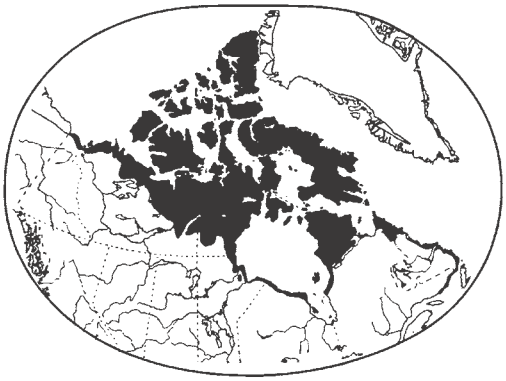

ARCTIC CORNER

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).

Insect biodiversity in the Thelon Wildlife Sanctuary

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Introduction

The Biological Survey of Canada's *Insects of Keewatin and Mackenzie Project* was initiated in 2000 to focus attention on the inadequately surveyed territory between the Mackenzie River and Hudson Bay. A project dedicated to documenting entomological diversity in this region, which encompasses all of mainland Northwest Territories and Nunavut, was viewed as a logical extension of the Survey's efforts in the Yukon Territory (cf. Danks and Downes 1997). In the summer of 2000, Scientific Committee members Doug Currie (Royal Ontario Museum and University of Toronto) and Donna Giberson (University of Prince Edward Island), along with Peter Adler (Clemson University), Brian Brown (Natural History Museum of Los Angeles) and Malcolm Butler (North Dakota State University), embarked on a 700-km collecting expedition along the Horton River between Horton Lake and the Beaufort Sea. Collections along the river revealed that the insect fauna of northwestern Northwest Territories was much richer than previously supposed, underscoring the need for further study (Currie et al. 2000, Currie and Adler 2000). The Horton River was surveyed during the first year of the project because of its close proximity to the eastern boundary of Beringia — the primary source area for organisms that repopulated the north following deglaciation. Our goal was to compare species richness in a recently glaciated area with that of the nearby Beringian refugium. Additionally, one

of us (D.G.) studied aspects of energetics and food web dynamics in a large arctic river. And because the Horton River flowed north towards the Beaufort Sea, we were able to sample in a south-to-north transect from approximately 67°30′ to 70°00′ north latitude. Given the success of our initial survey we resolved to mount a similar expedition farther south and to the east. A number of potential study sites were considered, but ultimately we settled on the Thelon River within the confines of the Thelon Wildlife Sanctuary.

The Thelon Wildlife Sanctuary

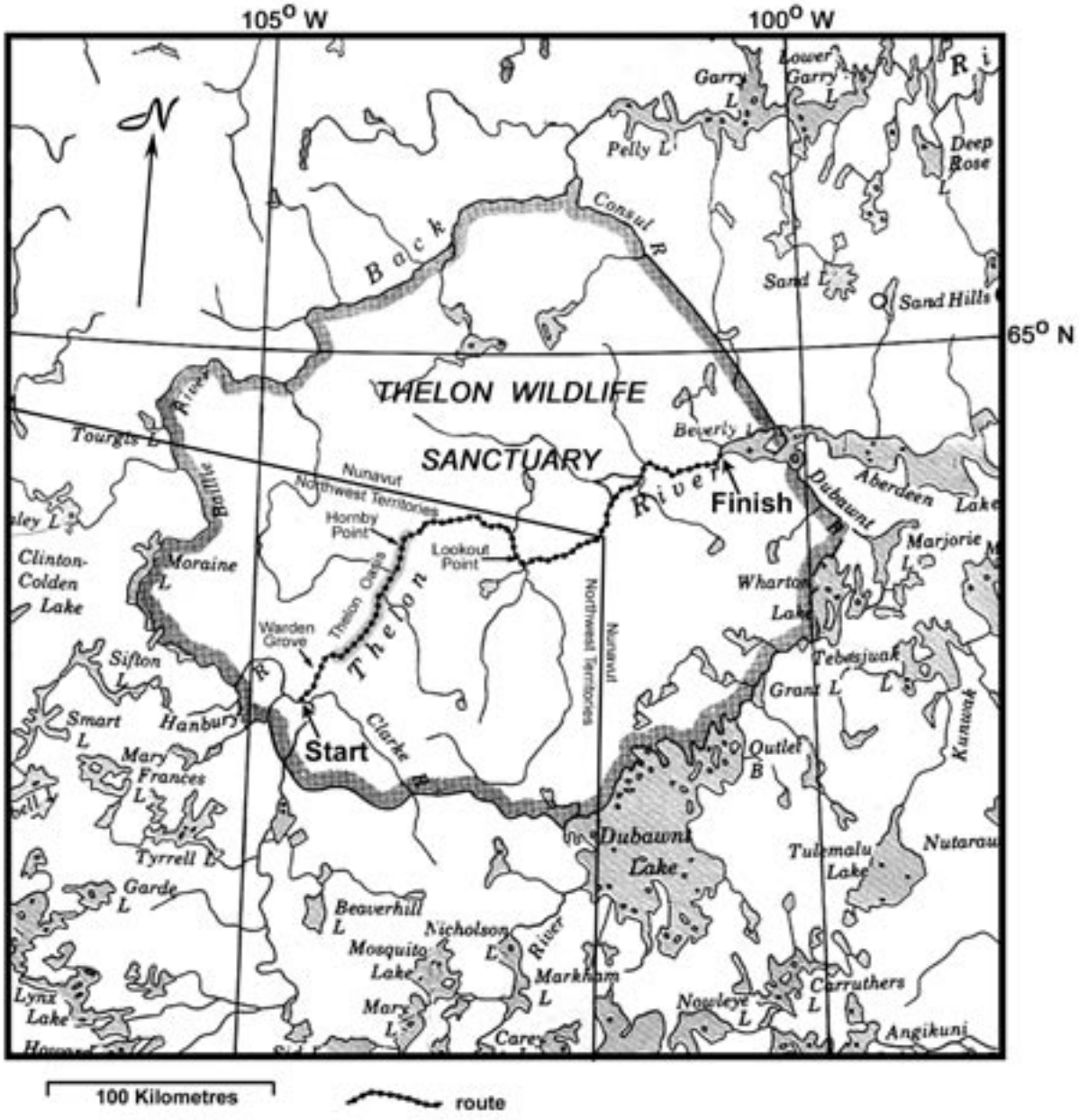
The Thelon Wildlife Sanctuary ranks among the largest and most remote protected areas in the world. Straddling the boundary between Northwest Territories and Nunavut, the sanctuary is renowned for its pristine nature and legendary history*. One of the outstanding features of the preserve is a stretch of the Thelon River between the confluence of the Hanbury River and Hornby Point, referred to as 'the Thelon Oasis'. Dense groves of spruce trees line the river valley along this stretch — hundreds of kilometers north of treeline. This northern oasis supports a rich assemblage of plants and animals, many of which occur far north of their typical range, including raspberry, currant, columbine, and moose. The sanctuary is perhaps best known as a refuge for the last remaining populations of mainland muskox, as well as for the 330,000 strong Beverly caribou herd.

Although renowned as a preserve for plants and mammals, virtually nothing is known about the insect fauna of the sanctuary. Indeed, the vast swath of the Canadian arctic between Yellowknife and Baker Lake remains virtually unexplored for insects owing to the absence of roads and human settlements. It is this lack of knowledge, coupled with the opportunity to prospect for insects in an 'arctic oasis', that inspired us to mount a two-week expedition along the Thelon River during the summer of 2002.

Logistics and river travel

A disadvantage of the proposed route is that two separate applications were needed for scientific research licenses: one each for Northwest Territories and Nunavut. Fortunately, the process proved to be far less cumbersome than experienced when planning for the Horton River expedition, and it turned out that a formal license for Nunavut was not even needed given our innocuous collecting techniques. As with the 2000 expedition, we engaged a wilderness travel company to outfit and guide our party. The three of us, along with guide Tim Gfeller and graduate students Lisa Purcell (University of Prince Edward Island) and Amanda Roe (University of Alberta), gathered in Yellowknife on June 28, 2002. Early the following morning we loaded approximately 320 kg (700 lbs) of food and gear, plus three canoes, onto two float planes in preparation for the three and a half hour flight to the Thelon Wildlife Sanctuary. We were dropped off on the Thelon River just below its confluence with the Hanbury River (63°38′N 104°32′W). Over the next two weeks we paddled our 5.2-m (17-foot) canoes about 300 km downstream, to a point where the river widens into Beverly Lake (64°32′N 100°58′W). Terrestrial and aquatic insects were sampled along the entire route using a combination of aerial and dip netting, malaise traps, and hand collecting. Specimens were pinned or variously fixed in ethanol or Carnoy's solution, depending on taxon or method of analysis.

*David Pelly's (1996) book on the Thelon Wildlife Sanctuary provides a fascinating account about history of the Thelon River, including the ill-fated attempt by John Hornby and his two young companions to spend the winter of 1926-1927 in the arctic oasis.



The route from the Hanbury River to Beverly Lake included many points of historical, geological, and anthropological interest. Early in the trip, near the beginning of the Thelon Oasis, we passed Warden's Grove, a cluster of cabins established in 1928 by the first custodians of the sanctuary — W.H.B. "Billy" Hoare and A.J. "Jack" Knox. Farther downstream near the end of the oasis, we found the ruins of the cabin where John Hornby and his two companions starved to death in the spring of 1927. The grave of the legendary trapper, along with those of nephew Edgar Christian and Harold Adlard, are marked by simple wooden crosses bearing their initials.

A geographical point of interest is a prominence known as Muskox Hill — the only pingo known to occur within the Thelon

Wildlife Sanctuary. River banks, eskers, and drumlins provided the only other relief in an area crushed flat by Laurentide Ice. One of the few sites that afforded extensive views of the Thelon River valley is an old Inuit encampment called Lookout Point. Numerous archaeological remnants including tent rings were scattered along a prominent ridge. Inuit artifacts were also common along the Thelon Bluffs, a steep-sided reach of river near the eastern boundary of the sanctuary. The river narrowed markedly as it passed through the bluffs, providing the only stretch of river with technically challenging flow.

Although the sanctuary is renowned for its wildlife, relatively few large mammals were encountered. Muskox, caribou, moose, and wolves were sighted sporadically, and it was not until we reached the vicinity of Beverly Lake that large numbers of caribou were seen travelling along ridge tops. Canada geese were abundant in areas where the Thelon River widened to lake-like conditions. Rough-legged hawks and bald eagles were the most commonly seen raptors.

Preliminary Results

Black Flies (Diptera: Simuliidae)

Peter Adler and Doug Currie made 37 collections of immature black flies from the Thelon River and its tributaries, plus numerous collections of adults. Morphological and chromosomal examination of approximately 4,700 specimens yielded 29 species, matching closely the total number of species (30) collected from the Horton River and its valley. However, only about half of the species (17) are shared between the two drainages. These results suggest that simuliid community structure is far from homogeneous across northern Canada. Collectively, the Horton and Thelon expeditions yielded a total of 42 black fly species — far exceeding the 22 species recorded previously from arctic Canada east of the Mackenzie River (cf. Danks 1981).

The 29 species collected from the Thelon Wildlife Sanctuary were divided among 8 genera as follows: *Gymnopais* (1), *Helodon* (1), *Prosimulium* (1), *Greniera* (1), *Stegopterna* (2), *Cnephia* (1), *Metacnephia* (3) and *Simulium* s.l. (19). At least one species, a member of the *Simulium arcticum* complex, is new to science. Another species, a member of the *Simulium* subgenus *Hellichiella*, was previously known only from a single locality in Norway. Nearly half of the species (14) exhibit a Holarctic distribution, underscoring the close association between the Nearctic and Palearctic simuliid faunas at northern latitudes. Surprising absences from the Thelon collections included S*imulium rostratum*, *Simulium venustum* cytospecies CC3, and representatives of the *Simulium aureum* complex. The absence of *S. rostratum* is especially puzzling given that this Holarctic species was among the most frequently collected simuliids on the Horton expedition. Indeed, it is among the most common and frequently collected species in all of Canada.

The timing of the expedition was ideal, both for assessing the simuliid fauna and for avoiding the ravages of the Barrren Lands black fly, Malcolm Waldron's (1931) "cruel parasite" of the tundra. Although larvae of both early- and late-season species were present, the adults of the principal human biters — members of the *Simulum venustum* complex — had not yet begun their massive emergence. The team members, consequently, were spared the suffocating attacks by black flies that had been experienced on the Horton expedition. The ever-present mosquitoes, however, attested to the prominent role of biting flies in northern lands.

One of the major objectives of the expedition was to search for two enigmatic and little-known species of black flies. One of

these species, *Simulium giganteum*, is known in the Nearctic Region from a single specimen collected in the vicinity of Baker Lake — not far from the eastern boundary of the Thelon Wildlife Sanctuary. The other, an undescribed species of *Hellichiella* from the James Bay region of Quebec, is currently known only from a description of its chromosomes (Rothfels and Golini 1983). Unfortunately, neither species turned up in our collecting efforts along the Thelon River valley. It is clear that knowledge about simuliid diversity in arctic Canada is far from complete.

Ephemeroptera, Plecoptera, and Trichoptera

Donna Giberson and Lisa Purcell concentrated on the aquatic orders, with special reference to 'EPTs' — Ephemeroptera, Plecoptera and Trichoptera. The relatively early timing of the Thelon expedition proved much better than the Horton expedition in terms of material collected. The immature stages of aquatic insects were captured using a D-framed net and hand-sorted in the field. Adults were collected using a combination of aerial netting, Malaise trapping, and the use of a beating sheet. Many mature larvae were encountered, which greatly enhances the prospect of species-level identification. The plecopteran families Perlodidae, Chloroperlidae, and Nemouridae were well represented. The Ephemeroptera were more richly represented at the family level including the Leptophlebiidae, Heptageniidae, Baetidae, Ameletidae, Siphlonuridae, and Ephemerellidae. Commonly encountered Trichoptera included the Hydropsychidae, Brachycentridae, and Limnephilidae, to name a few. Specimens are in the process of being curated, and will be sent to specialists for species-level identification.

Lepidoptera

Amanda Roe collected Lepidoptera and operated a Malaise trap on behalf of the University of Alberta's Strickland Museum. No unexpected butterflies were encountered and most collections represented only minor range extensions. The moths have yet to be completely identified; however, preliminary results suggest a similar pattern to that observed for butterflies. Butterflies were common relative to large moths, such as noctuids, perhaps owing to the earliness of the season. The vagaries of weather, especially with respect to wind, resulted in a sporadic survey of lepidopteran diversity along the Thelon River valley.

Donna Giberson processing insects under the protection of a home-made mosquito shield. (photo by D.C. Currie)

Future Plans

Our expeditions along the Horton and Thelon Rivers reveal that there is still much to be learned about patterns of insect diversity in Arctic Canada. With processing of the 2002 collections still underway, there have been no formal discussions about our future plans for the *Insects of Keewatin and Mackenzie Project*. The Horton and Thelon Rivers both fall within the High Subarctic Ecoclimatic Region of

Canada (Ecoregions Working Group 1989), so one possibility is to select a more northerly destination in the Low Arctic Ecoclimatic Region. The Back, Burnside, and Hood Rivers are all possible venues in this particular region. Alternatively, the geographical terms of reference of the Project could be expanded to include the Hudson Bay Lowlands and Ungava, thus including the entire Arctic landscape of the mainland of Canada. Regardless of the destination chosen, the success of the Project depends ultimately on our ability to raise funds and acquire licenses. The high cost associated with conducting research in the far north continues to be a major stumbling block for future expeditions. As sharing fixed expenses such as chartered aircraft and guides represents the only viable option for this type of fieldwork, we look forward to hearing from anyone interested in participating in a future expedition to the Canadian Arctic.

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Canadian research in arctic entomology is out in the cold

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Since the publication of the brief "Arctic Invertebrate Biology : Action Required" by the Biological Survey of Canada (Terrestrial Arthropods) thirteen years ago (Danks and Ring 1989), very little has been accomplished in Canadian arctic entomology. This brief recommended ways in which studies of arctic invertebrate biology could be enhanced through (1) identifying and developing key study themes in fields already shown to be significant such as cold-hardiness, seasonality, modification and control of life cycles, ecosystem-level ecology, and the role of insects/invertebrates in predicted global change scenarios, (2) organizing a series of workshops to discuss topics of broad interest, to develop further avenues of enquiry, and to coordinate research, and (3) developing both national and international cooperative research ventures to help identify other key issues and encourage long-term commitment to an ongoing programme of cooperative research initiatives on arctic invertebrates. NONE of these objectives has been met, despite further exhortations by Danks (1992), Danks et al. (1994) and Ring (1994).

The halcyon days of Canadian arctic invertebrate biology was in the half-century