Wider aspects of a career in entomology. 1. Winter in Canada

Hugh V. Danks

This series of articles outlines some ancillary aspects of my entomological career, for the potential amusement of readers. It reports the sometimes unexpected challenges of working in new places and in the real world, an approach that serves also to expose some conclusions about research activities and some information about insects and their environments.

I arrived in Canada from England in early November 1968 as a postdoctoral fellow, to study ecological aspects of insect cold hardiness as part of a new program in Ottawa at the Entomology Research Institute of the Department of Agriculture (although this program was then supported for a relatively short period).

Severe winters, North American faunas, and studies of cold hardiness were all new to me. An initial orientation from the available entomological literature showed that there had been a focus on laboratory experiments to assess the physiological and biochemical adaptations to cold, whereas ecological work was very limited and most studies in nature consisted of informal explorations and anecdotal reports. The existing work nevertheless suggested that research might be particularly informative on species that survive these cold continental winters in the most severe habitats. Consequently, I began by trying to find specimens of species overwintering in extreme and variable habitats exposed above the protective cover of snow, especially under the loose bark of dead trees (Fig. 1). This habitat is occupied by adults of some very cold-hardy insects, including species of beetles and parasitic wasps as well as oecophorid moths, some of which are capable of movement even at very low temperatures.

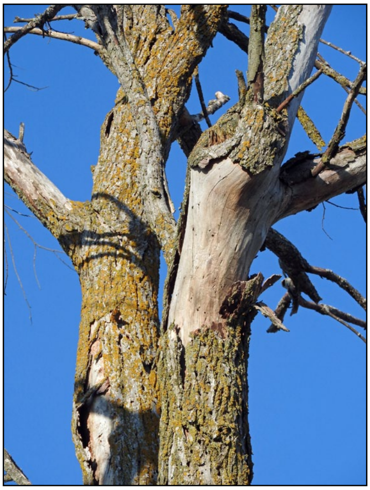

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Fig. 1. Loose bark above the snow on a dead tree, a preferred overwintering habitat of some particularly cold-hardy insects.

Starting my work in a new institution was interesting. For example, I discovered that many of the scientists insisted on being addressed by junior staff using their full titles, the system I thought that I had left behind in England. When I was dealing with one of the ladies in the typing pool, for example, I addressed her by her first name of Lynne, and invited her to use my first name in return instead of addressing me as “Dr Danks”. However, the system there was still so ingrained that henceforth she called me not “Hugh” but “Dr Hugh”.

Hugh Danks (hughdankss@yahoo.ca) retired in 2007 after many years as head of the Biological Survey of Canada. In that role, he helped to coordinate work on the composition and characteristics of the arthropod fauna of the country, and to summarize the results. In addition, his research studied cold-hardiness, diapause, and other adaptations to seasonality in northern regions.

The gentleman in charge of the institute stores ran the operation in the same manner as an army quartermaster, carefully protecting his storeroom and the products in it, and insisting that proper and methodical procedures be followed to obtain even the most minor items. This pattern of behaviour was somewhat discordant with mine as a new postdoctoral fellow anxious to obtain supplies as quickly as possible in order to begin my studies before too much of the winter had passed. One of my lists of requests included a hand tool with a sharp screw at the tip (sometimes referred to as a gimlet) that would be useful for exposing beetles and insect larvae in bark and dead wood. The "quartermaster" telephoned me to seek more details about this tool, and I explained that it resembled an awl with a screw at the end. When I later saw the purchase order, the item was listed as a "screw-all"!

Suitable dead trees were not especially common, so exploring the forest for hours on end to find them was an unusual experience in the cold; a British winter cardigan would by no means be sufficient! Without undue cost I acquired a large parka (in the days when heavy kapok was more prevalent than down or polyester fibre, for example), a wool tuque, and heavy mitts (again, before the days of warm but lighter materials). Even in these warm clothes, prolonged exposure to cold eventually reduced my body-core temperature, and after each lengthy foray it might take hours in a hot laboratory to warm back up. My tuque had ear flaps, held down by a tie under the chin, which kept my ears much warmer than in their absence but also delivered an unwanted cute appearance. The tuque also bore an apical tassel, which in due course started to shed lengths of green wool; these reminders of my early work in the winter could be found in obscure crannies throughout my accommodation for years afterwards. After coming very close to having frostbitten cheeks while sampling in the depth of winter at very low temperatures and in a brisk wind, I adopted a full face mask for fieldwork. This was a striking brown knitted covering likely to frighten passersby through its resemblance to a monkey.

Snow that has accumulated on the ground is frequently layered in Ottawa, sometimes packed by the wind, but most often because air masses that pass through the city at intervals during the winter differ widely in temperature. Therefore, intervals of freezing rain or warm sunshine between snowfalls may create a crust on top of the snow pack. Giant over-boots were sometimes useful in these circumstances as the snow built up during winter, because the likelihood of breaking though the surface crust was much lower than in a smaller boot. Eventually, however, snowshoes were necessary to avoid plunging down into thigh-deep snow, although some practice was required to discover an effective gait especially on some types of crusted snow coated with a layer of freezing rain (Fig. 2). In these conditions the snowshoes would break slightly though the crust, and then the leading edge would catch on the just-fractured crust during the next stride, making progress especially tiring and hard on muscles.

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Fig. 2. A coating of freezing rain on top of the snow pack, on a field near Ottawa.

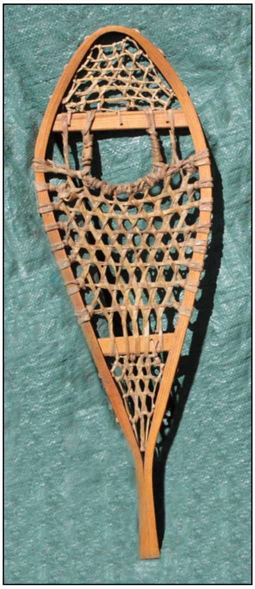

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Fig 3. A snowshoe of the traditional form, as used for the fieldwork mentioned here.

In those years, snowshoes had a hardwood frame laced with rawhide (Fig. 3), to which a simple toe strap was attached. During mild spells and in the spring, the webbing had an unfortunate tendency to turn gluey when wetted, even when regularly waxed, especially during the course of a long journey in poor conditions; at the same time, the wet snow tended to compact into ice under the front of the foot, reducing the efficiency of the stride. At first I used a broad style (as in the figure) that is best for deep, soft snow. I made a few unplanned snow angels while learning to use these snowshoes in more difficult situations, such as undergrowth and steep slopes. I later acquired narrow snowshoes, which are more easily manoeuvred and allow a much faster pace. Modern snowshoes are much easier to use: they consist of lighter and more durable materials, such as aluminum or carbon fibre and neoprene or other artificial fibres, and have a more complex and stable harness. Therefore, the old wooden snowshoes are now regarded as "antique", and many people use them for thematic decoration rather than for winter travel!

I also learned during snowshoeing to read the terrain and to stay off corridors and large clearings, a learning process accelerated by discovering a stream flowing underneath me as I broke through the overlying ice and snow. After that experience I assumed that Canadians already knew that running water limits the formation of ice and erodes the undersurface after it forms, only to discover later from the number of spring mishaps that many of them do not.

Another lesson I learned was that it is best to abandon hopeless causes in research, no matter their potential interest. I failed to find enough insects under bark to ensure that the habitat features selected by these species could be adequately assessed, and nor was there enough material to support properly designed experiments to test responses to cold. Even if samples of sufficient size could be generated by combining limited results from several successive seasons, this would not be appropriate for most purposes because of marked differences from year to year in the occurrence and variable timing of low temperatures, snowfall, sunshine, and other elements. Therefore, a new target for research was required, and I decided to study the cold hardiness of insects in small aquatic habitats. Not only should such habitats create great difficulties for insect survival because they are frozen in winter, but also material for potential experiments would generally be abundant there, including the larvae of chironomid midges and other insects.

The year-to-year variations in weather that would have hindered a project on species overwintering in scattered locations above the snow also hindered the alternative project on aquatic species. Weather patterns were exceptional that first winter. Sizeable falls of snow arrived weeks before the typical date, extending the period of seasonal snow cover. This pattern removed the possibility of examining most aquatic habitats while they were still unfrozen, easy to find, and more easily assessed for relevant features such as depth and permanence, even though some potentially suitable sites could be discovered by examining aerial photographs taken in summer (and that were available from the Geological Survey of Canada). The unusual weather that year reinforced the lesson that field research cannot always be completed under tight deadlines. In fact, most of those early years had greater snowfall than more recent seasons. The winter of 1970–1971 in particular was an exceptional one, bringing a record total snowfall to Ottawa of 441 cm, which then persisted for an unusually long 139 days. Piles of accumulated snow could not be cleared away fast enough by the municipality and rose in front of apartment buildings past the tops of the windows in lower units. After each heavy snowfall (for example, 20 or 30 cm in a single storm), minor roads in the city were often blocked by multiple cars (Fig. 4), stuck to varying degrees in the snowy and slippery conditions, and sometimes arrayed along the road at peculiar angles. In these conditions, only the centre of the road might be usable (compare Fig. 5a and Fig. 5b). For sampling insects, snowshoes were essential very early in the winter of 1970–1971.

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Fig 4. Cars, some spinning their tires, on a minor road in Ottawa during the snowy winter of 1970-1971.

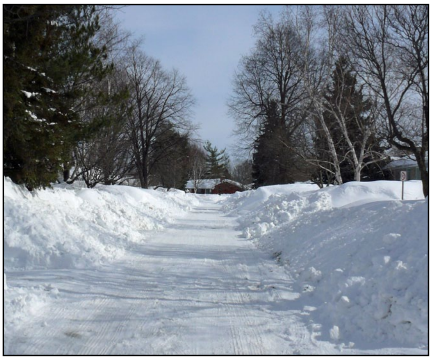

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Fig 5a. A suburban road in Ottawa only partly cleared after a heavy snowfall the previous day.

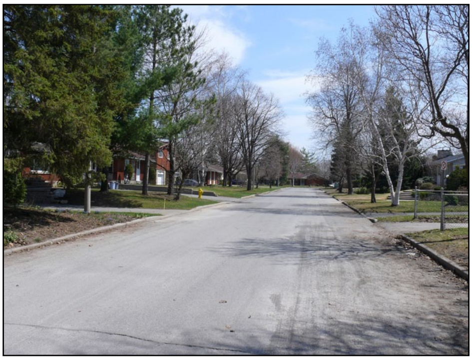

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Fig.5b. The same road in spring, showing its full width.

I undertook to drive in the snow as well as walk over it, but was surprised that despite the annual recurrence of winter, many people had not bothered to learn how to drive in these conditions. For example, on my way to work during the first winter I came across someone stuck in a parking lot, and unable to push out his vehicle unaided. I already knew that minimizing power to the wheels was the key to a successful extraction because it avoided digging them in deeper, but concluded that it would take a long time to free this particular individual when he declared, as we walked towards the car after my offer to assist: “No problem, my Pontiac has 325 horsepower”! He was indeed able to demonstrate that he could spin his wheels very easily to embed them even more deeply into the substantial slippery troughs he had created already.

My own car, bought with a postdoctoral stipend, was smaller and cheaper. I soon discovered that it was not well adapted to snowy winters when most local vehicles were heavy North American land barges with wheels of impressive diameter. After substantial falls of snow, these wheels were able to grip the road as they dug deep ruts whilst compacting or shaving off the intervening snow to the height of the chassis. As a result, my relatively small car often scrabbled on top of the base so produced because its smaller wheels gave insufficient purchase. Fortunately, I was able to borrow a large vehicle for fieldwork, thereby reducing the likelihood of becoming stuck in the snow during sampling expeditions, even though on country roads the front-heavy rear-wheel-drive cars then in vogue had a propensity for rear-wheel skids and fishtailing.

In any event, having come to terms with winter conditions, I could begin in earnest to study the cold hardiness of aquatic insects, as introduced in the next article in this series.