THE CANADIAN HERPETOLOGIST/ L'HERPÉTOLOGISTE CANADIENNE

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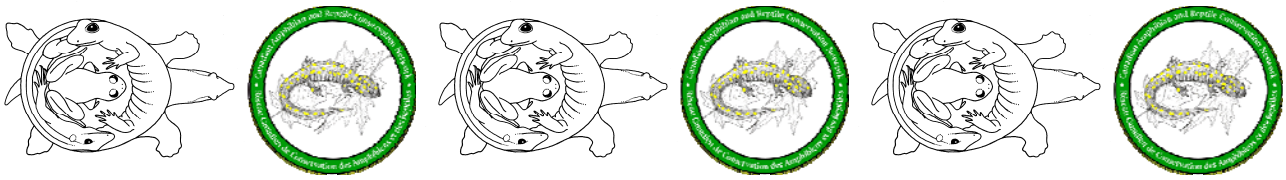

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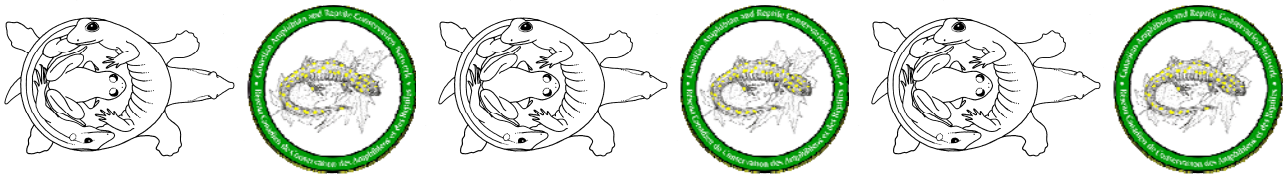
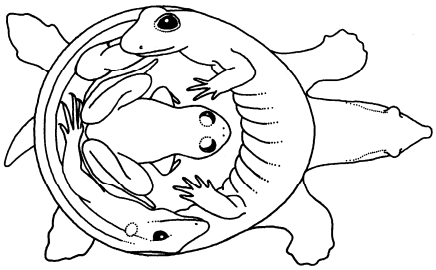
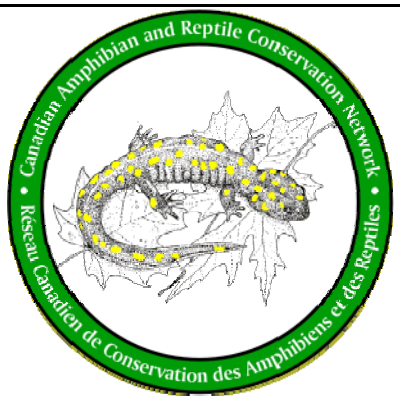




Canadian Association of Herpetologists/ Association Canadienne des Herpétologistes

THE CANADIAN HERPETOLOGIST (TCH) is a publication produced twice each year by the Canadian Association of Herpetologists and the Canadian Amphibian and Reptile Conservation Network. Correspondence should be addressed to the Editors (Litzgus (CAH) and Ashpole (CARCNet)).
Opinions expressed by authors contributing to The Canadian Herpetologist are not necessarily shared by the publication, its editors, or the two societies.

L'HERPÉTOLOGISTE CANADIENNE (LHC) est une publication biannuelle publiée par l'Association Canadienne des Herpétologistes et le Réseau Canadien de Conservation des Amphibiens et des Reptiles. Faites parvenir votre correspondance aux Éditeurs (Litzgus (ACH) et Ashpole (RÉCCAR)).
Les opinions exprimées par les auteurs qui collaborent au L'Herpétologiste Canadienne ne sont pas nécessairement partagées par la publication, ses éditeurs, ou les deux sociétés.



Amphibian and Reptile Conservation Network/ Réseau Canadien de Conservation des Amphibiens et des Reptiles

Instructions for Authors

We will print articles and news of interest to herpetologists in Canada. These may be in the form of short announcements or letters, or may be written as longer articles. We especially request news of your lab and current research activities, lists of your latest publications (up to one year old), travel plans, new students, grants, awards, fellowships, new books or book reviews, trivia or concerns. Please send your submissions as MS Word documents as email attachments to the Editors (Litzgus or Ashpole).

EDITORIAL NOTES

Jacqueline Litzgus
Laurentian University

Welcome to Spring… which has been a little late this year in the central-east, especially compared to last year. The turtles in Algonquin Park are not nesting yet, but here in Sudbury the Peepers, Wood Frogs and American Toads have been singing their little hearts out, with an occasional note thrown out by a Grey Treefrog. Teaching is done, students are out in the field, hip-deep in swamps and such… this is such a great time of year, full of potential!

Spring Peeper calling in Algonquin Park.
Photo by Matt Keevil, Laurentian University.

Also, welcome to the inaugural issue of the joint publication of the Canadian Amphibian and Reptile Conservation Network and the Canadian Association of Herpetologists, THE CANADIAN HERPETOLOGIST (TCH)! We polled the members of the two societies for suggested names, and then asked the membership to vote for their favourite name out of a short-list of five potential names. And here you have it! There are still a few kinks to work out, like whether we need a new ISSN (each of the former newsletters had its own), and whether we want to include some new sections and features, but we will adapt as we progress. I welcome any suggestions you might have.

This first issue is full of great stuff. In fact, we have a third welcome to mention – welcome to our new Book Review Editor, Joshua Amiel from the University of Sydney, working on his PhD with Rick Shine. Joshua picks up the reins where Richard Wassersug left off (big thanks to Richard for turning the Book Review section of the former CAH BULLETIN into an informative and regular feature). Joshua is adding his own original twist; please see inside for delicious details. In this issue you will also find news about upcoming meetings, a contribution from Fred Schueler about his birder-turned-herper career, a field report about Steve Hecnar's sabbatical in the UK, plus some more info about rattlesnake bites in Ontario submitted by James Mahaffy from Dordt College in Iowa, to add to Wayne Weller's previous contribution to the last issue of the CAH BULLETIN. As usual, we also feature great herp images and highlight recent student theses and publications from our colleagues. Enjoy!

MEETINGS

TCH will post announcements about upcoming herpetological meetings and provide reports of recently-held meetings.

JMIH 2011

The 2011 Joint Meeting of Ichthyologists and Herpetologists (JMIH) will take place in Minneapolis, Minnesota at the Hilton hotel, July 6-11. The 2011 JMIH includes the 27th annual meeting of the American Elasmobranch Society, the 54th annual meeting of the Society for the Study of Amphibians and Reptiles, the 69th annual meeting of the Herpetologists' League, and the 91st annual meeting of the American Society of Ichthyologists and Herpetologists. This meeting is very student-friendly, with several special social events organized specifically for students. For more information, please see the website: http://www.dce.k-state.edu/conf/jointmeeting/

Canadian Herpetology Meetings 2011

The 2011 Annual Meetings of the Canadian Amphibian and Reptile Conservation Network / Réseau Canadien de Conservation des Amphibiens et des Reptiles (CARCNET / RÉCCAR) and the Canadian Association of Herpetologists (CAH) will be held at Lakehead University, Thunder Bay, Ontario, Friday September 9 - Monday September 12, 2011.
Early Registration and Abstract deadline: 25 July, 2011.
See www.carcnet.ca for more details.

FEATURE ARTICLE

Herpetology, Thirty Years Later

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When I was a graduate student, 40 years ago, in the era when "Ichthyology & Herpetology" at the Royal Ontario Museum (ROM) was trying as hard as possible to discount the second discipline in its title, Ed Crossman advised me that "There's one professional herpetologist in eastern Canada, and that's plenty."

I'm told that when the ROM repented of this omission, and I offered "to exchange salamanders on the front lawn for the Satanic Mills of Toronto" as a curator of herpetology there, one reason that my application wasn't successful was the frugality of my proposed research programme: a comprehensive mileage, calipers, and computer analysis of geographic variation in the Ontario herpetofauna. Whether this would have resulted in a precocious invention of phylogeography and landscape ecology, or would simply have demonstrated that I would have been too shy to carry out the administrative responsibilities of employment, isn't something that can be studied now, but it did set the pattern for subsequent unemployability and under-funded research and collecting, always looking forward to a utopian era when ecological change, and the evolutionary response to such change, would receive the attention it deserved.

While I was an undergraduate curatorial assistant in the Cornell bird collection, I put away the last returns of the Orioles (*Icterus*) that Jim Rising had borrowed for his 20-years-later study of hybridization across Kansas (Rising, 1970). The only research specimens deposited in the collections while I was there were Buntings (*Passerina*) from a multi-disciplinary expedition across their hybrid zone (Emlen et al., 1975), so I took the opportunity of following Jim to the University of Toronto as his first graduate student. His academic lineage ran back to Joseph Grinnell, and this was just after his thesis supervisor had completed the blockbuster demonstration of rapid evolution in an introduced Bird (Johnston and Selander, 1964), completing the "experiment in nature" that Grinnell (1919) had set up, by publishing an hypothesis and depositing specimens in a museum collection, 50 years before.

This was the era when the grossly over-lumped *Rana pipiens* of the 1940s was being broken up into species with different calls and morphology (Pace, 1974), and I and some other Cornell undergrads had worked (rather haplessly) on aspects of Leopard Frog variation with Bill Brown, who was worrying that he had mentioned the geographic distribution of Leopard Frog male oviducts in his centrifugal speciation paper (Brown, 1957). As Jim set out to study geographic variation of native Savannah Sparrows (*Passerculus*) across North America, I went with him and applied the "Kansas school" method of skin-and-skeleton preparation, with its resulting plethora of repeatable measurements, to Leopard Frogs. After some initial confusion, I concluded that all northern Leopard Frogs were one species, but winkling out the interactions of history (= haplotypes, though the concept didn't exist then) and of adaptation to habitat, proved as interesting to me as a species-level difference would have been (Schueler, 1982).

In those days, interest in herpetology was a novelty among northern naturalists, who were predominantly birders, though herps were more conspicuous than they are today, when so many have declined to SAR status. Finding the National Museum of Natural Sciences (NMNS) in its florescent period of exile from a central building, with a "Herpetology Section whose collections... emphasis[ed]... geographic and life history variation of widespread Canadian species" (Cook, 1984; p. 197), my switch from birds to frogs was reinforced by the scientific grandeur of such a project of continent-wide documentation. It also seemed that herps were under-studied, and that the neglect of herps was especially great in the Boreal north; this appealed to me, as an expat Yankee, more than the southern fringe of spillover diversity that intrigued native-born Canadians.

The NMNS also contained Aleta Karstad, who had grown up in Georgia, where her father had done his Ph.D. research, so the Carolinean fringes of southern diversity also didn't especially impress her. She'd bonded with the Shield as a girl while catching Pike (*Esox lucius*) on chunks of hotdogs in ditches along the infant TransCanada Highway, just as I'd bonded to it in a cloud of Dragonflies somewheres west of Wabigoon in 1970, so when we bonded with each other in 1973, there wasn't much doubt about which country we'd be affiliated with.

Finding the NMNS under an administration that didn't seem to know, in the opinion of its curators, what the mission of a national museum should be, Aleta and I devoted ourselves to the national museum Canada required, despite the deviations from this mission that the actual museum endured. Our assumption, in trying to be the "Joe & Jane Average" that Canada needed, is that basic natural history is the ordinary activity of Human Persons living among kindred species, and that understanding "descent with modification" elicits from the observer a radically equal interest in all species of living beings.

We accordingly tried to set our sights on species and phenomena other than those that everyone else was observing. These were the phenomena that were the most obvious, subtending, as we came to say, the greatest fraction of the observer's visual field, or, for seasons where the phenomena are out of sight (as herps so often are), making up the biggest slice of the pie chart of their annual cycle. This idea of conspicuous but neglected species led us from the then-neglected herps into the pursuit of many honorary herps, including Crayfish, invasive roadside plants, Unionid mussels, and terrestrial Gastropods (phone 1-800-442-2342 for your free copy of Grimm et al., 2009). We were thus led into evangelism for species-level recognition of "macro" invertebrates, autumnal and winter herpetology, road ecology, and a "culture of precise geo-referencing of ordinary events" with field notes that try to combine Baconian records of noticed events with a Grinnellian attempt to anticipate hypotheses about future ecological and evolutionary change.

Our first discovery, once my postdoc at the NMNS had run its course, was that if there was funding for independent basic research, such as the Canada Council provides for independent artists, and NSERC provides for university employables, we couldn't find it, and nobody we asked could tell us where to look for it. The NMNS provided funding for field work, but not for in-house research, so for the one project that I adequately finished as I hung around the museum after the postdoc (Schueler, 1984), I was paid for nine days work on what proved to be a three-month labour of love, made possible by nearby in-laws on whose basement couch I could crash after spending the night on the computer (which was used by staff during the day). This was our first post-graduation instance of the sickening plunge into debt that has since accompanied every attempt to properly finish anything.

Through the 1980s, with such help as the Herpetology Section could provide, we surveyed the objects of our interest across Canada as we wrote, without always successfully publishing, popular natural history books (Karstad, 1979, 1985; Wood and Karstad, 1990). Formal support for our research evidently not being available, we sought to lay down patterns of specimens which would allow the study of ecological change in a future utopian era when ecological change would receive the attention it deserved. The Ontario Herpetofaunal Summary gave us the opportunity to also lay down such hypotheses in patterns of observations (see Schueler, 2001).

The mission of the next-to-last of these trans-Canada expeditions was to document the human impacts on the ecology of ecosystems, for the as-yet unpublished manuscript *"Fragile Inheritance, a painter's ecology of glaciated North America,"* in which we'd twisted a publisher's interest in endangered species into endangered habitats, on the grounds that the remains of the modified habitats were much easier to observe than the last few survivors of a wrecked population.

As we set off on the last of these trips, some of the projects of observation I'd been carrying out had more than a decade of data behind them, and I published an account of these (Schueler, 1988; under the editorially imposed, and perhaps unhelpful, title *Fred Schueler Cleans House*) in the flawed anticipation that notice of the availability of a background of historical data would make further work on these problems attractive to graduate students. Most of these projects now have a further two decades of accumulated data.

When we returned home in 1989 (finding all our fenceable effects stolen by rogue tenants), we plunged into a herpetological survey of the outer Bruce Peninsula that was diversely impeded by its sponsors. This was followed by a series of attempts to rouse local interest in natural history (The Biological Checklist of the Kemptville Creek Drainage Basin, Eastern Ontario Biodiversity Museum, Limerick Forest Advisory Committee, and others), each of which failed or withered in one way or another. We've wound up as the Bishops Mills Natural History Centre (BMNHC), operating as a "mom & pop" research institute, with a large building that's full of specimens and papers, but is unsupported by any business plan.

In September, 2001, Eric Hoffman came to the Canadian Museum of Nature (CMN) to sample DNA from the dried Leopard Frog skins that I had collected for my thesis. Eric's Ph.D. project did with DNA what I'd done with multivariate morphometrics, and snips from my skins from Canada and the northeastern US provided the yin to the yang of his samples from the montane- and mid-west of the US (Hoffman and Blouin, 2004). Eric and I also collected samples at some of the sites where I'd sampled in the 1970s to see how much genetic drift and colour change there had been, and to allow neutral-allele-based calculation of effective population sizes (Hoffman et al., 2004). It was at this point that Aleta and I realized that the future had arrived: 30 years of tumultuous environmental change was enough justification for us to go back to the places we'd visited in the past, and to leave a clear account of what we saw as change and stability, rather than waiting for future generations to puzzle over our accounts of location and conditions, or to reconstruct our hypotheses from the specimens we'd collected.

Since 2001 we've therefore chanted the mantra *"Thirty Years Later"* (30YL) and have tried to revisit as many places as possible. We've had museum (ROM, CMN) collaboration for assembling specimen records, and we've worked on embedding them in the uniform format of our general natural history database, increasing the precision with which our early field notes and catalogues are geo-referenced, referencing these co-ordinates and the field notes to the curatorial data for specimens held by the museums, revisiting sites, and comparing what we're able to find there now with what we found then.

Through all of this, we've been remote from the academic herpetology that's grown up since the 1970s, and that's astonishingly documented by whats-his-name (Anthony 2008), and with the exception of the South Nation Conservation Authority, we've never managed to work closely with any official agencies. Our intellectual community was broken up when the CMN decided, in the early 1990s, that herpetology (along with all other taxa the public would recognize as "animals") was redundant to Canada's interests, and it turns out that Bishops Mills is just far enough out to make it impractical to drive into Ottawa for lectures and seminars, but not so far that one doesn't feel guilty about not attending them. We've tried to work with local conservation enterprises, but they've all wavered or withered in one way or another, and the publicity-rich national enterprises don't seem interested in the kind of citizen-initiated scientific enquiry our utopian notions suggest (Schueler, in press). So our career path, although punctuated by published books, co-authored articles, and

accumulated data that many have found useful, has been marked by a failure to find any way to support ourselves, failed institutions and institutional relationships, insufficiently maintained buildings, and inadequately curated collections...

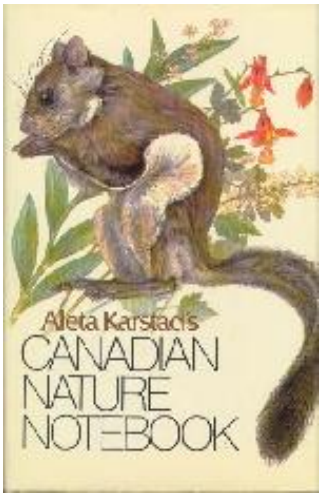
Among organizations, DAPCAN and then CARCNET have been closest to our hearts, with their understanding that in an era of ecological disaster, one studies conspicuous organisms in the hope that understanding will lead to better human co-existence with beloved other lineages, and that it is humanity's duty to take action to help these lineages remain, as much as possible, in their biogeographical context, and free to evolve and disperse. We've tried to attend all DAPCAN/CARCNET meetings, though distance, shyness, and lack of funds have produced rather erratic actual attendance.

CARCNET has, in return, supported our Chorus Frog revisits in Ontario. Our courtship display to each other had been the mapping of the distribution of Chorus Frogs in New York State (Gibbs et al., 2005), and the collapse of this formerly ubiquitous "species" to "Threatened" status, and its partition along morphologically cryptic genetic lines (Schueler, 1999; Picard et al., 2006; Lemmon et al., 2007), is our most spectacular example of the importance of monitoring abundant species and commonplace phenomena so that we can know when they change.

In the spring of 2009, we sought to renew our relationship with the CMN, and the museum's president, Joanne Dicosimo, visited the BMNHC and chose to make a trans-Canada 30YL expedition the museum's project for the 2010 International Year of Biodiversity. The CMN declined to be announced by us as the lead institution promoting long term natural history monitoring in Canada, and also required a not-for-profit organization to launder donated funds for the expedition into charitable receipts, so we badgered neighbours into nucleating the organization Fragile Inheritance (FI) to either just support us in the 30YL, or to become a national NGO devoted to understanding ecological change and preserving the diverse data that document ecological conditions.

Our plans for the expedition now stand at surveys and revisits to sites in Ontario in the spring and summer of 2010, the Maritimes in the later summer, the CARCNET meetings wherever they're to be, and then the winter in eastern Ontario, heading west in the spring of 2011 across Ontario, the prairies, and British Columbia, so that if all goes well we'll be in the west for the 2011 CARCNET meetings. We're waiting for suggestions from others about places to revisit to document persisting or changed herpetological situations.

The 30YL later trips, and the attempt to launch FI nationally, will be our last and biggest public project, an attempt to find and assemble other "Joe & Jane Averages" to care about monitoring and understanding long term ecological change in Canada. Herpetologists, perhaps because they have fewer species to worry about than biologists in other disciplines (or maybe because of the contrast in lifespan between Frogs and Salamanders and between Turtles and Snakes, or maybe because herpetologists are more head-strong or fond of beer), are characteristically farther-sighted than other people, so we hope to find co-visionaries among the members of CARCNET.



If Fragile Inheritance (FI) succeeds, Canada will have an NGO devoted to understanding ecological change. Those who find us annoying are welcome to join FI *en masse*, and once the 30YL expeditions are over, promote long-term monitoring in their own way, and we'll be pleased to have helped to catalyse this essential feature of sustainable human appreciation for the Earth. If FI fails to catch on, we'll retire to Bishops Mills and write up the results of our long-term monitoring as a series of books of memoirs, hopefully satisfying our children's insistence that we settle down and find some way of supporting ourselves. [1]

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1 Aleta's father, notoriously not-yet-settled-down himself, has begun this series with autobiographies of himself and his mother, the latter based on stories recorded by Aleta in 1974.

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How to participate in Thirty Year Later (30YL) and Fragile Inheritance (FI):

1) Suggest herpetological, or other, observations that need replication to Fred at <bckcdb@istar.ca>. These could be occurrences of species, colour morph ratios, or collection of material for study; anything that can be accomplished in a short visit to a site at the appropriate season.

2) Sign up for the Fragile Inheritance newsletter, by e-mailing Aleta <karstad@pinicola.ca>. This will evolve into a call for membership in an incorporated NGO if sufficient interest develops. see http://fragileinheritance.org/

3) Follow our progress across the country at http://www.doingnaturalhistory.com/ and linked blogs.

4) Plague us with questions about what we might have observed in your neck of the woods 20-40 years ago, and which of these phenomena or species it might be

interesting to look into again.

5) Buy lots of Aleta's daily paintings from http://karstaddailypaintings.blogspot.com/ or commission one when we're in your area, or in an area close to your heart.

6) See the Mudpuppy Night video clip on YouTube – http://www.youtube.com/watch?v=5Z_uFXaz9RQ – prepared for us by our friend and supporter John Barclay of Triune Arts http://triune.ca/

FIELD NOTES

A Guide on How to Spend Part of Your Sabbatical in Old Blighty

Stephen J. Hecnar
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Awww, sabbatical–that elixir of intellectual reinvigoration, that temporary refuge from avocation and return to one's calling–I made it! With continuous teaching overload and heavy service commitments since my last sabbatical, I was quite ready. I made the mistake last time by not leaving the continent. They will find you, they will hunt you down, and indeed they did. I learned and decided this time to adapt by disappearing. Cryptic frogs avoid predators and the hidden rattlesnake avoids harassment, yet both continue to forage.

After tying up some lose ends in the winter, I dispersed across the pond for spring in the United Kingdom. I know, you ask, why would a Canadian herpetologist in their right mind want to go to another cold place, why go to Old Blighty when one could search for treefrogs in a warm Neotropical jungle or chase lizards up coconut trees in the Caribbean? I appreciate biodiversity as much as the next biologist, but the temperate zone continues to hold my fascination with nature.

While the Holarctic might not be as speciose as the tropics, it has a more challenging and dynamic environment, especially for ectotherms such as our foul and loathsome creatures. Instead of diversity, the temperate zone has abundance. This fascinating herpetofauna faces immense challenges as it forms the vanguard of life recolonizing the glaciated regions of our planet. It is easy to forget that next to rocks falling out of the sky, glaciation is the most important form of large-scale disturbance affecting the distribution of life, especially when global warming is in vogue.

I have long been impressed with the European approach in herpetological studies, the role it has played in scaling up ecology, and how it included the human landscape element. Reading the European spatial ecology and conservation literature back in graduate school helped form my perspectives and approaches in research. It was time to pay a visit. I met Professor Richard Griffiths, University of Kent-Canterbury years ago at DAPCAN and CARCNET conferences. Griffiths leads one of the world's most dynamic groups of conservation biologists at the Durrell Institute of Conservation and Ecology. I was impressed by his work and found we used similar field approaches and shared many mutual research interests. Based on this, I thought that making a pilgrimage to Canterbury was in order. My quest was to see what our British colleagues were up to, to gauge possible research opportunities and collaborations, to find out what their key issues and concerns were, provide seminars, and to find out how the Brits do it (herpetology of course).

Fig. 1. Male and female Great Crested Newts, *Triturus cristatus*, from a pond on campus at the University of Kent-Canterbury. Photo by Darlene Hecnar.

I spent a month traveling with my trusty field assistant at my side in England and Wales among universities and protected areas but we made Canterbury our base. Britain is of course very expensive by Canadian standards but there are ways to stretch those thin Beaver Bucks. We avoided the high cost of hotels by renting an apartment short-term in Canterbury and taking time to check for good clean less expensive hotels when traveling between meetings. You can actually find tariffs similar to Canadian prices if you search for them. Another way to lengthen the loonie is to look up long lost relatives for overnight lodging as you travel. Being a mongrel with a British component in my

heterogeneous genome, this we did on occasion. No matter that most of my ancestors emigrated to Canada in the 1700's, by the end of our stays we were generally quite acquainted and our hosts were indeed convinced that we were relatives. One of my mottos is 'No relatives are safe when poorly-endowed (grant-wise of course) field biologists travel'.

Fig. 2. Slow-worm, *Anguis fragilis*, from King's Wood. Kent. Photo by Darlene Hecnar.

Food in the UK is often very expensive, so find out from the locals where the deals are. Breakfast alone in chain hotels often costs 30 quid. Your best bet is to eat in traditional pubs as they often have two for one supper specials for 9-15 £. And don't forget to wash the hearty grub down with a pint of real ale that usually costs less than 3 quid. The budget approach to meals is to find the nearest Sainsbury's or Tesco and buy groceries. Even when traveling we subsisted on sandwiches and other groceries that we kept in a cooler. We found that groceries were not too much more expensive than back home.

For travel flexibility, and needing a field vehicle, we opted for a hired car (rental) instead of travel by rail or bus. The monthly corporate rate was quite reasonable, and European cars are very fuel efficient, but don't expect to get much luggage or field gear in the boot (trunk). I have four bits of advice for Canadian biologists driving in the UK. First, rent an automatic if you can -- there will be enough challenges besides shifting gears. Second, get a Sat Nav (GPS). Street signs on local roads are often sparse or difficult to spot and to follow. However, signage on M roads (dual carriageways like our major highways) and most A roads is good. Third, rent the narrowest car possible. The M roads are fine but some of the A roads and most of B roads are very narrow, winding, most lack shoulders and abut buildings, stonewalls or fencerows, and often narrow unexpectedly down to single lanes. They actually do go through a lot of side mirrors on British hired cars. Fourth, don't decide to drive into London as we did, or any city centre, during rush hour as your introduction to British driving! We eventually found our destination, Kew Gardens, but my trusty side kick had lost her voice by then and I had to be pried off the steering wheel. I eventually found driving on the left side of the road and the ever-present roundabouts (which replace traffic lights) challenging and fun. An advantage of driving on the wrong side of the road from the wife's side of the car is that it keeps your sword arm free for holding the dipnet that won't fit in the boot. This can also double as a lance for jousting with oncoming traffic as you negotiate the narrow winding roads at the 60 mph limit. Don't try to keep up with the locals who all seem to drive like Stirling Moss when motoring on country lanes.

Fig. 3. European adder, *Vipera berus*, from Anglesey, Wales. Photo by Darlene Hecnar.

Our timing was great for getting out to the field as Richard was running a field school when we arrived. We got the opportunity to observe and help capture many smooth, palmate, and crested newts, right on campus. It seems that you can dig a hole virtually anywhere in Britain, fill it with water, wait a fortnight, and then find newts have colonized your pond. Although Britain can only boast 14 amphibian species, it was quite impressive to see three or four newt species per pond in high abundance. We also visited Richard's reptile sites in King's Wood where we captured many slow worms and adders under cover objects and observed numerous live-lizards basking on debris in open sites in the ancient forest. The abundance was amazing, especially considering that it was only about 9

or 10°C. Some estimates of slow worm density are as high as 1000 per hectare. Richard and one of his students once tried to translocate the species from an area to be developed but found that the abundance curve would not level off. This level of activity and biomass really drove home the point about how well adapted these temperate reptiles are to the cool British climate and just how important they must be in terms of energy flow. Also impressive was watching Richard's gymnastics as he leapt to hand-capture adders. He smiled as I complimented his abilities but humbly admitted that Canada's own Pat Gregory was the true king of serpent-seizing gymnastics. We also accompanied Richard and his crew for a trapping session at his newt ponds on the Blean Plateau. This is where Richard and his associate David Sewell conduct their impressive long-term study of the metapopulation and metacommunity dynamics of syntopic crested, smooth, palmate, and alpine newts (Griffiths et al. 2010). From our Canterbury base we searched nearby natural areas and visited Darwin's Down House. It was a special treat to actually be inside his study and stroll along the 'Sandwalk' where the thoughts came and efforts of Darwin and his colleagues changed the world. This was especially poignant having just finished reading "Darwin's Armada" (McCalman 2009). I ended my visit by providing Mine Host and his group a seminar on the challenges in monitoring the dynamics of amphibians. Our subsequent discussion seems to have left all with the feeling that we face common challenges.

Fig. 4. Common lizard, *Lacerta vivipara*, from Kent. Photo by Stephen Hecnar.

Next, we traveled slowly across the pleasant landscapes of southern England and up through Wales while visiting numerous natural areas before reaching our next destination, Bangor University. Surprisingly, this old university in northern Wales is 'herpetology central' for the United Kingdom. This distinction owes itself to a group of three eminent herpetologists, Roger Thorpe, Anita Malhotra, and Wolfgang Wuster, all in one department. Their herpetology course regularly has an enrollment of over 100 students. They also have the most impressive teaching/research collection of live reptiles that I have ever encountered in a university. Who would guess that one would see the most species of pit vipers they have ever seen anywhere, in northern Wales! This impressive collection is maintained because of the group's research focus on the evolution of venomous snakes. It was refreshing to see that taking the life out of biological education has not progressed as far in Britain as it has in Canada (Hecnar 2008). Anita hosted us to a wonderful meal at her cottage on Anglesey and her boys gave us a tour of backyard biodiversity and showed us their pet lizards before we accompanied Anita and her students to Newborough Forest to conduct newt surveys by torchlight. We found nearly 100 crested newts in just one small location! Wolfgang hosted us to a tour of an adder site where he also displayed impressive Gregorian-style serpent seizure and then showed us the coastal habitats of Anglesey.

Fig. 5. Darwin's study in Down House near the village of Downe, Bromley. Photo by Darlene Hecnar.

From Wales we headed across the midlands taking the aptly named "Snake Pass" through the Peak District. After surviving the treacherous and narrow but scenic winding roads we arrived in Sheffield for a seminar and meetings. Once my better half pried me from the steering wheel I entered the Animal and Plant Sciences Building and was met by a huge flat screen on the lobby wall with giant images of myself and skinks. The advertising seemed to work as my talk on spatial scale and conservation was very well attended. Animal and

Plant Sciences is a huge department devoted to studies at the organism level and higher, a rarity these days. In fact, when planning meetings for this sabbatical it was difficult to find biology or zoology departments as they seem to have fallen victim of a plethora of university restructuring exercises. The University of Sheffield is home to Kevin Gaston, the eminent macroecologist and his not so small army of students, post-docs and visiting scientists in the BIOME lab. We had great discussions on large-scale issues with Kevin and his international group that includes my former co-supervised Ph.D. student, Felix Eigenbrod (now a lecturer at Southampton).

After Sheffield we headed for Cambridge to visit the Department of Zoology and Museum. The museum is impressive in all respects, but especially for its collection of fish-amphibian ancestors and early amphibians and reptiles. However, good luck trying to find curatorial staff; instead we used the self-serve approach to photograph specimens for my herpetology course. The shockingly open aspect to the museum contrasts with the 'Tighter than Fort Knox' control of the Zoology Department Building. The guard at the gate said that everything is locked down and nobody can just drop in to visit zoology unless meetings have been prearranged. However, the friendly chap took pity on us scruffy zoologists from the colonies, and suggested we try asking security at reception in the main entrance. At reception, we were greeted by a big sign saying "gone for lunch", so we walked in. We spent the afternoon working in the zoology library, where staff were friendly and helpful, and then walked around the department having a lovely time reading posters and peaking into labs until... we were met by a rather hoity-toity senior professor who blared "Just what do you think that you are doing?", to which I replied "We are zoologists from Canada who have come to pay homage to Cambridge". Unimpressed, he exclaimed "This is a secure building, how did you get in?" I replied, "We walked in through the main door". "Well, you are just going to have to leave immediately" he exclaimed and stormed off. I wanted to blurt out defiantly "We've been thrown out of better universities than this" but then I remembered we weren't kicked out when we visited Oxford. Well leaving the Zoology Building is easier said than done as we found every door was locked and you need a card key to exit without setting off an alarm. Although we wanted to avoid an international incident, we did not want to spend the night and were just about to open a door and make a mad dash for it, when a student walked up and opened the door for us ending our Cambridge adventure. Although I am a proud alumnus of Lakehead and Windsor, now I can truthfully say "I was kicked out of Cambridge!"

We made our way back to home base in Canterbury to end our visit by teaming up with the legend himself, Pat Gregory, who had just arrived to start his field work. The weather was cool but we spent an enjoyable time chatting herpetological matters and walking his grass snake study site. With the blend of old world charm and nature in southeast England, as well as the helpful people at DICE, I can see why Pat keeps going back to Old Blighty. A bad day in the field is still better than a good day in the lab, and despite getting drenched and chilled we got to see a few slow worms and a wee grass snake before retiring to a real pub to discuss the day.

Fig. 6. Darwin's thinking path "Sandwalk" at Down House, Downe, Bromley. Photo by Darlene Hecnar.

This is but a sampling of the places we visited and colleagues that we met but I learned a lot from this sabbatical trip. Getting a chance to work with different species is a treat in itself but it was great to see how the Brits do it and to hear about their concerns. It was refreshing to see that field schools and field trips featuring amphibians and reptiles were the norm at many universities. I found that both British and Canadian academics have many similar concerns such as growing bureaucracy that takes more time away from our research and teaching, decreasing funding, increasing commercialization of universities, application of business models to administering universities, lack of opportunities for graduates, and growing disinterest by the public and politicians in the value of basic research. On average, most of these issues seemed a bit more troublesome in Canada, where we tend to teach more and deal with more bureaucracy on average than do the Brits. An interesting difference is that permits are less restrictive and easier to obtain in the UK. There is also a trend to deregulate animal care in the UK while its

bureaucracy in Canada is entering a new growth phase. We also seem to have less balance in our lives than our British counterparts. Just try to schedule a meeting with a British herpetologist on a weekend or Bank Holiday, you will likely be told "Cheers mate, but I'm off rambling in Scotland with me family this weekend."

Herpetological conservation is different in the UK. There are many well-organized trusts and local groups that study and monitor the fauna. Although British protected areas are small relative to those in Canada, there are many reserves that have been established for endangered herpetofauna. In Canada, we still have only one, Hyla Park in New Brunswick. There are also strict regulations that require habitat mitigation and translocation of individuals to accommodate developments. Here in Canada most developments usually proceed because the 'green over yonder' syndrome seems to trump local protection in our environmental impact process.

Our excellent adventure came to an end too soon, and not unlike our Cambridge experience, the ash from the volcano in Iceland subsided enough that they opened Gatwick for a few hours and we escaped. I was returning home more invigorated and excited than I've been since childhood. I knew as we flew against the westerlies that there was a mountain of neglected bureaucracy awaiting my return, but the long flight provided ample time for reflection. I learned a lot from meeting British colleagues and their herpetofauna, but perhaps the most important lesson came from an experience on a cool but sunny day at a site where an abundance of slow worms, adders and live lizards were active in a small old field nestled between a farmhouse and a prehistoric earthwork -- human enterprise and nature have coexisted for millennia in Britain with few species losses. This gives hope for the future of our cold-adapted amphibians and reptiles in the post-glacial landscapes Canada. We can learn much from the conservation successes and failures in Britain and elsewhere in Europe. But we can also teach the world by example should we choose. What the Brits and other Europeans envy most about Canada is our wilderness and space. Hopefully we can learn from history to value and conserve our biodiversity and wilderness before much more is lost. I think I'll be going back to Old Blighty; there is much to both learn and to teach. UK sabbatical – highly recommended.

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What lies beneath…
Photo by Patrick Moldowan, University of Guelph,

Two Additional Rattlesnake Bites from Ontario

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In a recent article in the CAH BULLETIN, Wayne Weller (2010) shared information on the three known rattlesnake fatalities known from Ontario. Recently I found evidence of two more snake bite deaths from Ontario and Wayne suggested I share the information with CAH. One was the death of eleven year old John Girling from the Indian Reservation in the area of Southampton in Bruce County on 16 August 1899. The other was the death of an eight year old boy (no name given in the newspaper), the son of John Fitter of Topping in September 1902.

The first death was documented in an 1899 Ontario death certificate (Number: 005709, schedule C, p.513-514). According to a newspaper account (Beacon 1899) the boy was picking berries when he was bitten. This account and the fact that the physician who treated him was apparently a local physician, whose name appears on several other deaths, indicate that the boy was bitten

in Southampton area. The certificate indicates that it took him four weeks to die. I have a copy of the certificate and would be happy to share it with anyone who is interested.

It is reasonable to assume that this death was from a Massasauga (*Sistrurus catenatus*) since Massasauga are still found in Bruce County (Rouse and Willson 2002). The only other venomous snake known to have existed in Ontario was the Timber Rattlesnake(*Crotalus horridus*) but their range was not close to Bruce County, making it highly unlikely that a Timber Rattlesnake caused this death. The last Timber voucher specimen was collected in 1941 from the Niagara Gorge area, but they may have existed earlier in some other areas of the Niagara escarpment (Environment Canada 2010, Cook 1984).

The length of time between the bite and death is rather long. Most people who were fatally bitten by a Massasauga in the days before antivenom died within a week (Mahaffy unpublished data for Michigan), but this is not the longest interval between a Massasauga bite and death. I found an account of a lady from Bloomingdale, Van Buren County, in Michigan who died five weeks after being bitten by a Massasauga (Mrs. E. Tucker 1885)

The only information I could find on the second death was from a 20 September 1902 news item from the Toronto Star (Boy 1902). The account reads as follows: "the eight year old son of John Fitter of Topping was bitten by a snake while playing in a field where his father was hauling oats and died in great agony. No antidote had any effect." This snake was most likely a Massasauga since Perth County is not close to any known historic range of the Timber Rattlesnake and historically was an area known to have Massasauga (W. Weller, pers. comm.). The location of the snake in an oat field at harvest time is not an atypical place to find Massasauga. Massasauga have been reported in other early accounts in oat or hay fields at the time of harvest. In the Cicero Swamp in New York, Whiffen (1913) indicates that many of the Massasauga move into these fields around the time of harvest.

These two Ontario records are important because they indicate that there were some early Massasauga deaths in addition to the two more recent ones(1956 and 1862) known to herpetologists. Based on the number of rattlesnake deaths I have found in early historical records from Michigan (22 human deaths most likely all from Massasauga – manuscript in preparation), Minnesota (Mahaffy 2009), and Iowa, I was fairly certain there would be more than the three known Ontario rattlesnake deaths, especially from the 1800s or early 1900s. With serious searching, I suspect one could uncover even more fatalities. Since the Timber Rattlesnake tends to deliver more fatal bites than the Massasauga, I would suspect early in the history of settlement there were more fatalities than the one known 1812 Timber Rattlesnake fatality in the Niagara escarpment area. Early accounts would suggest that that there were some Timber Rattlesnake dens in the Burlington Bay area (Robertson 1911). Since I can only do online searches at this time and since the electronic newspaper database I have used, newspaperarchives.com, does not cover Ontario papers, I did not find any more references in the histories or other web resources available to me.

Acknowledgements.- This work would not have been possible without the help of some Ontario herpetologists, genealogists, historians and librarians. Special thanks to Wayne Weller for feedback and helping me understand Ontario rattlesnake distribution. The contact person for the Ontario death registration website, Heather Bertram, was able to get me a copy of the original vital records of John Girling and also checked some other death records. Audrey Underwood of the Bruce County Historical society transcribed and sent me the newspaper account of Girling's snake bite. A helpful lady answered a post I placed on a forum and found the fatal bite from the Topping area.

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Amphibious sunset in Algonquin Park.
Photo by Patrick Moldowan, University of Guelph.

BOOK REVIEWS

This section of TCH includes reviews of not just books but other vehicles for the dissemination of information that might interest Canadian herpetologists.

A Taste for Adventure

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Hello fellow herpetologists. I have recently taken the post of Book Review Editor for TCH, the joint publication of the Canadian Association of Herpetologists and the Canadian Amphibian and Reptile Conservation Network. I am currently a Canadian PhD candidate studying amphibian and reptile learning behaviour and brain development with Rick Shine at the University of Sydney.

As Review Editor, I would like to expand TCH's review section to include a variety of media and items of herp interest, as well as books. Reviews will now be pooled from a diverse background of herp related sources, including websites, movies, television programs, news stories, documentaries and journals. Ideally, review contributions will meet where academic and amateur herpetology intersects with pop culture, satisfying a broad range of interests. In future, I invite readers to alert me to any herp related media you feel to be worthy of review. I have decided to write this, my inaugural review, myself to set the tone for what I hope this section of TCH will achieve.

There is a belief among some biologists that you don't really know the animals you study until you have tasted them. I have known this curiosity to get the better of more than one colleague and can recount at least two field trips where debates have broken out over the freshness and palatability of a recently road-flattened herp. No sense in letting it go to waste…right?

The hardest decision, however, is not whether to collect such questionable fare but how to prepare it once you have returned to the field station. While many biologists are adept in food preparation, tackling fresh yet exotic game meat often lies outside the realm of standard culinary expertise. So where does one turn for advice on how to prepare fresh garter snake?

Luckily, the World Wide Web houses a voluminous archive of amphibian and reptile recipes. Many of them in fact geared toward inventive ways to prepare road-killed animals. A quick Google search turns up: www.backwoodsbound.com, www.panix.com/~clay/cookbook, www.australiancrocodile.com.au …and many more! I have chosen to showcase these three sites because they have a diverse range of recipes with stepwise instructions.

Backwoods Bound has the easiest recipes to follow, with the simplest ingredient lists and an extensive selection of dishes. Therefore, I recommend Backwoods Bound for impromptu field station creations. It is also the most relevant site for Canadians because it lists common North American species. Clay's Cookbook is for the moderate to advanced chef, with slightly intimidating ingredients lists and dinners that will take some serious planning, though are sure to please. Finally, Australian Crocodile contains recipes for cooking

crocodile but I am sure alligator would make a reasonable substitute. Australian Crocodile's ingredients lists are also very basic with easy to follow instructions but the site lacks the diversity of Backwoods Bound.

In preparation for this review I procured some farmed crocodile and tested a few of the recipes from these sites. I made the Marinated Alligator Strips from Backwoods Bound (substituting crocodile for alligator) and the Mango and Basil Crocodile from Australian Crocodile. Both were simple dishes that delighted and impressed my dining companions, some of whom were no strangers to herpetological degustation. Crocodile, it turns out, doesn't taste like chicken at all but rather has the consistency of fish and if one takes care not to overcook the meat it is actually quite tender and delicious. Perhaps the best part of such unconventional dining is writing your own dining etiquette. In this case I decided white wine would compliment our meal and was not able to find an amateur sommelier that would dispute this decision.

Blue Spotted Salamander crossing a road.
Photo by Matt Keevil, Laurentian University

Due to ethical considerations, my croc meat was farm raised. Such culinary escapades require a socially conscious cook and it is important to note that a large number of amphibian and reptile populations are listed as being under some level of conservation threat. This means that responsibility falls on the person preparing the food to make sure they get their meat from an ecologically sustainable source so that wild populations are not put at further risk*. Many specialty butchers will have farmed or sustainably harvested game meat available for purchase.

So, if the multitude of cooking shows on television has you inspired to prepare a gourmet delicacy for your next dinner party but you want something a little out of the ordinary, then consider frog's legs or stuffed snake. These options are sure to stir up dinner conversation and make your meal unforgettable.

**For the opportunistic chef, please note that not all road-kill is fair game. Animals, alive or dead, within parks or similarly protected areas may require permits for removal. Any animal that possesses some form of identification is likely part of a long-term scientific study and should be left alone so that researchers can record the animal's fate. Remember, dinner is not worth the hefty price of a government fine, so proper identification of all wildly procured meats is essential and when in doubt leave it alone.*

THESIS ABSTRACTS IN CANADIAN HERPETOLOGY

TCH publishes abstracts of recently completed Honours, M.Sc., and Ph.D. theses from Canadian universities and professors. Students or their supervisors are invited to send abstracts to the Editor.

Ceillier, I. B.Sc. 2010. University of Ottawa, Ottawa, ON. (Supervisor: Gabriel Blouin-Demers).
Is emergence after hibernation of the Black Ratsnake (*Elaphe obsoleta*) triggered by a thermal gradient reversal?

For temperate ectotherms, the timing of hibernation is essential because of their short active period: emerging too early entails the risk of freezing while emerging too late reduces an already very short active season. Hence the necessity for a reliable trigger of emergence. I used radio-telemetry to monitor body temperatures inside the hibernacula of Black Ratsnakes (*Elaphe obsoleta*) during hibernation, and fenced the hibernacula to catch the snakes upon their emergence. I found that there is in fact a reversal of the vertical thermal gradient between the inside and the outside of the hibernacula and that this reversal, in some cases, corresponds with the peak of emergence for that hibernaculum. Nevertheless, I cannot conclude that this reversal is the major cue for emergence; it is more likely a combination of several cues (external and internal) that trigger emergence. I found that there was a negative relationship between mean temperature and median emergence date in the different hibernacula, but this relationship was not significant.

Crawford, A.J. B.Sc. 2010. Lakehead University, Thunder Bay, ON. (Supervisor: Stephen Hecnar).
Geographic trends in species richness and regional pool representation within Canada's national park system.

Canada's system of national parks and historic sites plays an important role in biodiversity conservation within the country. The size of these protected areas is crucial. By using the species-area relationship, predictions can be made of the proportion of species (mammals, birds, amphibians and reptiles) that will be represented from the respective regional pool for a given park size. The proportion species-area equation was most useful as a semi-log transformation (S/P = c + zLogA). Latitude, longitude and elevation were also variables taken into consideration with species richness and percent regional pool representation. Pearson correlation matrices, linear regression and multiple regression analyses were utilized to review data. Species richness and percent regional pool were positively correlated with area and negatively correlated with latitude. Significant species-area equations were determined for mammals, birds and amphibians, while percent regional pool representation equations were significant for all four taxonomic groups. Mammals had the greatest relationship strength out of the four groups when comparing species richness or percent regional pool representation and area. Recommendations for Canada's national park system are made on the basis of conserving regional species richness through appropriate protected area.

Mink Frog in Algonquin Park.
Photo by Matt Keevil, Laurentian University.

Graham, J. B.Sc. 2010. University of Ottawa, Ottawa, ON. (Supervisor: Gabriel Blouin-Demers).
Thermal ecology of Blanding's Turtles (*Emydoidea blandingii*) on Grenadier Island: the influence of thermal quality of the environment on habitat selection.

The numerous biological and physiological processes that underlie an organism's basic functioning are dependent on temperature. Also, behaviours dictated by the thermal quality of an environment play a large role in the repertoire of day to day reptilian activities. Blanding's turtles (*Emydoidea blandingii*) inhabit a thermally challenging environment. They are found in the northern states of the U.S.A., and within the Great Lakes region and south-west Nova Scotia in Canada. This study aims to study the thermoregulatory behaviours of a population of Blanding's Turtles found on Grenadier Island in the St. Lawrence River. Twenty-two turtles were monitored from May to October 2008 using temperature sensitive radio transmitters. Since this species is found in a thermally challenging environment, I expected that the thermal quality of the environment would play a largely influential role in habitat selection. I used turtle body temperatures (Tb), operative environmental temperatures (Te) measured in the field, and the preferred range of body temperatures (Tset) to calculate several indices of thermoregulation. The accuracy of Tbs (db), the thermal quality of the environment (de), the effectiveness of thermoregulation (de – db), and the thermal exploitation index (Ex) were all assessed. The overall quality of the environment was thermally challenging; at no point in the active season did the environment as a whole offer temperatures within Tset; however, during the warm months, few thermal microhabitats allowed Tset to be attained. Blanding's Turtles used their environment in a non-random manner and were relatively effective thermoregulators from May to August, choosing either aerial basking or warm surface water. By September and October, when the environment ceases to offer temperatures with Tset, Blanding's turtles' thermoregulatory strategy shifted to thermoconformity. By looking at the exploitation index, it was determined that whenever the environment offers Tset values, Blanding's Turtles show a high thermal exploitation, suggesting their behaviours and microhabitat selection are highly dictated by the thermal quality of their environment.

Larkin, J. M.Sc. 2011. Natural Resources Institute, University of Manitoba, MB. (Co-supervisors: Pamela Rutherford (Brandon University) and Nicola Koper (University of Manitoba)).
Microhabitat preferences of the prairie skink (*Plestiodon septentrionalis*) in southwestern Manitoba.

In Canada, the prairie skink (*Plestiodon septentrionalis,* formerly *Eumeces septentrionalis*) exists

only in southwestern Manitoba and is listed as Endangered under the Canadian Species at Risk Act. Habitat loss is the most significant threat faced by the prairie skink in Canada. Factors contributing to habitat loss include: native prairie cultivation, aspen (*Populus tremuloides*) encroachment, leafy spurge (*Euphorbia esula*) invasion, urbanization and road construction. The objectives of this study were to determine microhabitat preferences of prairie skinks, and determine the effect of leafy spurge invasion on prairie skink microhabitat and populations in southwestern Manitoba. To determine microhabitat preferences, sites used by skinks were compared to randomly located sites within the individual's home range. Artificial cover was the most important microhabitat element for prairie skinks in southwestern Manitoba during the active season. Prairie skinks did not select microhabitat based on other variables, including thermal characteristics, number of leafy spurge stems or percent cover of vegetation, exposed soil, gravel, juniper or leaf litter. The thermal characteristics of the microhabitat were further examined by comparing the temperature under cover to the surface temperature adjacent to the location where each skink was observed. When individuals were caught under cover, the temperature under the cover was significantly lower than the surface temperature. The average surface temperature was closer to the preferred body temperature of this species, suggesting that prairie skinks may use cover for reasons other than thermoregulation, such as predator avoidance and foraging. To determine the impacts of leafy spurge on the thermal characteristics of the microhabitat, iButton® data loggers were used to compare differences in daily standard deviation, maximum and mean ground temperatures between leafy-spurge invaded and un-invaded plots at four study sites. No significant differences in temperature were observed between leafy- spurge-invaded and un-invaded plots. Using coverboard sampling, no detectable differences in prairie skink densities between leafy-spurge-invaded and un-invaded plots were observed. However, prairie skinks were significantly more likely to be found in leafy spurge patches when cover was present, than when no cover was present. Artificial cover may improve prairie skink microhabitat by altering the thermal characteristics, providing refuge from predators, and providing microhabitat for prey. Land managers should consider providing artificial cover in suboptimal habitats for prairie skink conservation in southwestern Manitoba.

Reilly, S. B.Sc. 2010. University of Ottawa, Ottawa, ON. (Supervisor: Gabriel Blouin-Demers).

Painted Turtles (*Chrysemys picta*) may not flee earlier when chronically stressed.

Glucocorticoids are released in response to stressful environmental stimuli and can result in beneficial short-term effects. When elevated levels of glucocorticoids are long lasting, however, as is the case in chronic stress, glucocorticoids can have negative effects such as reproductive shutdown, decreased immunity and growth, and a reduced ability to cope with additional stressors. In recent years, the stress response has been used as a bio-monitor for potentially threatened populations since chronic stress may be useful in predicting the survival of stressed populations. In the interest of conservation, this study aims to answer how chronically stressed individuals react to acute stressors in nature. I hypothesized that chronically stressed individuals have a reduced ability to cope with an additional acute stressor due to elevated levels of CORT. I predicted that individuals with chronically elevated levels of CORT should tolerate an approaching threat to a greater degree than those without such elevated levels of CORT. Painted Turtles (*Chrysemys picta*) were implanted with slow-release silastic implants containing either corticosterone (i.e. simulating chronic stress) or sham, and the responsiveness to acute stressors was measured by approaching basking individuals and measuring their flight initiation distances. Results indicate a significant effect of treatment, between 1 CORT and 2 CORT treated individuals in particular.

Two-lined Salamander.
Photo by Matt Keevil, Laurentian University.

Row, J.R. Ph.D. 2011. Queens University, Kingston, ON (Co-supervised by Steve Lougheed and Gabriel Blouin-Demers).

Origins of genetic variation and population structure of Foxsnakes across spatial and temporal scales.

Understanding the events and processes responsible for patterns of within species diversity provides insight into major evolutionary themes like adaptation, species distributions, and ultimately speciation itself. Here, I combine ecological, genetic and spatial perspectives to evaluate the roles that both historical and contemporary factors have played in shaping the population structure and genetic variation of Foxsnakes (*Pantherophis gloydi*). First, I determined the likely impact of habitat loss on population distribution through radio-telemetry (32 individuals) at two locations varying in habitat patch size. As predicted, individuals had similar habitat use patterns, but restricted movements to patches of suitable habitat at the more disturbed site. Also, occurrence records spread across a fragmented region were non-randomly distributed and located close to patches of usable habitat, suggesting habitat distribution limits population distribution. Next, I combined habitat suitability modeling with population genetics (589 individuals, 12 microsatellite loci) to infer how Foxsnakes disperse through a mosaic of natural and altered landscape features. Boundary regions between genetic clusters were comprised of low suitability habitat (e.g. agricultural fields). Island populations were grouped into a single genetic cluster suggesting open water presents less of a barrier than non-suitable terrestrial habitat. Isolation by distance models had a stronger correlation with genetic data when including resistance values derived from habitat suitability maps, suggesting habitat degradation limits dispersal for Foxsnakes. At larger temporal and spatial scales I quantified patterns of genetic diversity and population structure using mitochondrial (101 cytochrome b sequences) and microsatellite (816 individuals, 12 loci) DNA and used Approximate Bayesian computation to test competing models of demographic history. Supporting my predictions, I found models with populations which have undergone population size drops and splitting events continually had more support than models with small founding populations expanding to stable populations. Based on timing, the most likely cause was the cooling of temperatures and infilling of deciduous forest since the Hypisthermal. On a smaller scale, evidence suggested anthropogenic habitat loss has caused further decline and fragmentation. Mitochondrial DNA structure did not correspond to fragmented populations and the majority of Foxsnakes had an identical haplotype, suggesting a past bottleneck or selective sweep.

The dedication of a mother.
Snapping Turtle nesting in Algonquin Park.
Photo by Patrick Moldowan, University of Guelph.

Sigurdsen, T. Ph.D. 2009. McGill University, Montreal, QC. (Supervisors: Robert L. Carroll and David M. Green).

The lower Permian dissorophoid *Doleserpeton* (Temnospondylii) and the evolution of modern amphibians.

The origin and evolution of modern amphibians is still a subject of controversy. The amphibamid temnospondyl *Doleserpeton* has often been suggested as a close relative of modern amphibians, but the skeletal morphology of this important taxon has never been fully described. In this thesis, a study of the skeletal anatomy of *Doleserpeton* is presented, and the interrelationships of dissorophoids are discussed. The relationships of modern amphibians and Paleozoic tetrapods are studied using phylogenetic analyses based on both Bayesian inference and parsimony. The skull of *Doleserpeton* is preserved in such detail that it allows the first description of the inner ear of an amphibamid

temnospondyl. It is found to house a posteriorly positioned perilymphatic duct, a feature which is today restricted to amphibians. Evidence for the presence of a frog-like tympanic annulus is also described. During the studies of the limb skeleton of *Doleserpeton*, it was realized that important features of the forelimb of modern salamanders were misinterpreted in previous anatomical descriptions. Comparisons of the forelimbs of salientians (frogs), caudates (salamanders) and the Lower Jurassic caecilian *Eocaecilia* reveal important shared derived traits that are also found in *Doleserpeton*. Humeral evidence also indicates that saltation was an important part of the locomotion of the Lower Triassic salientian *Triadobatrachus*. Previous phylogenetic analyses are re-examined and numerous problems in previous character coding are revealed. An analysis of the new data collected suggests that modern amphibians may be a monophyletic group closely related to dissorophoid temnospondyls.

Garter Snake in Algonquin Park.
Photo by Matt Keevil, Laurentian University.

Stoot, L.J. B.Sc. 2011. Lakehead University, Thunder Bay, ON. (Supervisor: Stephen Hecnar).
Occupancy structure of amphibian species ranges in eastern North America.

All species possess a unique geographic range, which is the area in which all individuals and populations of a species occur. Theory predicts that species will display a negative relationship for occupancy as distance increases from the centre of its range. The increase in patchiness as distance from the centre is also predicted, which displays spatial autocorrelation. I tested these predictions using data for 17 eastern North American amphibian species at 41 different locations. Results demonstrated that species having higher mean occupancy displayed less variation in occupancy among locations supporting Darwin's idea of dominant species common and demonstrating that rare species can be rare in abundance or distribution. In addition, amphibian species showed negative trends for occupancy as a function of distance from the centre but lacked significant results. Also, a lack of significance was found for presence of spatial autocorrelation in the majority of my study species. I hypothesize that lack of significance in both occupancy as well as spatial autocorrelation is attributed to inter-site variation between sites as well as environmental and anthropogenic effects.

Mink "polyfrog" in Algonquin Park.
Photo by Patrick Moldowan, University of Guleph.

Weerawardhena, S.R. M.Sc. 2010. University of Calgary, Calgary, AB. (Supervisor: Anthony Russell).
Patterns of recolonization by tropical anurans following forest habitat alteration.

I investigated the patterns of recolonization by tropical anurans following forest habitat alteration. I focused on abandoned tea plantations in the Knuckles Mountain Forest Range in Sri Lanka. Here I selected a series of successional stages of abandoned tea plantations and surveyed these for anurans that inhabited each vegetational stage. My results reveal that anuran species richness, complexity of species composition and diversity increased simultaneously with vegetation recovery. Results of multiple regression analysis showed that density of tea plants had a positive and significant effect ($P<0.05$) on the species richness of anurans. This is because the values of variance inflation factors relating to litter cover, crown cover, density of woody trees and density of tea plants exhibited a strong degree of multicolinearity. Therefore, the species richness of anurans in these stages depends on the collective

influence of litter cover, crown cover, density of woody trees and density of tea plants.

Wise, P.A.D. M.Sc. 2010. University of Calgary, Calgary, AB. (Supervisor: Anthony Russell).
***In ovo* development of the head skeleton of the leopard gecko (*Eublepharis macularius*).**

Early formation of the cartilaginous skull has been well documented, but very little information is available for the development and expression of patterns of formation for the bony skull. This work documents cranial development through the entire *in ovo* period for one species of lizard, the leopard gecko. An all-female series of embryos was utilized to remove any effects of sexual dimorphism. An ossification sequence is established that commences in Stage 34 and finishes in Stage 41. The sequence is relatively conserved with little variance, with 21 dermatocranial elements present before any neuro- or splanchnocranial elements begin ossification. Subsequent analysis of the development of form of the individual cranial elements provides more than twice the data previously recorded for the ossification sequence. Growth data of the elements reveals different rates of growth for closely associated boned within sub-regions of the skull.

Green Frog in Algonquin Park.
Photo by Matt Keevil, Laurentian University.

RECENT PUBLICATIONS IN CANADIAN HERPETOLOGY

TCH lists recent publications by Canadian herpetologists working in Canada and abroad. Please send to the Editor a list of your recent papers, and send citation information for new papers as they come hot off the presses.

Amiel, J. and R.J. Wassersug. 2010. Temperature differentials between the bodies and tails of Ribbon Snakes (*Thamnophis sauritus*): ecological and physiological implications. Amphibia-Reptilia 31: 257-263.

Amiel, J.J., B. Chua, R.J. Wassersug, and D.R. Jones. 2011. Temperature dependent regulation of blood distribution in snakes. Journal of Experimental Biology 214: 1458-1462.

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Bulté, G. and G. Blouin-Demers. 2010. Estimating the energetic significance of basking behaviour in a temperate-zone turtle. Écoscience 17: 387-393.

Bulté, G., M.A. Carrière, and G. Blouin-Demers. 2010. Impact of recreational power boating on two populations of Northern Map Turtles (*Graptemys geographica*). Aquatic Conservation: Marine and Freshwater Ecosystems 20: 31-38.

Carrière, M.A. and G. Blouin-Demers. 2010.Habitat selection at multiple spatial scales in northern map turtles (*Graptemys geographica*). Canadian Journal of Zoology 88: 846-854.

El Balaa, R. and G. Blouin-Demers. 2011. Unpalatability of northern leopard frog *Lithobates pipiens* Schreber, 1782 tadpoles. Herpetology Notes 4 (in press).

Fouquet, A., D.M. Green, B. Waldman, J.H. Bowsher, K.P. McBride, and N.J. Gemmell. 2010. Phylogeography of *Leiopelma hochstetteri* reveals strong genetic structure and suggests new conservation priorities. Conservation Genetics 11: 907-919

Gray, H.M., H. Kaiser, and D.M. Green. 2010. Does alkaloid sequestration protect the green poison frog, *Dendrobates auratus,* from predator attacks? Salamandra 46: 235-238.

Higham, T.E. and A.P. Russell. 2010. Divergence in locomotor performance, ecology, and morphology between two sympatric sister species of desert-dwelling gecko. Biological Journal of the Linnean Society 101: 860-869.

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Irisarri, I., D. San Mauro, D.M. Green, and R. Zardoya. 2010. The complete mitochondrial genome of the

relict frog, *Leiopelma archeyi*: insights into the root of the frog Tree of Life and a new mitogenomic gene order. Mitochondrial DNA 21: 173-182.

Kilburn, V.L., R. Ibáñez, O. Sanjur, E. Bermingham, J.P. Suraci, and D.M. Green. 2010. Ubiquity of the pathogenic chytrid fungus, *Batrachochytrium dendrobatidis*, in anuran communities in Panamá. EcoHealth 10.1007/s10393-010-0634-1.

Lelièvre, H., G. Blouin-Demers, D. Pinaud, H. Lisse, X. Bonnet, and O. Lourdais. 2011. Contrasted thermal preferences translate into divergences in habitat use and realized performance in two sympatric snakes. Journal of Zoology (in press).

Lelièvre, H., G. Blouin-Demers, X. Bonnet, and O. Lourdais. 2010. Thermal benefits of artificial shelters in snakes: a radiotelemetric study of two sympatric colubrids. Journal of Thermal Biology 35: 324-331.

Lelièvre, H., M. Le Hénanff, G. Blouin-Demers, G. Naulleau, and O. Lourdais. 2010. Thermal strategies and energetics in two sympatric colubrid snakes with contrasted exposure. Journal of Comparative Physiology B 180: 415-425.

Millar, C.S. and G. Blouin-Demers. 2011.Spatial ecology and seasonal activity of Blanding's Turtles (*Emydoidea blandingii*) in Ontario, Canada. Journal of Herpetology (in press).

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Picard, G., M.A. Carrière, and G. Blouin-Demers. 2011. Common Musk Turtles (*Sternotherus odoratus*) select habitats of high thermal quality at the northern extreme of their range. Amphibia-Reptilia 32: 83-92.

Raby, G.D., A.H. Colotelo, G. Blouin-Demers, and S.J. Cooke. 2011. Freshwater commercial bycatch: an understated conservation problem. BioScience 61: 271-280.

Row, J.R., G. Blouin-Demers, and S.C. Lougheed. 2011. Movement and habitat use of the Eastern Foxsnake (*Mintonius gloydi*) in a fragmented landscape. Journal of Herpetology (in press).

Row, J.R., G. Blouin-Demers, and S.C. Lougheed. 2010. Habitat distribution influences dispersal and fine-scale genetic population structure of Eastern Foxsnakes (*Mintonius gloydi*) across a fragmented landscape. Molecular Ecology 19: 5157-5171.

Russell, A.P. 2010. Review of "Biology of the Reptilia, Volume 22. Comprehensive Literature of the Reptilia", compiled by Ernest A. Liner, Edited by Carl Gans and Kraig Adler. Society for the Study of Amphibians and Reptiles. Herpetological Review 41: 396-398.

Russell, A.P., T.M.Chrbet, and H.C. Maddin. 2011. Restorative regeneration of digital tips in the African clawed frog, (*Xenopus laevis* Daudin). Anatomical Record 294: 253-262.

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Russell, A.P. 2011. 25 and counting: personal reflections on the EEE. Expanding the mandate: the birth of the Ecology, Ethology and Evolution Section. Bulletin of the Canadian Society of Zoologists 42(1): 21

Ryan, M.J, A.P. Russell, and S. Hartmann. 2010. A New Chasmosaurine Ceratopsid from the Judith River Formation, Montana. pp 181-188 *In*: Ryan, M.J., B.J. Chinnery-Allgeier, and D.A. Eberth (Eds.) New Perspectives on Horned Dinosaurs. Indiana University Press, Bloomington, IN.

Sigurdsen, T. and D.M. Green. 2011. The origin of modern amphibians: a re-evaluation. Zoological Journal of the Linnean Society (online: DOI: 10.1111/j.1096-3642.2010.00683.x).

Sperry, J.H., G. Blouin-Demers, G.L.F. Carfagno, and P.J. Weatherhead. 2010. Latitudinal variation in seasonal activity and mortality in Ratsnakes (*Elaphe obsoleta*). Ecology 91: 1860-1866.

Todd, J. and R.J. Wassersug. 2010. Caudal pseudoautotomy in the Eastern Ribbon Snake *Thamnophis sauritus*. Amphibia-Reptilia 31: 213-215.

Venesky, M.D., R.J. Wassersug, and M.J. Parris. 2010. How does a change in labial tooth row number affect feeding kinematics and foraging performance of a ranid tadpole (*Lithobates sphenocephalus*)? Biological Bulletin 281: 160-168.

Venesky, M.D., R.J. Wassersug, and M.J. Parris. 2010. Fungal pathogen changes the feeding kinematics of larval anurans. Journal of Parasitology 96: 552-557.

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Weller, W.F. 2009. New distribution records for Painted Turtles, C*hrysemys picta*, from northwestern and northeastern Ontario. Canadian Field-Naturalist 123(4): 375-376.

Weller, W. F. 2009. Extension of the known range of the Gray Treefrog, *Hyla versicolor*, in northwestern Ontario. Canadian Field-Naturalist 123(4): 372-374.

Wise, P.A.D. and A.P. Russell. 2010. Development of the dorsal circumorbital bones in the leopard gecko (*Eublepharis macularius*) and its bearing on the homology of these elements in the Gekkota. The Anatomical Record 293: 2001-2006.

Henry the Snapping Turtle.
Photo by Matt Keevil, Laurentian University.

NEWS AND ANNOUNCEMENTS

CAH Student Travel Award Recipients 2011

Congratulations to Julia Riley of Laurentian University and Kelly Boyle of University of Victoria on receiving a CAH Student Travel Award of $300 each! Kelly will use her award to present at the Canadian Herp meetings in Thunder Bay, Ontario in September 2011, and Julia will use her award to present at the JMIH in Minneapolis, Minnesota in July 2011. Way to go!

Student News

Felix Eigenbrod (B.Sc. Lakehead University 2000, M. Res. University of York 2002, Ph.D. Carleton University 2008 [Co-supervisors: Lenore Fahrig and Stephen Hecnar]) was appointed as Lecturer in Ecology and Ecosystem Services at the University of Southhampton, UK in August 2010. Eigenbrod presented at past CARCNET meetings and his doctoral research demonstrated that the negative effects of roads can exceed effects of habitat loss on amphibians in eastern Canada. He also developed a new metric for examining the combined effect of roads and habitat loss on wildlife— *accessible habitat*. His research revealed that the amount of habitat accessible without crossing roads is more important than total habitat available in a landscape for explaining anuran species richness. After leaving Canada, and prior to his current appointment, he worked as a Post-doctoral Fellow in Kevin Gaston's lab at the University of Sheffield, UK.

The Herpetologists' League EE Williams Research Grant

The Herpetologists' League is pleased to announce competitive grants for graduate student research for 2012. These awards are named in honor of the late Ernest E. Williams, the first Distinguished Herpetologist of The Herpetologists' League.

Overview

1. An award ($1000.00 maximum amount) will be presented to one winner in each category:
   - Behavior
   - Conservation
   - Ecology
   - Physiology
   - Morphology/Systematics
2. See HL web site for application form, complete rules and details: http://www.herpetologistsleague.org/dox/eewilliamsgrant.pdf.
3. Entries must be received by 5 PM Mountain Time on 15 December 2011.
4. Send complete application (cover page, proposal, budget, CV,) as a single PDF electronically to: Erin Muths at muthse@usgs.gov. Please put "EE Williams Research Grant" in subject line.

5. One letter of support should be sent, preferably by e-mail, directly by the supporter.
6. Proposals will be reviewed by at least two professional scientists, who will provide written feedback by April 2012.
7. Funding dispersed in April 2012 and winners announced at the closing banquet at the JMIH in Vancouver, British Columbia, 2012.

Rules – please read, the rules have changed from last year

1. The applicant must be a member in good standing of The Herpetologists' League.
2. The applicant must be registered and in good standing in a degree-granting program (MS and PhD candidates eligible).
3. One proposal per applicant per year.
4. Project must be original work, authored and conducted by the applicant.
5. Projects that are already fully supported by other sources are not eligible.
6. The proposal category must be clearly designated. However, HL reserves the right to judge proposals under a category different from that requested based on evaluation of the subject matter and the number of proposals received in each category.
7. Previous winners are NOT eligible for the award in subsequent years.
8. A short report (2 pg) summarizing the results of the project and a reprint or .pdf of any publication arising from the project is due to secretary of HL when available.

Preparation guidelines (see website for more details)

1. Word limit: 1200 words not including citations, budget, cover page or CV.
2. Double spaced, 12 pt font.
3. Margins: 1 inch.
4. Include the cover page provided at the HL website.
5. Include a detailed budget, as well as sources and amounts of current and pending support.
6. Clearly designate the proposal category on the cover page.
7. Arrange in advance for one letter of support to be sent separately by the supporter.
8. Include a two-page CV that includes telephone, e-mail, and mailing addresses.

Seeking Dynamic Herp Photos

In support of CARCNET'S fund raising for student scholarships and travel bursaries, we are looking for donations of dynamic herp images.

Selected images will be featured on greeting/special-occasion cards and will be available for sale at the 2011 CARCNET AGM in Thunder Bay, ON.

High resolution images should be accompanied by a concise caption that explains the image, including species featured and details around the when, where, how, and why the photo was taken. Photo credit and copyright will be noted on the card. Please include photographer's name, as it is to appear in the photo credit, in the file name of your photo submission; e.g. Lithobates_pipiens_kris_kendell.jpg).

Images and details, or other inquiries can be sent to Sara Ashpole: sashpole@mailservices.uwaterloo.ca

American Toad.
Photo by Patrick Moldowan, University of Guelph.

CARCNET - RÉCCAR

Canadian Amphibian and Reptile Conservation Network/
Réseau Canadien de Conservation des Amphibiens et des Reptiles

For the first time we are pleased to offer multi-year memberships. This allows you to avoid the hassle of re-registering every year and protects you from increases in membership fees. Membership is from October 1 of each given year.

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Non-Student Membership: $20/ year CDN ☐ or $100/ 5 years ☐

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Canadian Association of Herpetologists / Association Canadienne des Herpétologistes

Membership in the CAH/ACH

The Canadian Association of Herpetologists is a scientific organization of professionals, students and interested amateurs. Its goals are to foster herpetological research and to aid communication among researchers in Canada. Membership in CAH is open to all whose work in concerned with the biology of amphibians and reptiles, particularly those who are located in Canada, who are working with Canadian populations, or who are interested in herpetology in Canada.

L'Association Canadienne des Herpétologistes est une organisation scientifique regroupant des professionnels, des étudiants et des amateurs intéressés par l'herpétologie. Les buts de l'association sont de promouvoir la recherche en herpétologie et de favoriser la communication entre les chercheurs canadiens. L'adhésion à l'ACH est ouverte à tous ceux dont le travail est relié à la biologie des amphibiens et des reptiles, particulièrement à ceux qui exercent leur travail au Canada, à ceux qui s'intéressent aux populations canadiennes, ou à ceux qui, de façon générale, sont intéressés par l'herpétologie au Canada.

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(Supervisor signature to confirm student status _____)

Please check appropriate items.

Please mail this form with correct dues (payable to the Canadian Association of Herpetologists) to:
Dr. Patrick Gregory – President and Treasurer CAH/ACH, Department of Biology,
University of Victoria, Victoria, B.C., V8W 2Y2.