

Trips, traps, triumphs and tribulations: A journey from childhood dreams to a dream-career in entomology

Modified from the Heritage Lecture presented at the Joint Annual Meeting of the Entomological Societies of Canada and British Columbia, Vancouver, 2 November 2010

When first asked to deliver the 2010 Heritage Lecture (Fig. 1), I immediately started thinking about what the word “heritage” actually means. I turned to the authoritative Wikipedia for the answer, and found the following (<http://en.wikipedia.org/wiki/Heritage>):

“Heritage” refers to something inherited from one’s ancestors. It has several different senses, including:

Natural heritage, a group’s inheritance of fauna and flora, geology, landscape and landforms, and other natural resources

Cultural heritage, the legacy of physical artifacts and intangible attributes of a group or society: man-made heritage

In entomology, our heritage combines these two, but it is really cultural heritage that makes humans what they are, in that we can pass accumulated knowledge down from generation to generation. Knowledge isn’t acquired by osmosis, however. All of us have had people in our lives who have guided and inspired us, our mentors. Returning to the web, I found the following:

Mentor - A wise and trusted counselor or teacher

Mentorship - “... informal transmission of knowledge... relevant to work, career, or professional development

Mentoring entails informal communication... during a sustained period of time, between ... the mentor and ...the protégé.” (Modified from Bozeman and Feeny 2007)

This paper is not meant to focus on me, but rather to recognize the importance of heritage and mentorship. Specifically, I want to recognize the importance of the people who created knowledge from which I have benefitted, some long before my time, as well as those who directly inspired and mentored me throughout my life. I also wanted to link my Swedish heritage to my career by highlighting the connection between Swedish entomologists and entomology in Canada. My journey from a somewhat geeky child to a decidedly geeky adult merely serves as the common thread.

I grew up in Sweden, a country where even non-biologists tend to be naturalists. From a very early age, it was clear that the parts of nature I was interested in were usually hiding under rocks



Fig. 1. Staffan presenting the Heritage Lecture.

Dezene Huber

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or pieces of bark – many photographs of me as a child show me on all fours, or with a collecting jar in my hand, regardless of the occasion (Fig. 2). I was fortunate to have parents that both tolerated and encouraged my interests. My father, Rune, had little formal education (Grade 6), but all my friends thought he knew everything. He had an unquenchable thirst for knowledge, and read everything that he could get his hands on. He also had a love for everything British, which fostered in me an interest in the English language. My father learned English by listening to BBC radio and reading English books, where he wrote words in the margin translated with the aid of an English-Swedish dictionary. Who knows where I'd be if I had inherited his drive! My mother was equally important; she tolerated my collections of everything from spiders to lizards (but drew the line at snakes). At one point, I cleaned out the basement of the apartment building where we lived of female *Tegenaria domestica* (Clerck) - they all lived out their lives in glass jars that I kept in my bedroom closet!



Rune Lindgren

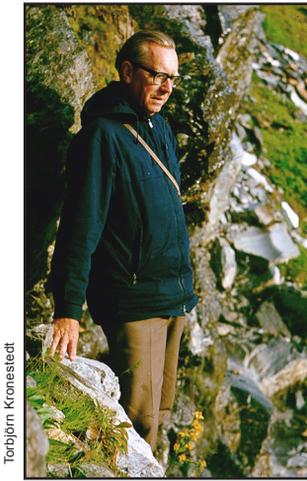
Fig. 2. Staffan, about 1962, with the mandatory collecting jar and dressed to kill.

When we study our favourite insects, it is easy to forget the painstaking work that was done to enable us to identify and categorize them with relative ease. Sweden has been the home of a large number of such people (Table 1), none more noteworthy than Carolus Linnaeus, of course. In spite of many changes, we still use the binomial nomenclature that he devised, and some early Latin names persist intact to this day. For example, *Araneus angulatus* Clerck 1757, is the oldest known arthropod species named by one of Linnaeus' students, and it is still valid today (Dal 1974). Next time you use a Latin name and its authority, think about the significance of that person's contribution, because it represents considerable effort, which represents an extremely valuable heritage! We should protect and promote classical taxonomy, because without it the diversity of the insect world would be not just a wilderness, but an impenetrable jungle!

Linnaeus had many students, but one of them is of particular interest in the context of this essay as he hails from my hometown of Piteå, went abroad at a young age, and ended up in an English-speaking country, much like myself. Daniel Solander was quite influential during his

Table 1. Some significant Swedish entomologists from the 18th and 19th Century (Dal 1974). Many were students of Carolus Linnaeus.

Name	Years	Specialty
Carl DeGeer	1720-1778	Various
Carl Clerck	1709-1765	Araneae, Lepidoptera
Gustaf von Paykull	1757 -1826	Coleoptera
Leonard Gyllenhaal	1752 - 1840	Coleoptera
Carl Fredrik Fallén	1764-1830	Diptera, Hemiptera
Carl Johan Schönherr	1772 -1848	Coleoptera
Johan Wilhelm Zetterstedt	1785-1874	Diptera
Carl Henrik Boheman	1796 -1868	Coleoptera
Anders Gustaf Dahlbom	1806-1859	Hymenoptera
Carl Stål	1833-1878	Hemiptera
Carl Gustaf Thomson	1824-1899	Coleoptera, Hymenoptera



Torbjörn Kronestedt

Fig. 3. Åke Holm in the field, Kärkevagne, Sweden, 1969.

life, but he is perhaps the least known of Linnaeus' students since he published precious little of his discoveries, in part because he died at a relatively young age. He was the biologist on Captain Cook's voyage on the "Endeavour", and would have been the first biologist to set foot on New Zealand and Australia (as a result, he is rather well known there). He did collect insects, but few formal descriptions were completed, perhaps in part because of the ease of preservation of insects for later examination, and the presence in London of J.C. Fabricius, a Danish student of Linnaeus (Wheeler 1983) (and as such I'll claim him as an honorary Swedish entomologist!). A limited number of specimens collected by Solander during Cook's first voyage are apparently at the British Museum, and at the Hunterian Museum of the University of Glasgow, and it is possible that additional specimens are hidden in Fabricius' collections (Wheeler 1983).

As a child, I was obviously blissfully unaware of these people, and I was not much wiser at the early stages of my entomological career either, if truth be told. I was very much

aware of another prominent Swedish entomologist whose legacy can be found in a huge body of literature on the Carabidae of Canada – Carl H. Lindroth (Lindroth 1961-69). At first, I didn't know him as an entomologist, however, but as a member of a panel of experts on a popular Swedish television show, "Fråga Lund" (Ask Lund), where Lund refers to Lund University. His importance to Canadian entomology was a pleasant discovery when I started looking at ground beetles shortly after accepting my current position at UNBC. I never had the pleasure to meet Carl Lindroth, but his brother Arne was the professor, and his nephew Svante a graduate student (graduate students did most of the undergraduate teaching in those days) at the Department of Ecological Zoology, Umeå University, so I had some tangential connection, if nothing else.

To a large extent, we learn how to behave from those we interact with and look up to – an important form of mentorship for young people in particular. Carl Lindroth's wit and pleasant personality on the television show impressed me, and probably contributed to my view of professors in general (professors were pretty much demi-Gods to me at that age). Several other academics also influenced my perception of scientists, but none was more important than Åke Holm, an arachnologist in the Department of Entomology, Uppsala University, specializing in the family Linyphiidae (Kronstedt 1991) (Fig. 3). As a Grade 6 student, I wrote to him after reading a newspaper article about his work. His reply was prompt and very encouraging, and we corresponded off and on for many years after this. I did meet him when I studied in Uppsala many years later. In retrospect, it would be interesting to know what he thought of the mangled spider specimens contained in match boxes he received through the mail from me. Be that as it may, his kindness and encouragement made a huge impression on me, and I have tried to emulate him throughout my career by always responding when I get inquiries from youth.

Another important influence in my life was a year spent as an exchange student in the United States. Along with seven other students from six different countries, I studied at a small high school in south central Michigan. Apart from giving me the confidence to later apply to university in Canada, it taught me a lot about people from different cultures. I have been a strong proponent of exchange ever since, as I believe that if we understand people from other cultures, we are less likely to judge or dislike them.

I was lucky in that I knew I wanted to study and do research. I grew up in a forestry-dependent community, so I even knew that I wanted to be a forest entomologist early on (at least after I had passed every biology student's seemingly mandatory period of wanting to become a marine biologist). I pursued every opportunity to learn about arthropods, including a stint identifying spiders for a PhD student, two entomology courses at Uppsala University, and a summer job surveying aquatic insects around Umeå.

In terms of formal education, I studied entomology under two professors in Sweden, Bertil Kullenberg, Professor of Entomology, Uppsala University, and Bertil Lekander, Professor of Forest Entomology, Royal College of Forestry, Stockholm. (Incidentally, Carl Lindroth was the author of the textbook we used at Uppsala University (Lindroth 1968)). I didn't realize it at the time, but the respective expertise of these mentors would merge to become my own area of focus, perhaps showing how we are influenced by those who teach us. Bertil Kullenberg was a pioneer in chemical ecology and plant-insect interactions (see Vereecken et al 2009). He also epitomized the public's stereotype of an entomology professor – he seemed to have boundless energy and incredible passion for his research – I remember vividly a short film showing him bouncing through a meadow with an insect net, presumably in pursuit of some bee. Although he did only a limited amount of the actual face-to-face lecturing, his direction was particularly evident in the advanced course I enrolled in, and it made a strong impression. Bertil Lekander was an expert in bark beetles, specifically their larval taxonomy (Lekander 1968), and kindly allowed me to enroll as a special interest student in the forest entomology courses, reinforcing my desire to work with forest insects.

After finishing my undergraduate education I was at a crossroads of sorts. I had several options, but opted for pursuing a PhD in endocrinological research working on testosterone production in rats, largely because funding was in place. I learned a little bit about doing research, but more importantly I learned the importance of following your passion – I may admire rats, but I am far from passionate about them – in fact I don't really like them. I returned to pursue my passion for entomology, and that decision has served me well.

Having failed miserably as a lab rat scientist, I once again found myself at a crossroads. The Master of Pest Management program at Simon Fraser University was brought to my attention when I inquired about opportunities to work for the Centre for Overseas Pest Control in the UK. As a non-British subject, I was ineligible, but with their discouraging reply came a pamphlet about the MPM program. To make a long story short, I found myself on a flight to Vancouver about a year later, with funding from the Sweden-America Foundation. My intent was to return to Sweden, but that's when I met John Borden, who was to become supervisor for both my graduate degrees. Only weeks after landing in Vancouver, and still rather homesick, John gave me an offer I couldn't refuse. After a very long time of waffling, I finally agreed to stay on for a PhD, and the rest is history, as they say. John was an incredible mentor – after bucket-loads of red ink, he even managed to turn me into a decent writer! The part I remember the most, however, was that no matter how much I had bungled something, John always had something positive to say just before I left his office. His success as a mentor is evident in the incredible impact he has had on forest entomology in British Columbia – his legacy will no doubt be the heritage that benefits generations of foresters and forest entomologists to come. I have tried to emulate John in everything that I do as a university professor, but I fall woefully short when it comes to passion, energy and ability. To me, he is the energizer bunny of entomology, and he still wears me out with his boundless enthusiasm for every new project. Nevertheless, it was a particularly rewarding moment when I, Dezene Huber and Lisa Poirier, also benefactors of his mentoring, successfully nominated John for an Honorary Doctorate at UNBC (Fig. 4).

John in turn had been mentored by another pioneer of chemical ecology, David L. Wood,

professor at the University of California, Berkeley. Along with Robert M. “Milt” Silverstein, a chemistry professor at The State University of New York, Syracuse, he laid the foundation for the research I did for my PhD. I first met David at some point during the early 1980s, and although he never directly took part in any research I did, his influence is undeniable and profound. David is kind, accommodating, and willingly shares his knowledge with students and colleagues. I never really fully understood how important he has been until I was at a very well attended symposium in his honour at the Entomological Society of America’s annual meeting in San Diego last year. When David and Milt Silverstein started their collaboration, multi-authored publications were viewed as inferior and therefore undesirable, particularly for someone pursuing tenure at a major university. David ignored that standard, and now multi-authored papers are the norm. The

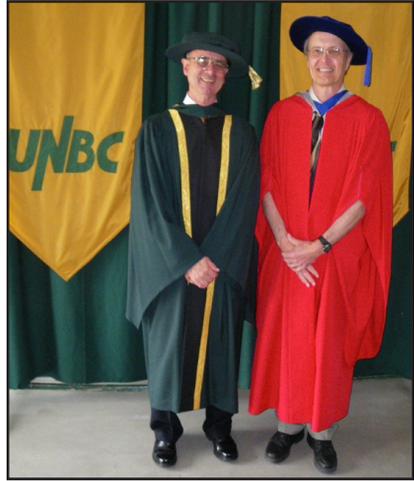


Fig. 4. John Borden and Staffan at the UNBC convocation, May 29, 2009.

Alex Michalos

individuals that are prepared to stick their necks out are the ones who pave the way for the rest of us – David has certainly been one of those individuals.

Perhaps most people know me as the inventor of the “Lindgren funnel trap” (Lindgren 1983) (Fig. 5). When I started my PhD, bark beetle pheromone research was done with sticky traps - horrible contraptions that required the use of nasty solvents and left specimens in a less than pristine condition. The invention of the multiple funnel trap came about from my dislike of anything sticky, laziness, and simple observation of beetle behavior. Necessity *is* the mother of invention! In this context I must acknowledge Michael G. Banfield, without whom the trap would probably not have been commercialized. (Mike was also instrumental in facilitating my immigration to Canada, again demonstrating the importance of networking). I also came up with a small bioassay trap for grain beetles made of plastic weighing boats (Lindgren et al. 1985), and since then I have also introduced, or helped design, other traps. Perhaps my affinity for



Leslie Chong

Fig. 5. Staffan with prototype III of the Lindgren funnel trap, 1981.

traps is in my genes, as Swedes figure prominently in the insect collecting-design world. For example, the Malaise trap is named for René Malaise, an entomologist and explorer of French descent but born and raised in Stockholm – his immigrant father was the chef at an up-scale restaurant (Sjöberg 2004). Albert Tullgren improved the extraction of litter samples by adding the heat source, meaning that most people use the Tullgren funnel, rather than the Berlese funnel (http://en.wikipedia.org/wiki/Tullgren_funnel). More recently, my colleague and friend Göran Nordlander designed a modified pitfall trap, the Nordlander pitfall trap, which I adopted and use on a regular basis after working with it in Sweden (Nordlander 1987, Lemieux and Lindgren 1996). Niklas Björklund, a former student of Nordlander’s, solved a long-standing problem while a post-doctoral fellow in my lab by designing the Björklund trunk trap (Björklund 2009), which has enabled us to effectively live-trap *Hylobius warreni* Wood for use in behavioural studies.

After my PhD, I spent some time as a post-doctoral fellow in John McLean's lab at UBC. John epitomizes a glass-half-full attitude, and has been extremely supportive, and a very positive influence throughout my career. My time in his lab also provided the bridging time that enabled Phero Tech Inc. (then PMG/Stratford) to employ me. I spent 10 years with Phero Tech before leaving for my current position, and enjoyed the opportunity to work with university, government and industrial collaborators – all extremely valuable experiences. An industrial post-doctoral fellowship from the Science Council of British Columbia (SCBC) funded the first few years of my time with Phero Tech, and that brings me to the importance of funding. When I started my PhD, the SCBC was ramping up, and thanks to John Borden I was first in line for a so-called GREAT Award (Graduate Research in Engineering and Technology) (the SCBC folks loved acronyms). Thanks to John I got to keep it as well, as SCBC suddenly realized that I was an alien and briefly contemplated reversing the decision! I enjoyed a very good and beneficial relationship with SCBC, and became something of a poster child for them after utilizing virtually all of their various funding sources – GREAT Award, industrial post-doc, and research grants, both for myself and for post-docs and students. John Borden taught me a fair bit about applying for grants, and my time in industry allowed me to hone those skills over the years. Money isn't everything, but it sure helps! Nevertheless, the importance of mentorship cannot be understated in this context!

In 1994 the new campus of the University of Northern British Columbia opened its doors, and I was fortunate enough to be there as a charter faculty member. The experience was truly exhilarating – we had nothing, not even chalk or blackboards (this is the truth – the administrators figured we would be more technologically advanced than that!). Working with a team of wonderful colleagues, we quickly turned the fledgling university into a fairly respected research institution. I was the lone entomologist to begin with, but in 2001 Lisa Poirier joined UNBC, and in 2005, entomology at UNBC got an enormous boost courtesy of the mountain pine beetle. We were joined by Dezene Huber as a Canada Research Chair and Brian Aukema as a Canadian



Fig. 6. Members of the UNBC Forest Insect Research Group at JAM2010. Back row, left to right: Kendra Schotzko, Caitlin Pitt, Staffan Lindgren, Jordie Fraser, Brian Aukema (now at the University of Minnesota), Dezene Huber. Front row: Kishan Sambaraju, Lisa Poirier, Kathryn Berry, Erin Clark, Celia Boone. Tamara Richardson is missing from the photograph.

Forest Service research scientist. All of a sudden UNBC's Forest Insect Research Group (FIRG) (Fig. 6) was one of the best forest entomology research groups in North America. Being surrounded by these young, bright scientists and their students has been extremely rewarding for me. It didn't happen completely by accident – I worked actively to attract all three to UNBC and was fortunate enough to succeed. You have to be lucky, but to a considerable extent you make your own luck!

The scientists I have mentioned above have all left considerable legacies – a valuable heritage for us all. Ideally, I guess those of us who engage in research would all like to leave something significant behind. Apart from the Lindgren funnel trap and having a rove beetle named after me (*Metocalea lindgreni* Klimaszewski) (Klimaszewski and Pelletier 2004), I don't know that my legacy will be particularly noteworthy. After the delivery of my lecture, one of my former graduate students, Greg Smith, reminded me that those I have supervised are also part of my legacy. He reminded me that at the same time as I

emphasized the importance of mentorship to me, I forgot to recognize the importance of my role as a mentor to my students. Greg is right, of course, and it serves as yet another reminder of the importance of mentorship.

I have been fortunate to work in a discipline where egos are generally checked at the door. Perhaps it is the baffling diversity of form and function that we encounter that tend to make us humble, at least by scientist standards. Numerous of my entomology colleagues – too many to name here - have become like an extended family, and my graduate students are almost like adopted children. I do have to specifically mention the role of my immediate family for the sacrifices and support they made on this journey. My wife enthusiastically supported a 6-month sabbatical in Sweden and our move to Prince George, and looked after pretty much everything for the first 5 years or so while I pursued tenure and promotion. Without her support it would not have been possible for me to succeed, despite the rich heritage and excellent mentorship I have enjoyed. A health-related setback in 2007 gave me the most important lesson of all: entomology and professional success are important, but in the end good health, friendship, and family are most important.

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