© 2019. Published by The Company of Biologists Ltd | Journal of Experimental Biology (2019) 222, jeb197764. doi:10.1242/jeb.197764

CONVERSATION

Early-career researchers: an interview with Danielle Levesque

Danielle Levesque is an Assistant Professor at the University of Maine, USA, where she studies hibernation and torpor in mammals. She received her Bachelor's degree in Wildlife Biology from McGill University, Canada, in 2006, before completing her PhD with Barry Lovegrove at the University of KwaZulu-Natal, South Africa, in 2014. She then completed a Postdoctoral Fellowship at University of Malaysia Sarawak with Andrew Alek Tuen before moving to Maine in 2015.

Where did you grow up and how did you get hooked by science?

I was born in New Brunswick, Canada, but we moved all over the place because my dad was an officer in the Canadian army. We lived in different places in Canada and Europe before eventually moving to Ottawa when I was about nine. I don't know when or how I got into science. At one point I wanted to be an archaeologist, then a palaeontologist, an astronaut and a marine biologist. In my last couple of years of high school, I decided that I wanted to work with animals. I thought the only way you could do that was to get a veterinary degree, so I worked at a cat and dog clinic. But I really didn't like that, so I decided that being a zoo vet would be fun; that's how I ended up in wildlife biology. In Canada, you don't go straight into veterinary sciences, you do two years of an undergraduate course first and then you take the Medical College Admission Test and apply for veterinary school. But the chances of getting into vet school in Ontario were small because they only take 100 students a year. I thought, 'If I had to finish a degree that I started, because I was not able to get into vet school, which one would I rather continue on?', and I decided that wildlife biology sounded fun, so that's how I ended up at McGill. While I was there, I took a couple of classes with Murray Humphries and discovered energetics and torpor and hibernation. I was fascinated by the energetics of hibernation – why some animals turn off for periods of time – and the idea that if you don't have to use energy, why would you? Once I discovered you could do animal research without being a vet, I decided to finish my degree and try research instead.

How did you build up your research experience while you were an undergraduate?

I took some lab classes, but when I was in my Junior (third) year I was offered a place on an exchange to the University of Queensland (UQ), Australia. I wanted to do an undergraduate research project of some kind when I was there, and when I asked if that was possible, my institution said, 'Sure, if you have a Canadian supervisor'. Murray agreed to supervise me at McGill and I contacted Gordon Grigg at UQ, because he was doing research on thermoregulation of echidnas. He and Murray knew each other because they had just been at the International Hibernation Symposium in Vancouver, so when I contacted Gordon he replied that I was welcome to come. That's how I got to work on echidnas. Working in Australia was incredible. I helped Peter Brice, Gordon's PhD student at the time, to try to figure out if they had a thermoneutral zone, a range of ambient temperatures where metabolic rate stays constant, but they didn't, because they don't really maintain a body temperature on a regular basis. Gordon had a really good lab set up. His lab technician/manager and frequent co-author, Lynn Beard, was an incredible person to learn from. In the end I was there for about eight months.

How did you move on to a PhD after coming back from Australia?

I had hoped to do a PhD with Gordon, but he retired, and I wasn't sure what I wanted to do, so I decided to do a Master's degree first. I contacted Bill Milsom at the University of British Columbia, Canada, about working on hibernation in ground squirrels, but he said that the person who did that work was Glenn Tattersall, who had since set up his own lab at Brock University. I went to meet Glenn and he suggested that I look at chipmunks in his lab. At the end of my Master's, Glenn and Brock University funded a ticket for me to go to the next Hibernation Symposium in 2008 in Namibia. If you get a free ticket to Africa you want to make the most of it, so Brent Sinclair at Western University, Canada, encouraged me to apply to the Meerkat Project, run by Tim Clutton-Brock of the University of Cambridge, UK. I went there for six months before the conference as a field assistant and I basically chased male meerkats around the Kalahari while they tried to find mates. It gave me experience in behavioural ecology

Danielle Levesque works in the School of Biology and Ecology, University of Maine, Orono, ME 04469, USA.
E-mail: danielle.l.levesque@maine.edu

Journal of Experimental Biology (2019) 222, jeb197764. doi:10.1242/jeb.197764

and taught me how to radio-track animals and do fieldwork in remote locations.

If you get a free ticket to Africa you want to make the most of it

When I got to the conference I knew that I was going to meet everybody in the torpor research world who had interesting PhD projects on offer, and by the end of it I had three PhD options. One was from Barry Lovegrove to work on tenrecs. He's based at the University of KwaZulu-Natal, South Africa. Tenrecs had been on my radar because they're a bit like echidnas – their body temperature can be extremely variable – and I'd read David Quammen's *The Song of the Dodo*. In it, he interviews P. J. Stephenson, who talked about tenrecs and the huge variations in the ways they hibernate. I went up to Barry after his talk and asked how echidnas compare with tenrecs. He thought that was a great question. Then he looked at my nametag and asked if I was French. I said that I speak the language, so he asked if I wanted to go to work in Madagascar on tenrecs and that was it, I was in.

Tell us about your experiences of fieldwork in Madagascar.

Barry and his student Keri Lobban did most of the preparations and sent everything to Madagascar by boat before I arrived. I planned to join them in South Africa for what should have been a couple of weeks, but then there was a political coup in Madagascar in 2009 and the whole thing got delayed by about eight months. When we eventually got to Ankarafantsika National Park, it was still difficult to do research at night because there was a blanket moratorium on nightwork, caused by bandits and illegal logging in other regions. It took another three months before we got the permission to start working.

The field site was quite comfortable. There were two of us from my university, two Malagasy students who worked with us for the first three months, and a bunch of people working on conservation projects at the field station. We had running water, electricity and our tents were on raised platforms with thatched roofs, so they didn't get rained on directly. There was also a restaurant that we could go to for most of our meals when we were busy with fieldwork. In addition, there was a local market where we could get fresh produce and we went to town every month or so. At the beginning we had virtually no phone signal, but half-way through a different phone company moved in and we even got a data signal. I was there for about three years off and on, and I did a mixture of fieldwork and lab experiments. I implanted data loggers internally in tenrecs to record free-ranging body temperatures, but that also meant I ended up with some of the best movement and body temperature data on Malagasy boas, because a lot of the tenrecs got eaten; which meant that I got two natural history papers out of a predominantly eco-physiological study.

Where did you move after your PhD?

When I was looking for places to do my postdoc, the limiting factor was whether I could keep working on the evolution of endothermy using weird tropical animals, and I was also hoping to get back to Canada. However, postdoc funding is sometimes a little tricky for Canadians. Around the same time, Barry and I became interested in working in South-East Asia. After the 2012 Hibernation Symposium in Vienna, Austria, midway through my PhD, we travelled back to South Africa via Sarawak, a Malaysian state on the island of Borneo, where we met Andrew Alek Tuen at the Universiti Malaysia Sarawak (UNIMAS). After our visit, I thought that Borneo would be a fun place to work, so I applied for a JEB travelling fellowship to work on treeshrews at UNIMAS while I was finishing up my PhD, but unfortunately the permits didn't come through in time and I gave the money back. However, the application wasn't wasted, because it ended up forming the basis of my postdoc research. I decided to join Andrew's lab, because it would give me a chance to learn from his expertise on the ecology of Bornean small mammals and to be embedded in a small research institute (the Institute for Biodiversity and Environmental Conservation) in a really unique part of the world. When I arrived, I was the first postdoc that they had ever had, so I was treated more as a member of the faculty, which was fun, but I was still turning to Barry to trade ideas about mammalian physiology, and when it came to the job market I talked either to Glenn or Brent.

The application wasn't wasted, because it ended up forming the basis of my postdoc

When did you begin your job search?

I started looking for jobs as soon as I arrived in Andrew's lab. I had two years of funding, which could have been extended to three, so I had a safety net. I applied for a couple of lectureships in Canada initially, because there weren't many places where I really wanted to work, but I didn't get those. Then this job in Maine came up. The posting was for mammology and mammalian health, and, although I don't really do health, there was a line in the advert about mammals in relation to temperature – which is exactly what I do – and heat stress is a health challenge. Maine is a Land-Grant institution, so research at these types of universities is meant to be of service to the state, and I had some ideas about predicting vulnerability to climate change using Maine's natural climate gradients. There was no pressure when I applied, I just thought I would try, and I was relaxed about the interview because I felt that it would be good practice because I didn't expect to get it. But then I did.

Research at these types of universities is meant to be of service to the state

How difficult was applying for a job in the USA while you were in Asia?

Annoyingly, I couldn't access the departmental website at the time; they'd had problems with hackers in Indonesia, so their security system had blocked a lot of people from South-East Asia. I had to email the Search Committee Chair to get access. The Skype part of the interview was also a little challenging, because of the time difference, which was 12 hours. At the time I was in the field collecting data, so I caught a treeshrew, stuck it in the respirometer and left my colleague keeping the system going while I drove back to my office for the interview. The hiring committee went through their set questions and at the end it was late for me so they said, 'We'll let you get to bed now', but I told them that I had to drive back to my field site to finish the data collection. After that interview I had to put together a syllabus, because the position involved teaching a mammology class, and there was also an on-campus interview in Maine, which lasted two days. The university was very kind and flew me over a day early, so I could

Journal of Experimental Biology (2019) 222, jeb197764. doi:10.1242/jeb.197764

get used to the time difference and recover from the 18-plus hours of travel.

What has it been like to set up your first lab?

Most people do a second campus visit after they get the job offer, but I was too far away so I never did. I wish that I'd been a bit more forceful about getting a clean, renovated lab space. I eventually had to move my lab at the end of last year so that I could get a hole in the wall to the outside to bring air in for respirometry. But setting up the lab has been fun, and I have enjoyed deciding what to buy. I wanted to make sure that I had a couple of pieces of equipment that were mobile so that people could take them to different places. I had helped to set up Murray's mobile field lab back in 2006, as well as setting up the field sites in Madagascar and Borneo, so I had had some practice before. But this time I thought, 'Good, I don't have to rely on equipment that someone else has chosen. I can finally make the choices myself.'

How did your experiences of working in South Africa, Madagascar and Borneo prepare you for working in a US university?

The lack of resources in certain countries – the lack of access to library resources, top-of-the-line equipment and consistently reliable internet – was eye-opening for me. I think in some ways, being in other countries helped me in terms of broadening my perspective on the different backgrounds of people going to university. Now I'm used to working in systems where English isn't everybody's first language and where there are different levels of education, even going into university. Over the years I have become better at explaining things and talking slower, which has always been an issue for me. But in other ways working abroad did not prepare me well for teaching in the USA, because of the way that education has changed over the last 10 years or so with the development of active learning. I felt that I was a little behind. Most of my previous teaching was old-school style lecturing, so I'm having to learn a lot of the newer ways of teaching as I go.

The lack of access to library resources, top-of-the-line equipment and consistently reliable internet – was eye-opening for me

What have you learnt from the teaching part of your role?

I teach an undergraduate course in mammology, which forces me to learn about mammal species I wouldn't necessarily know anything about. Because I'm interested in the evolution of temperature regulation in mammals, it is really helpful to know more about the evolution of mammals more broadly.

I used to teach a second semester Introductory Biology class, where I taught the animal form and function section. That was a 300-student class, which was absolutely terrifying. I hadn't thought of things at a freshman level in a very long time. The process of going through the course and breaking things down was really interesting. They've since handed that class over to full-time instructors who can change content and teaching style more readily than faculty, but I just proposed starting up a comparative animal physiology course. We make all our biology students take a physiology course of some kind and, at the moment, that's all human stuff. But I know our zoology students would be really interested in more comparative physiology. I have good friends who have taught similar classes in other places who can advise about what to teach, so I'm looking forward to that.

What do you think about Open Access publishing?

Having worked in countries that don't have big library subscriptions, I know it can be tricky to gain access to some materials after they've been published. Some journals – and JEB is one of them – are always free for certain countries, which is nice, but not having access to as large of a university library database can be frustrating. I always encouraged the students that I worked with in Borneo to either email people or contact them through ResearchGate to get papers. That said, I dislike the idea of authors paying for publication. I'm not sure if making it more expensive to publish is the solution, because that disadvantages the same people who can't access papers from subscription journals. I probably will have to pay to publish at some point, but I just don't understand how charging authors is the solution. I've always appreciated the JEB model, where papers are behind a paywall for 6 months and then available afterwards. I would much rather do that than pay.

I think we're also realizing that making research accessible to the public is something that is vitally important, but I'm not sure if scientists are always the best people at doing that. Working with science communicators who do it properly is really useful. Also, learning how to break things down in the way I was taught when I contributed to Outside JEB – but even more tuned for lay people – is a skill that all scientists should have. Training in science outreach is often included in post-grad courses now, especially in the USA. National Science Foundation grant applications also require statements about how you are going to disseminate parts of your research to the public. That said, I don't think that every scientific paper can be written so that anyone can read it, because you lose the depth of the research.

Learning how to break things down…is a skill that all scientists should have

How can experimental biologists assist in conservation efforts?

That is something that I try to do by taking the fundamental things that we've learned about how animals and temperature work and putting them into an applied framework. I'm also excited about conservation physiology, which has popped up in the last few years. I think that getting good mechanistic models and data into conservation plans is probably a good thing. If I can contact the people on the ground doing the work, I like to have informal conversations with them, as opposed to talking 'at' them. I was one of the first people to put radio collars on some of the animals I work on in Madagascar and South-East Asia, so conservation is sort of built into what I do. Right now I am involved with the IUCN Small Mammal Specialist Group because they are interested in learning more about South-East Asian mammals, so I am learning more about the world of conservation, but it's still early days.

I think that getting good mechanistic models and data into conservation plans is probably a good thing

Journal of Experimental Biology (2019) 222, jeb197764. doi:10.1242/jeb.197764

If you could give one piece of advice to your younger self, what would it be?

To take coding in high school. Now that most of the analyses I do are in R, it would have been so much easier if I had been familiar with any kind of programming language. R involves different packages that do different things, but it's all code-based. People who grew up with fluency in coding have a bit of an advantage over people like me, who patch things together. I'm finding now that my students are also in the same spot, so I encourage them to take classes as soon as possible.

Danielle Levesque was interviewed by Kathryn Knight. The interview has been edited and condensed with the interviewee's approval.