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Assistant Professor and Endowed Chair
in Natural History and Conservation
The Centre for Ecosystem Sentinels
Department of Biology
University of Washington
Seattle, WA

September 30th 2019

Dear Search Committee:

Please find enclosed my application for the position of assistant professor and endowed chair in natural history and conservation. I am excited about the prospect of contributing to the University of Washington's world class research, teaching and training of young scientists, and furthering of an outstanding academic environment.

I use long-term seed and demographic datasets to study the eco-evolutionary impacts of climate change. I seek to understand the interaction between climate change and existing environmental gradients with implications for evolutionarily informed conservation efforts. My research utilizes diverse concepts and techniques from natural history, plant genetics and genomics, evolution, and analytical chemistry with a strong focus on understanding geographic variation in the evolution of ecologically relevant traits. My research focuses on: (1) rapid adaptation to drought and evolutionary rescue; (2) using landscape genomics to assess the need and feasibility of assisted migration; (3) spatiotemporal variation in herbivory and plant defence; (4) global collaborative projects on latitudinal gradients in pelagic fish predation, and plant urban evolution. My research has resulted in publications in leading journals in evolution and ecology (e.g. Ecology Letters, Trends in Ecology and Evolution, Ecology, Evolution).

This position is of particular interest to me because of the interdisciplinarity of your department and centre, the strong focus on long-term monitoring, and the opportunity to be involved in the leadership and administration of the Centre for Ecosystem Sentinels. Within this position I would advance my existing and proposed monitoring programs on plants and herbivory. I am also interested in collaborating on other long-term monitoring programs that the centre has already established. Indeed, I have a history of carrying out collaborative projects across different types of organisms.

A core focus of my lab would be to mentor a diverse group of undergraduate and graduate students with a goal of training future leaders in interdisciplinary science and conservation. Given the underrepresentation of racialized individuals within ecology and evolution, recruitment and retention of individuals from a diverse set of backgrounds will be a top priority. This can be achieved by seeking to make the university and graduate school experience more supportive and welcoming to people off all backgrounds (see my diversity and teaching statements).

I would seek to develop a well-funded research program involving both field and lab work. Upon arriving in Seattle, I would seek funding from NSF, as well as alternative funding sources. I would strive to encourage my students to apply for grants and fellowships to fund their professional instruction and to train them in the art of effective grant writing. I have an excellent record in successfully acquiring research grants and fellowships (~$750,000 CAD) including the Vanier Scholarship and Banting Fellowship (most prestigious doctoral and postdoctoral awards in Canada). Recently I co-wrote a Genome British Columbia grant, which is funding the sequencing of ~800 genomes to study evolutionary rescue and assisted migration.

I have included the contact information from Amy Angert (University of British Columbia), Marc Johnson (University of Toronto), and Peter Kotanen (University of Toronto).

Thank you for reading my application. I hope to have the opportunity to convey my enthusiasm for the position in person.

Sincerely,

Daniel N. Anstett

Banting & Killam Postdoctoral Fellow
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Daniel N. Anstett

Present Position: Banting & Killam Post-doctoral Fellow with Prof. Amy Angert, University of British Columbia, Canada

Education

Ph.D., 2017, University of Toronto, Canada
B.Sc., 2011, University of Toronto, Canada

Publications

Papers in Progress

12. Anstett, D.N., H. Branch, J. Zajonc & A. Angert. (2019). Range-wide rapid adaptation to severe drought in *Mimulus cardinalis*. Submitting to **Evolution** fall 2019.

11. Roesti, M, **D.N. Anstett,** B. Freeman, J.A. Lee-Yaw, L. Chavarie, J. Rolland, D. Schluter & R. Holzman. (2019). Predation in the world's open oceans is higher at temperate than tropical Latitudes. **Nature Communications** Reviewed, revision in progress.

Peer Reviewed Papers

10. Anstett, D.N., I. Cheval, C. D'Souza, J.-P. Salminen, & M.T.J. Johnson. (2018). Ellagitannins from the Onagraceae decrease the performance of a generalist and a specialist herbivore. **Journal of Chemical Ecology** 45:86-94.

9. Anstett, D.N., J.R. Ahern, J.-P. Salminen, & M.T.J. Johnson. (2018). Testing for latitudinal gradients in defence at the macroevolutionary scale. **Evolution** 10:2129-2143. *Recommended by Faculty of 1000.* .

8. Fitzpatrick, C., A.V. Mikhailitchenko, **D.N. Anstett,** & M.T.J. Johnson. (2017). The influence of range-wide plant genetic variation on soil invertebrate communities. **Ecography** 40:1-11.

7. Anstett, D.N., K. Nunes, C. Baskett, & P. Kotanen. (2016). Sources of controversy surrounding latitudinal patterns in herbivory and defence. **Trends in Ecology and Evolution** 31:789-802.

6. Anstett, **D.N.**, W. Chen, & M.T.J. Johnson. (2016). Latitudinal gradients in induced and constitutive resistance against herbivores. **Journal of Chemical Ecology** 42:772-781.

5. Anstett, D.N., J.R. Ahern, J. Glinos, N. Nawar, J.-P. Salminen, & M.T.J. Johnson. (2015). Can genetically based clines in plant defence explain greater herbivory at higher latitudes? **Ecology Letters** 18:1376-1386.

4. Anstett, D.N., I. Naujokaitis-Lewis & M.T.J. Johnson. (2014). Latitudinal gradients in herbivory on Oenothera biennis vary according to herbivore guild and specialization. **Ecology** 95:2915-2923.

3. Anstett, D.N., A. Salcedo & E. Larsen. (2013). Growing foliose lichens on cover slips: a method for asexual propagation and observing development. **Bryologist** 117:179-186.

2. **Anstett, D. N.**, H. O'Brien, E. W. Larsen, R. Troy McMullin, & M.-J. Fortin. (2013). Dispersal analysis of three Peltigera species based on landscape genetics data. **Mycology** 4:187-195.

1. Jones, M., M. Forester, J. Adams, A. Teufel, **D.N. Anstett**, B. Goodrich, E. Landguth, S. Manel & S. Joost. (2013). Integrating spatially explicit approaches to detect adaptive loci in a landscape genomics context. **Evolution** 67:3455-3468.

Non-Refereed Papers

Anstett, D. **N.**, Y. Liang. & M. Makhani. (2011). Effects of biotic and abiotic factors on coral distribution and diversity on a fringing reef in Barbados. **JULS** 5:24-27.

Anstett, D. N. & H. Coiner. (2010). The influence of wind and light exposure on the extent of lichen coverage in an alpine environment. **JULS** 4:38-41.

Grants, Scholarships, Awards

Research Grants

Genome BC, Testing the conceptual foundations of assisted migration for species facing climate change, 2018-2019 ($125,000). Co-written with Amy Angert and Loren Rieseberg.
Sigma Xi Grant in Aid of Research, ($1,000)

Fellowships and Scholarships

2019-2021 – Killam Postdoctoral Fellowship ($100,000)
2019-2021 – NSERC Postdoctoral Fellowship ($90,000)
2017-2019 – NSERC Banting Postdoctoral Fellowship, ($140,000)
2014-2017 – NSERC Vanier Canada Graduate Scholarship ($150,000)
2014-2017 – NSERC Alexander Graham Bell Canada Graduate Scholarship, declined ($105,000)
2012-2013 – University of Toronto - Mary H. Beatty Scholarship ($5,000)
2012-2013 – NSERC Alexander Graham Bell Canada Graduate Scholarship (17,500)
2012-2013 – Ontario Graduate Scholarship Program – declined (15,000)
2007-2011 – Millennium Scholarship Excellence Award ($16,000)

Awards and Honours

Ramsey-Wright Award, academic excellence and outreach, University of Toronto ($1,000)
Journal of Young Investigators Poster Competition Award ($100)
Canadian Botanical Association Oral Presentation Award ($400)

Mentorship

Academic advisor, directed studies student, UBC, 2018 (J. Zajonc)
Academic advisor, masters summer intern, U of T, 2016 (I. Cheval)
Academic advisor, 3rd year undergraduate thesis, U of T, 2015-2016 (C. D'Souza)
Academic advisor, 2rd year undergraduate thesis, U of T, 2014-2015 (N. Nawar)
Academic advisor, 3rd year undergraduate thesis, U of T, 2014-2015 (A. Chen)
Academic advisor, 2nd year undergraduate thesis, U of T, 2014 (A. Chen)
Additionally supervised 16 undergraduate and graduate lab and field assistants, U of T & UBC, 2013-2019

Teaching

Diversity of Organisms U of T – Mississauga, 2014, Lab intro lecture, ran lab section.
Ecology, U of T – Mississauga, 2012, Lab intro lecture, ran lab section, marked exams.
Rhetoric of Science, U of T, 2011-2012, Taught stats labs, marked mock grant proposals.

Internship and Training

University of Turku, Salminen Lab. 2013-2014, Analytical Chemistry Training.
University of Toronto, Larsen Lab, 2010-2012, Training in molecular and landscape genetics.
Operation Wallacea, U of T, 2011-2012, Research student recruitment.

Presentations

Invited

2019 – UBC Green College Member Series, "Biogeographic gradients, measuring sticks of the Anthropocene.
2019 – UBC Botany Department Lecture Series, "Evolutionary ecology across latitudinal gradients in an era of climate change"
2018 – Simon Fraser, Ecology Series, "Evolutionary ecology across latitudinal gradients".
2018 – Canadian Society for Study and Evolution, Evolutionary Conservation Symposium, Guelph, "Using common garden experiments and genomics to guide assisted migration in an era of climate change".
2018 – Undergraduate Honors Research Class (guest lecturer), UBC, "10 years of research in landscape biology".
2018 – Biodiversity Centre, UBC, "Latitudinal gradients in herbivory and plant defence".
2018 – Green College, UBC, "Evolutionary ecology across diverse landscapes".
2017 – Exit Seminar, U of T, "Latitudinal gradients in herbivory and plant defence.
2015 – Master Gardeners Technical Update, Ontario Royal Botanical Gardens, Training on gardening and climate change to 300 master gardeners.
2014 – Landscape Genetics Symposium, "Using simulations to study the landscape genetics of plant defence evolution" U of T.
2014 – Massey College, U of T, "Wrath of co-evolution: struggles between plants and insects",
2012 – Undergraduate Ecology Class, BIO206 (guest lecturer), U of T.

Contributed

2019 – Society for the Study of Evolution, Providence, PI
2018 – Eco-Evo UBC Retreat, Squamish, BC
2018 – Society for the Study of Evolution, Montpellier, France
2018 – EvoWIBO, Evolutionary Biology of the Pacific Northwest, Port Townsend, WA
2017 – Eco-Evo UBC Retreat, Squamish, BC
2017 – Society for the Study of Evolution, Portland, OR
2017 – Gordon Plant-Animal Interactions Conference, Ventura, CA
2015 – International Association for Landscape Ecology, Portland, OR
2015 – Ecological Society of America, Baltimore, MA
2015 – Ontario Ecology, Ethology and Evolution Colloquium, Toronto, ON
2014 – Atwood Symposium, Toronto, ON
2014 – Symposium on Insect-Plant Interactions, Neuchâtel, Switzerland
2014 – Canadian Society for Ecology & Evolution Conference, Montreal, QC
2013 – Ecological Society of America, Minneapolis, MN
2013 – Ontario Ecology, Ethology and Evolution Colloquium, London, ON
2013 – Gordon Plant-Animal Interactions Conference, Ventura, CA
2012 – International Association for Lichenology, Bangkok, Thailand

2011 – Ontario Ecology, Ethology and Evolution Colloquium, Toronto, ON
2010 – Rising Stars of Research National Undergraduate Conference, Vancouver, BC

Professional Affiliation and Service

External Reviewer

I have reviewed 15 papers and grants from: NSF, Ecology Letters, Evolution, Ecology, Journal of Ecology, Ecography, Global Ecology and Biogeography, Climate Change, Polar Biology, Marine Progress Series.

Committees and Service Positions

UBC Postdoc Travel Award Committee, UBC, 2019-Present
President, UBC Postdoctoral Association, UBC, 2019-Present
Green College Admission Committee, UBC, 2019-Present
Postdoc Representative, Botany Faculty Meetings, UBC, 2018-Present
Executive Member, UBC Postdoctoral Association, UBC, 2017-2019
Massey College Admissions Committee, U of T, 2017
Board of Directors, Cabbagetown Community Arts Centre, Toronto, 2012-2017
Advisor to Board of Directors, Nepali Children's Education Project, Toronto, 2009-2017
Co-Chair, Massey College Community Service Committee, U of T, 2016-2017
Massey College House Committee (student government), U of T, 2016-2017
Co-organizer, Ontario Ecology, Evolution, and Ethology Meeting, U of T, 2015-2016
UTM Biology Graduate Student Association, U of T Mississauga, 2013-2015
Atwood Memorial Lecture, Speaker Selection Committee, 2012-2013

Memberships

The Society for the Study of Evolution, 2016-Present
American Naturalist 2015-Present
Canadian Society of Ecology and Evolution 2014, 2018
Green College, 2017-2019
Massey College, 2013-2017

Volunteer Research Positions

Field Assistant, Operation Wallacea, South Africa, 2010
Field Assistant, Operation Wallacea, Indonesia, 2009

Collaborators

Interdisciplinary research has enabled the impact of my research. I have recent or on-going collaborations with the following academics:

J. Ahern (U Turku), A. Angert (UBC), C. Baskett (Michigan State U.), H. Branch (UBC), M. Bontrager (UC Davis), D. Carmona (U Merida), I. Cheval (AgroSup Dijon), L. Chavarie (UBC), C. Fitzpatrick (UNC Chapel Hill), B. Foster (Colorado State U), M.-J. Fortin (U Toronto), B, Freeman (UBC), A. Hargreaves (McGill U), R. Holzman (Tel Aviv U), M.T.J. Johnson (U Toronto), P. Kotanen (U Toronto), S. Joost (EPF Lausanne), E. Landguth (U Montana), E. Larsen (U Toronto), J. Lee-Yaw (UBC), S. Manel (U Marseille), T. McMullin (Canadian Museum of Nature), N. Nawar (U Toronto), R. Ness (U Toronto), H. O'Brien (U Bristol), M. Roesti (UBC), L. Rieseberg, J. Rolland (UBC), J.-P. Salminen (U Turku), J. Santangelo (U Toronto), D. Schluter (UBC).

My research focuses on the evolution of ecologically important traits across environmental gradients and climate change. My lab will seek to use long-term monitoring programs to understand how evolution impacts population demography and test the need for the human mediated movement of genotypes to rescue existing populations (assisted migration). I will aim to address these issues through researching **(1) Evolutionary Rescue and Rapid Adaptation to Drought, (2) Using Landscape Genomics to Test Assumptions of Assisted Migration, and (3) Spatiotemporal Variation in Herbivory and Plant Defence.**

(1) Evolutionary Rescue and Rapid Adaptation to Drought

Climate change is increasing the frequency and severity of extreme droughts, placing species at risk of local extinction. Population persistence may require the rapid evolution of drought avoidance and/or tolerance traits and their plasticity. This may lead to evolutionary rescue, where a decline in population size is recovered due to an increase in drought-adapted genotypes. Evolutionary rescue has been examined theoretically and demonstrated in laboratory experiments, but its prevalence in natural populations facing climate change is unknown. **My research seeks to understand how rapid evolution to drought varies across a species' range and its implications for evolutionary rescue.**

My lab will study rapid evolution in the riparian plant scarlet monkeyflower, *Mimulus cardinalis*, in response to a record-setting drought in California and Oregon. The Angert Lab has established demographic census plots spanning the range of *M. cardinalis*, and I intend to collaborate on their long-term monitoring. Seed and demographic information from 12 sites spanning the range of *M. cardinalis* will be collected yearly to determine the effect of increasingly variable climate on drought adaptations and long-term population stability. I ask **(1.1)** *What* M. cardinalis *traits are involved in rapid evolution to drought?* **(1.2)** *How does rapid evolution vary across the range of a plant?* **(1.3)** *Does drought adaptation have a cost to fitness during wet periods?* **(1.4)** *Does rapid evolution lead to evolutionary rescue?* Through a greenhouse common garden, I have shown evidence of drought escape through the evolution of earlier flowering time in 6 out of 12 populations (e.g. Fig. 1A; Anstett et al. 2019 in prep) and the loss of flowering time plasticity at four sites (e.g. Fig. 1B). This loss could lead to reduced fitness during wetter years, which may impede full recovery of some populations. Water content, a measure of drought tolerance, increased in four southern and central sites during the peak of the drought. Three of these four sites did not show evolution of early flowering time, indicating the evolution of different drought strategies across sites.

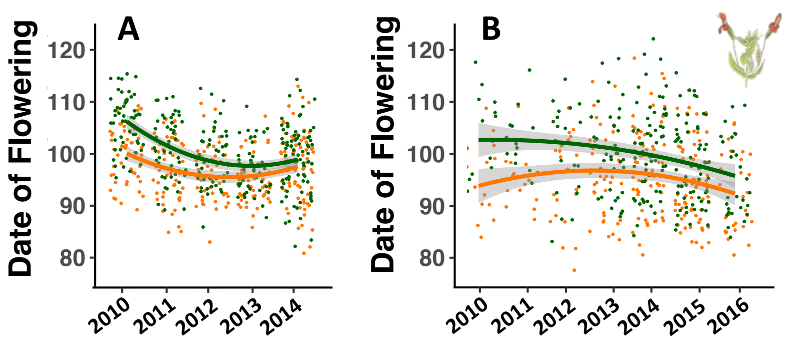

Fig. 1. Evolution of (A) earlier flowering in *Mimulus cardinalis* in a population Southern California. (B) Evolution of flowering time plasticity in a population in central California.

Future Research – My lab will assess the long-term impact of adaptation to drought and loss of genetic variation on population viability. With continued demography surveys and seed collections on the 12 target sites, we will be able to track the effect of past drought and future environmental change on trait evolution. Through common gardens my lab will quantify fitness during drought experiments and use this information to parametrize population demographic simulations. This will allow us to compare the expected versus realized impacts of drought on demographic viability. We will also carry out a one-time seed re-collection of 2008-2010 *M. cardinalis* seed collections range-wide across 70 sites, to assess the effect of drought on trait evolution range-wide (Fig. 3). My lab will also use targeted sequencing approaches to track genetic changes in regions associated with drought adaptation. Target regions will be acquired using genome-wide association mapping (GWAS) from the whole-genome sequencing of the 70-site dataset of *M. cardinalis* (Fig. 3; see next section for sequencing details). The scope of this work will allow for quantification of the long-term effects of opposing selection pressures through multiple drought cycles. It will give a field-based assessment of evolutionary rescue in nature and establish this system as a case study for adaptive evolution.

(2) Using Landscape Genomics to Test Assumptions of Assisted Migration

Assisted migration is a bold technique that has been proposed to carry out evolutionary rescue on species threatened by climate change. While this idea is controversial for multiple reasons, the lack of data needed to design effective implementation hinders future use. **My lab will use the landscape genomics of *M. cardinalis* over a period of extreme drought to test the viability of assisted migration as a conservation strategy.** I will test two important assumptions of assisted migration: **(3.1)** *Assisted migration assumes the needed genotypes are not already present in declining populations.* **(3.2)** *Assisted migration also assumes that certain places on today's landscape will provide the needed genetic variation for future climates (space-for-time equivalency).* With a Genome BC grant I am sequencing ~800 whole genomes at 15X coverage across 70 sites (Fig. 3). I will carry out GWAS using environmental variables to find regions associated with drought severity and increased temperature. To test for the presence of needed genotypes in at-risk populations (3.1), I will determine the frequency of each adaptive allele or its distance away from each northern site. This will provide the first detailed analysis of the need for assisted migration. To test for space-for-time equivalency (3.2), the increase in frequency of drought-associated alleles will be tracked across a seven-year time series comprising 385 genomes from twelve sites. Finding concordant patterns across many adaptive loci would provide evidence in favor of the space-for-time assumption. In conjunction, these analyses will assess the need and benefits of utilizing assisted migration.

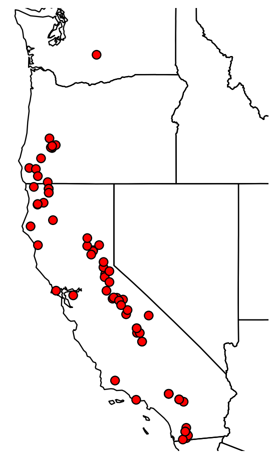

Fig. 3. Locations of 70 populations sampled across the range of *Mimulus cardinalis* prior to severe drought. Each location will be re-sampled in the near future to assess effects of climate change through resurrection experiments.

Establishing a landscape genomics pipeline for determining the need for assisted migration will allow broader applications to species at risk. My lab's approach will use the decreasing costs of sequencing to assess the distribution of putatively adaptive variation across a significant portion of a species' range, with the goal of identifying regions of increased conservation importance, and potential for assisted migration. The exact determination of target species will be based on the needs and prior work of local and regional government and conservation agencies. Through this collaboration I will be able to both advance the study of landscape genomics and help find conservation solutions for multiple species at-risk due to climate change and environmental degradation. Due to its clear broader impacts this work will be competitive for NSF and for applied funding sources.

(3) Spatiotemporal Variation in Herbivory and Plant Defence

Climate change is leading to a longer growing season, higher temperatures and increased drought. These conditions are likely to increase insect population sizes, activity, and number of generations within a season, as well as encourage northward spread and host shifts within native and invasive insects. It is likely that herbivore pressure will increase, placing plant populations under pressure to rapidly evolve greater defences against herbivores. **My lab seeks to quantify change in herbivory over time and the potential rapid evolution of increased plant defences across multiple taxonomically and geographically diverse systems**.

(3.1) *Does herbivory increase over time?* My lab will measure change in herbivory over time across a latitudinal gradient in *Oenothera biennis* and *M. cardinalis*. In 2012, I assessed latitudinal gradients in herbivory in *O. biennis* across 79 populations[1], forming a baseline for future comparisons. Strikingly I found increased herbivory at higher latitudes in fruit tissues (Fig. 2A), possibly already capturing increases due to

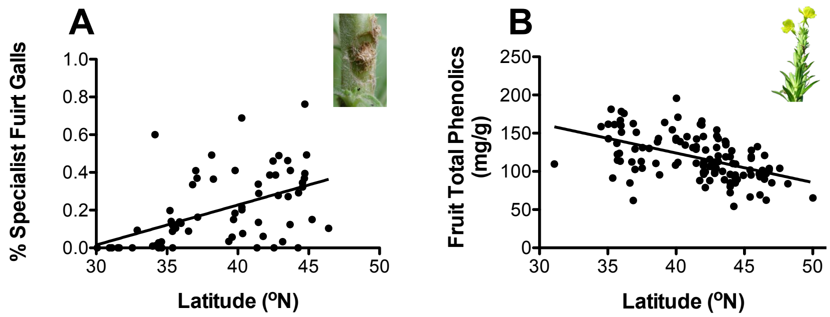

Fig. 2. Latitudinal gradients in *Oenothera biennis*. (A) Increased specialist fruit galls at higher latitudes in a latitudinal survey. (B) Plant chemical defences are lower at higher latitudes across 137 genotypes of *O. biennis.*

climate change. My lab will resurvey these latitudinal gradients for two years to search for changes in herbivory in individual regions and across a N-S transect of the species range. My lab will also add an herbivory monitoring program to our *M. cardinalis* demography surveys, allowing us to track herbivory changes over the next 20 years and assess the impact of this herbivory on population demography.

(**3.2**) *How do genetically based plant defences change across the range of a plant?* To assess changes in plant defences over time my lab will carry out a resurrection program using (A) *O. biennis*, (B) *M. cardinalis, and* (C) 12 species from Project Baseline[2]. Previous work I carried out on a range-wide seed collection of *O. biennis* showed increased plant defences at lower latitudes (Fig 2B) and measured at total of 24 plant resistance traits [3]. My lab will compare results from these genotypes, collected in 2002-2008, with new seed collections carried out in 2021. Through greenhouse and common garden experiments, my lab will assess changes in physical and chemical defences, induced defences, and herbivory tolerance. In *M. cardinalis* we will leverage the on-going seed collection efforts to assess trade-offs between adaptation to drought tolerance and evolution of plant defence. Specifically, will compare trichome evolution (which is an adaptation to both drought and herbivory) with chemical defences (phenylpropanoid glycosides).

My lab will assess change in plant defences using Project Baseline[2], a repository of range-wide seed collections for use in climate change research. Initially we will select collections of 12 annual species across multiple plant families (Asteraceae, Balsaminaceae, Brassicaceae, Campanulaceae, Fabaceae, Onagraceae, Phrymaceae). Baseline collections from 2014 through to 2018 will be compared to re-surveyed seeds which my lab will collect at least 5-years after initial collections. Evolution of plant defences will be assessed using resurrection experiments by growing past and future genotypes in greenhouses and common gardens. Plant defences and tolerance to herbivory will be broadly assessed through feeding trials with generalist and when possible specialist insects. Physical defences (e.g. trichome number), and broad-based chemical defences (e.g. total phenolics) will be assessed across all target species. More specialized chemical defences (e.g. glucosinolates, phenylpropanoid glycosides) will be assessed within taxa where they are relevant. For genera where molecular resources are available and chemical defence genes are described (e.g. *Brassica*, *Helianthus*), I would consider exploring genomic evidence of adaptation through candidate gene and GWAS approaches if these species show change in plant defences over time. This study would eventually also focus on perennial species once these seeds become available from project baseline (~2028-2030). Overall, the variability in the biogeography and evolutionary history of the target species will help ensure any observed patterns are generalizable, and variation attributable to differences in biology and geography.

References

1. Anstett, D. N., Naujokaitis-Lewis, I. & Johnson, M. T. J. Latitudinal gradients in herbivory on O*enothera biennis* vary according to herbivore guild and specialization. *Ecology* **95**, 2915-2923 (2014).
2. Baseline, P. http://www.baselineseedbank.org.
3. Anstett, D. N. *et al.* Can genetically based clines in plant defence explain greater herbivory at higher latitudes? *Ecol. Lett.* **18**, 1376–1386 (2015).

Throughout my time in academia, I have found that the best courses were those where passionate faculty were able to both engage my interest and ensure that the course content gave value and relevance to my program. I intend to bring these values into the classroom by making class a dynamic environment through experiential, discovery-based learning. Giving students a chance to explore, discover, and test concepts with data is more impactful than simple lecturing. I will emphasise labs, small in-class experiments, multimedia exercises, short-term field work, and discussion groups, providing more opportunity for students with diverse learning styles to be successful. Through these exercises, I will highlight the relevance of evolution to the critical issues of our times, like climate change and conservation.

Throughout my previous teaching experience, I have motivated students with diverse reasons for taking biology courses. To contextualize course content, I provided examples from a wide range of study systems. I highlighted the applications of theory to real world problems by emphasizing interdisciplinary links between fields. I employed some of these strategies as a teaching assistant in a second-year undergraduate ecology course. Here I gave lectures that began with a short multimedia presentation, followed by illustrating concepts with natural history. Then I would break up the class into discussion groups or begin the computer lab or field work portion of the tutorial. Based on surveys I conducted, students found this approach both helpful and engaging. I also have experience in running statistics tutorials and marking mock grant proposals in a variety of topics. As well, I also ran a workshop for 300 master gardeners on the effects of climate change on plants and insects. These experiences have helped shape my teaching philosophy and are my foundation for advancing modern, discovery-based teaching.

Effective mentorship is critical to the professional development of any student, regardless of their career path. From my experience, effective scientists are built by empowering students to ask interesting questions, building their technical and project management skills, and developing their communication capabilities. Achieving this skillset should not merely be left to chance. Instead the supervisor should ensure that students are on track by meeting regularly and investing themselves in their student's projects. Students should be encouraged to read widely within their field, then narrow down their interest to a series of questions, and build projects with ambitious goals, but a feasible scope. A supervisor should identify gaps in the student's knowledge base and skills and suggest ways to remove these barriers. Throughout this process a supervisor should build trust so that their students will be comfortable seeking guidance and support for professional and personal concerns. Ultimately, a mentor should be flexible by encouraging organization and structure when needed, but also leaving students the freedom to build their ideas and truly make a thesis their own. It is many of these qualities that I strive to emulate as a mentor.

The time I have spent mentoring students has been among the most rewarding parts of being a scientist. Throughout the past five years I have mentored many work-learn and volunteer students, supervised six undergraduate student projects, and one master's summer intern, and closely worked with and at times (unofficially) co-advised a PhD student. I have published three papers with my students as co-authors. One undergraduate student carried out two research projects and went on to secure her own funding to attend a national ecology and evolution conference. She is now conducting a Ph.D. in evolutionary genetics at the University of Toronto. These experiences have aided in establishing an adaptive mentorship style where I match the changing needs of my students. Initially, this might mean providing close supervision in order to build skills and confidence. By having regular meetings, I will provide guidance on how to approach the literature, narrow down research interests and develop research questions. Then as my student's progress, I will be there to ensure they plan well-designed experiments and have the skills required to see the science through from initial designs all the way to data analysis and writing. As students become more confident, they will work more independently while still maintaining regular updates. I will encourage students to read broadly and develop their own research designs, either within my study systems, or to develop their own system.

I will strive to provide the resources, training and support my students need to carry out rigorous science and become experts in their field of study. Ultimately, I will encourage students to chart out future career goals to position themselves to best fit what is needed to attain a job either in academia, government, private sector or NGOs. My supervisory style will emphasize building strong science communication skills through giving frequent feedback on writing and encouraging oral presentation opportunities. I will also strive to build a lab culture that is cohesive and collaborative, as well as encouraging participation through attendance of journal clubs and seminars. I will make the success and well-being of my students the top priority in my research program. Ensuring students have the guidance and support systems they need to be successful is what builds rigorous science and diversity within academia. A supervisor needs to identify gaps in a student's background and work to remove barriers (e.g. technical issues, excessive worrying) that can prevent academic success. Because of the power difference between students and mentors, developing a respectful and professional relationship is vital to ensure the functionality of mentoring.

I have pursued my academic and professional career within two of the most ethnically diverse cities in Canada. I carried out my undergraduate and doctoral studies in Toronto, and my postdoctoral studies in Vancouver. These environments gave substantial opportunity to mentor and advise students from many cultural and economic backgrounds. I strived to offer more than just a student project. I uplifted students by providing career advice, guiding them to improve their scientific communication skills, emphasizing the best practices for scientific rigor, and removing language and cultural barriers, especially in the early stages of their projects. For example, one of my students was an international student from Bangladesh, who was brilliant academically, but struggled with academic writing. I took the time to give feedback and advice, which ultimately allowed her to flourish as a researcher. She is now doing a PhD in chemical oncology. Additionally, during my PhD and postdoc, I supervised six undergraduate and intern students, and mentored fifteen students on various lab and field projects, many of whom were women of color. Throughout my academic career, supporting diversity through removing barriers to promote equity among my students has been at the center of my mentorship philosophy.

More broadly within my community, I sought to address equitable access to education through outreach in two non-governmental organizations. While carrying out my PhD, I was also on the board of directors of The Cabbagetown Community Arts Centre, an organization that provides affordable afterschool programs to intercity children within the St. James Town/Regent Park area of Toronto. I was also volunteer coordinator and advisor to the board of directors of the Nepali Children's Education Project, an NGO that fundraises and grants scholarships for students in Nepal, that would otherwise be unable to afford an education. During my time in graduate student government at Massey College (an interdisciplinary organization within the University of Toronto), I also actively engaged with issues of diversity and inclusion within the student body. I was part of initiatives surrounding the formation of a diversity secretariat, space allocation policies, and the formation of a new needs-based scholarship. These experiences demonstrate my familiarity with issues of access and equity within education. I hope to continue outreach work in a professional capacity through public lectures and outreach to schools from a diverse set of socioeconomic backgrounds.

At the University of Washington I will seek to build an academic home by inspiring student enthusiasm regardless of their background. This is particularly important given the underrepresentation of racial diversity within ecology and evolution as a whole and the intersectionality between race, gender, and economic background. Having inclusive and equitable spaces means providing role models and a sense of belonging to as many students as possible. It means creating constructive and respectful learning environments that seek to retain the diversity within student cohorts and to make the academy more relatable to underrepresented individuals. This can be pursued within the classroom by giving examples of excellent academic work from researchers from a range of backgrounds. It can also be achieved by advancing diverse teaching styles and instruction that will appeal to students with a variety of learning styles (see teaching statement).

Promoting diversity and equity is vital to advancing modern science. I will strive to build a diverse and inclusive lab by advancing an adaptive mentorship style that seeks to meet the needs of each of my students while giving them enough time and quality supervision (see mentorship section of teaching statement). Quality supervision includes creating a positive lab culture and aims to foster academic excellence and trust within its members. This type of encouragement is particularly important for first academic generation students who may need additional support in order to fit in and thrive. By advancing a supportive, understanding, and collegial lab community I hope to bolster a support network for my students. Ultimately this type of work will increase retention of underrepresented groups and advance the richness of our field through a more diverse set of perspectives.