water beetles: Water beetles were collected by Donna Giberson, and identified by Helena Shaverdo, a Post-doctoral researcher in Rob Roughley's lab at the University of Manitoba (currently at the Naturhistorisches Museum Wien in Vienna), who expressed interest in collaborating on the water beetles. Five of the 37 sites along the Horton River had water beetles, compared to 15 of the 34 sites along the Thelon. Sixty-one specimens were collected in total, yielding 13 species (in 7 genera) of Dytiscidae and 1 species of Gyrinidae. Only two species were found in the Horton corridor, compared to 13 along the Thelon, but the difference in species diversity may be at least partly due to differences in sampling effort. Most of the collections represented range extensions for the water beetle species, and there was one new record for NWT and one for NU (Giberson and Shaverdo 2003; Shaverdo and Giberson in press). Seven of the species have holarctic distributions, and all have also been collected west of the Mackenzie River.

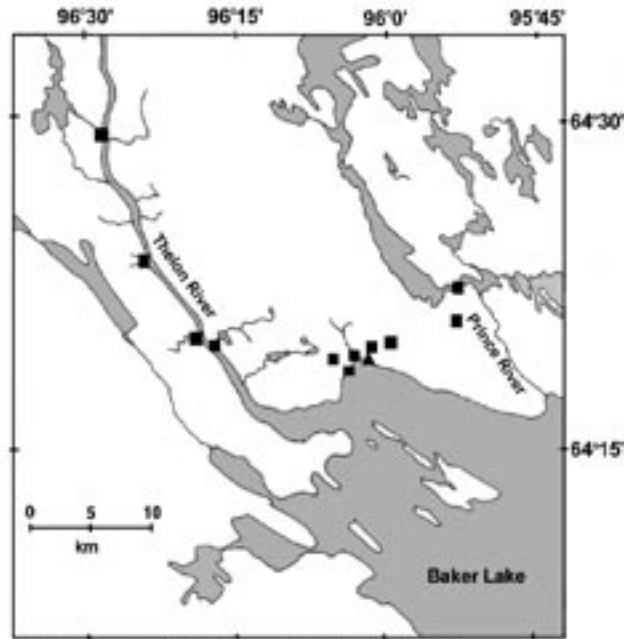
Field Collecting in 2003: Arviat, Baker Lake, and Rankin Inlet

Donna Giberson, Doug Currie, and Peter Adler travelled to the region around northwest Hudson Bay during the summer of 2003, with the objective of sampling as many aquatic habitats near the three communities as possible. Unlike previous trips, where we flew in to headwater sections of isolated rivers, the sampling plan consisted of using the communities as a base, then travelling out each day to

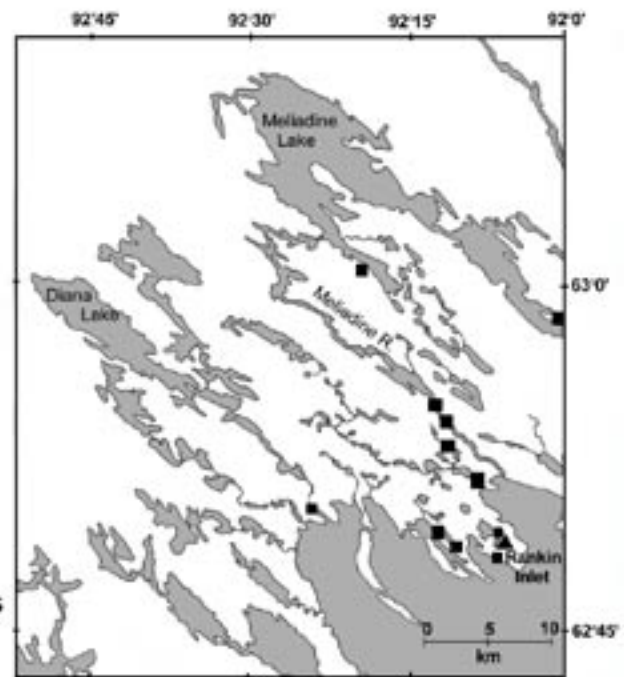




A. Arviat sampling areas



B. Baker Lake sampling areas



C. Rankin Inlet sampling areas

2003 sampling areas.

sample nearby rivers and ponds. Various modes of transport were used to access sampling sites, including truck, All-Terrain vehicle, motorboat, and foot.

Sampling sites:

The area around northwestern Hudson Bay is dominated by low relief granitic outcrops (Canadian Shield), so is generally rocky with depressions that fill with water and vegetation. Lowland areas are marshy and underlain by permafrost. When flying over the region in summer, the first impression is that of nearly unlimited water: large tundra ponds that drain into each other, and ultimately into large rivers that flow into Hudson Bay; small ponds that perch in rocky outcrops and which may be isolated from each other; and marshy areas and small seeps that characterize much of the remaining land mass. Our sampling consisted of rock-searches, kick-netting, and sweep netting in the tundra near the sampling sites, and monitoring of a Malaise trap near Arviat. Sampling was conducted around Arviat from July 9–13 (with Malaise sampling extending to mid-September at this location), Baker Lake from July 14–17, and Rankin Inlet from July 18 - 21, 2003.



Malaise trap set up near tundra pond north of Arviat.

Arviat (formerly Eskimo Point): Arviat is located on Hudson Bay, in the southernmost part of Nunavut. It is marshy, with very low relief, and the main flowing water is from tundra pond to tundra pond, although there are

two large river systems just north (the Maguse River) and south (the McConnell River) of the community. Road access was limited to a few km in either direction of town, but a large esker system near town provided ATV access to a wide variety of sampling areas, so most sampling was done with the aid of Inuit guides, who were familiar with the area. We would like to acknowledge the help of Guy Alikut, our host at Jeannie's B&B, and Ludovic Onert, our Inuit guide, for their invaluable help in getting us out to suitable sampling habitats in the few days we were in town. Guy provided transport to sample sites that were accessible by truck, and Ludovic guided our intrepid crew out onto the tundra (and back!) on ATVs. Mike Settingerton from the Nunavut Wildlife dept. also helped with sampling, and volunteered to maintain a malaise trap for the remainder of the summer at a site about 6 km north of town.

Baker Lake: The community of Baker Lake is near the geographical centre of Canada, and is located inland from Arviat and Rankin Inlet. The town is on the shores of Baker Lake, near the mouth of the Thelon River. The area is better supplied with roads than Arviat, partly because of its importance as a centre of mineral exploration. Relief is greater than found in Arviat, with low rocky hills rising up from the lake to the north of town. Many small streams drain the permafrost-covered hills around town and flow to Baker lake, providing considerable sampling habitat near town. In addition, tundra ponds (large and small) abound in the hollows in the hills, and streams can be found draining these ponds as well. Two large river systems were also accessible for sampling; a rough road extends to Prince River to the east, and the Thelon River is accessible to the west via motorboat. Our hosts at the Baker Lake Lodge drove us out to Prince River (approximately 10 km from town) and we walked back to town, sampling streams and ponds on the way. We were also able to sample aquatic habitats near town by





Doug and Peter sampling small tundra pond outflow on Prince River Road, near Baker Lake.

walking along a myriad of roads that extend outward from Baker Lake. Joan Scotti also took us up the Thelon River by motor boat, to a point about half-way to Aberdeen Lake; this allowed us to acquire samples from the lower Thelon River, to compare to our samples from the middle part of the river the year before.

Rankin Inlet: Rankin Inlet is another coastal community, located north of Arviat and east of Baker Lake. As with Baker Lake, the area is well supplied by roads and trails, and many sites could be accessed easily by truck or by foot. The staff at Nunavut Arctic College in Rankin were extremely helpful, pointing us to suitable sampling habitat (and providing transport) and providing comfortable accommodation while we were in Rankin. We would like to acknowledge Mike Setterington again for organizing the accommodation, and Mike Shouldice (the

Campus director) for all his help. Our main sampling locations around Rankin Inlet were along the road to Meliadine River to the north, and on the Tudlik Peninsula west of town. Mike Shouldice continued to collect aquatic insect larvae at a site on the Meliadine River for the rest of the summer in 2003, as well as a site on the Diana River (NW of Rankin Inlet).

As in previous trips, Peter Adler and Doug Currie focussed on the black flies, and were particularly interested in the many small streams that connected tundra pools. A major goal of the survey was to look for two enigmatic species of black fly that had so far eluded capture during this project, but which had been collected previously in the Canadian Arctic. The two species were *Simulium giganteum*, known in the Nearctic from a single specimen collected near Baker Lake, and an undescribed species of *Hellichiella* which has been collected from the James Bay region of Quebec, but is currently known only from a description of its chromosomes. Unfortunately, neither species was found during this survey, suggesting that knowledge of simuliid diversity in Arctic Canada may still be incomplete. Twenty-five species of black fly, in five genera, were recorded from 48 collecting sites in this survey, but only a single new record was added, with the capture



Doug and Peter sampling the Meliadine River, north of Rankin Inlet.

of *Simulium annulitarse*; all other species had been collected in the previous surveys. Most of the species collected (19 of 25) were in the genus *Simulium*, with the remainder in *Metacnephia* (3 species), *Helodon*, *Stegopterna*, and *Cnephia* (one species each). Fifteen species were collected around Arviat, 20 around Baker Lake, and 13 around Rankin Inlet. These species records, and others collected during the arctic insects project, have been incorporated into a newly published book on the black flies of North America (Adler et al. 2004).



Near Arviat; Doug Currie showing vial of black flies to Frank, a local resident who came by while we were sampling.

Donna Giberson collected general aquatic invertebrates from both the running water and standing water sites encountered around the three communities, with a total of 45 collections. Diversity of both the Mayflies and Stoneflies was lower than found along either the Horton or Thelon river corridors, despite a much broader range of habitats sampled; only 4 species of mayfly and 5 species of stonefly were encountered in the 2003 survey. All were species that had also been collected along the Thelon River. The Trichoptera, Coleoptera, and other invertebrates that were collected are still being studied, but preliminary work suggests that the fauna is similar to that collected along the Thelon in 2002. Malaise trap residues have been sent to interested specialists who are currently developing the data.

One of the highlights of the 2003 sampling was working closely with local people in each of the three communities. Word quickly spread around each community when we were there, and we were often stopped on the streets and in shops and asked “bug questions”. Also, we met up with several locals as we were sampling, and generated a lot of interest; many people were not aware that the larval stages of the black flies (locally called “milugiaq”) and mosquitoes (“kikturiaq”) were aquatic, and many more were surprised at the number of insects

found in the streams they take drinking water from.

Field Collecting in 2004: Rankin Inlet, and western Alaska

Although Donna Giberson was not able to travel to the arctic during the summer of 2004, a collaboration with Mike Shouldice of Nunavut Arctic College has meant that collections will continue in 2004 along the Meliadine and Diana Rivers. Mike will sample these rivers every couple of weeks during the summer, and is also maintaining a Malaise Trap near the river to provide seasonal data on the emergence of many of the aquatic species.

Doug Currie and Peter Adler visited westernmost Alaska during the summer of 2004 in order to gain biogeographic context for the Canadian arctic black fly fauna. The areas sampled (Nome, Bethel and environs) – which once formed part of the Bering Land Bridge – are situated approximately 1000 km west of the major road networks in Alaska. Only 7 species of black flies were previously recorded from this vast and sparsely surveyed territory. Although the 2004 collections have yet to be scrutinized in the laboratory, at least 30 morphologically recognized species have thus far been identified, more than quadrupling the



number of species previously recorded from western Alaska. The number of species will unquestionably increase once the polytene chromosomes of larvae have been screened for sibling species. Twenty-two western Alaskan species (73%) exhibit a Holarctic distribution, underscoring the close association between the Nearctic and Palearctic faunas at high latitudes. Yet given the close proximity between westernmost Alaska and the Russian Far East (Chukotka), it is perhaps surprising that no new records were established for species currently known only from the Palearctic Region. On the other hand, the distributions of 8 Nearctic species are extended westward to within a hundred or so kilometers of Chukotka, suggesting the possibility that some of these species may eventually be found on the other side of the Bering Sea.

Future work

In 2005, Doug Currie and Peter Adler will further their studies of faunal affinities between East and West Beringia by undertaking a collecting expedition to Chukotka in the Russian Far East. Anadyr and Provideniya, which are both accessible by air from Nome, Alaska, have been identified as likely bases of operation. Donna Giberson is hoping to head back to Rankin Inlet with Steve Burian (mayflies) and Jade Savage (muscid flies), to sample for species that have so far been missed in the earlier surveys.



Donna Giberson on road between Baker Lake and the Prince River Bridge, complete with sampling gear.

Photo by D.C. Currie.

Symposium at the Entomological Society of Canada meeting

There will be a symposium at the upcoming meeting of the Entomological Society of Canada and Acadian Entomological Society (Charlottetown, 15–18 October 2004), focusing on the insects of the Central Barrens region of arctic Canada. The goal of the symposium is to highlight what has been learned in the four years of the project, and note the work that still needs to be done.

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All photos and maps by D.J. Giberson except where otherwise noted.