

# ALEXANDER VAN NYNATTEN, PHD

Department of Biology  
University of Victoria  
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## Education

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- 2019      **Ph.D.** in *Cell and Systems Biology*  
*University of Toronto, Toronto, ON, Canada*  
**The molecular evolution of rhodopsin in marine-derived and other freshwater fishes**  
Advisors: Belinda SW Chang, Nathan R Lovejoy
- 2012      **B.Sc.** (Honours) in *Biochemistry and Cell Biology*  
*University of Western Ontario, London, ON, Canada*  
**Miniaturization of the CK2 kinase assay using capillary electrophoresis**  
Advisors: David Litchfield, Ken Yeung

## Appointments

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- 2023 – Present      **BIOSCAN Postdoctoral Fellow**  
*University of Victoria, Victoria, BC, Canada*  
**Molecular ecology and evolution of coral symbioses**  
Advisor: Julia K Baum
- 2021 – 2023      **Mitacs Postdoctoral Fellow**  
*University of Toronto Scarborough, Toronto, ON, Canada*  
**Identifying and quantifying entrained larval fishes using eDNA metabarcoding**  
Advisor: Nicholas E Mandrak
- 2019 – 2021      **Postdoctoral Fellow**  
*University of Toronto Scarborough, Toronto, ON, Canada*  
**Analysis of genomic evolution in Nearctic deepwater fishes**  
Advisors: Belinda SW Chang, Nathan R Lovejoy, Nicholas E Mandrak

## Peer-reviewed manuscripts

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21. Van Nynatten, A., Castañeda, R.A., Chakona, A., Lovejoy, N.R., Weyl, O.L.F., Mandrak, N.E. (2024). Environmental DNA metabarcoding in the Cape Fold aquatic ecoregion: opportunities and challenges for eDNA uptake in an endemism hotspot. *Freshw. Biol.* 69: 1627–1639.
20. Macpherson, E., Hauser, F.E., Van Nynatten, A., Chang, B.S.W., Lovejoy, N.R. (2024) Evolution of rhodopsin in flatfishes (Pleuronectiformes) is associated with depth and migratory behaviour. *J. Fish. Biol.* 105: 779–790.

19. Chen, S.K., Liu, J., **Van Nynatten, A.**, Tudor-Price, B.M., Chang, B.S.W. (2024) Sampling strategies for mapping molecular fitness landscapes using high-throughput methods. *J. Mol. Evol.* 92: 402–414.
18. **Van Nynatten, A.**, Duncan, A.T., Lauzon, R., Sheldon, T.A., Chen, S.K., Lovejoy, N.R., Mandrak, N.E., Chang, B.S.W. (2024) Adaptive evolution of Nearctic deepwater fish vision: a novel metabarcoding approach to monitor functional variation for conservation. *Mol. Biol. Evol.* 41: msae024
17. Scott, B.M., Chen, S.K., **Van Nynatten, A.**, Liu, J., Schott, R.K., Heon, E., Peisajovich S.G., Chang, B.S.W. (2024). Scaling up functional analyses of the G protein-coupled receptor rhodopsin. *J. Mol. Evol.* 92: 61–71
16. Hauser, F.E., Xiao, D., **Van Nynatten, A.**, Brochu, K., Rajakulendran, T., Elbassiouny, A.E., Crampton, W.G.R., Lovejoy, N.R. (2024). Selection on a voltage-gated sodium channel C-terminus (scn4aa) is associated with ecologically mediated differences in electric organ discharge in South American electric fishes. *Biol. Lett.* 20: 20230480
15. Chau, K.D., Hauser, F.E., **Van Nynatten, A.**, Daane, J.M., Harris, M.P., Chang, B.S.W., Lovejoy, N.R. (2024). Multiple Ecological Axes Drive Cone Opsin Evolution in Beloniformes. *J. Mol. Evol.* 92: 93–103.
14. **Van Nynatten, A.**, Gallage, K.S., Lujan, N.K., & Mandrak, N.E., Lovejoy, N.R. (2023). Ichthyoplankton metabarcoding: an efficient tool for early detection of invasive species establishment. *Mol. Ecol. Res.* 23: 1319-1333.
13. Gallage, K.S., **Van Nynatten, A.**, Lujan, N.K., Lovejoy, N.R., Mandrak, N.E. (2023). Identifying early life stages of Great Lakes fishes using a metabarcoding approach. *Can. J. Fish. Aquat. Sci.* 80: 1813-1823.
12. Castiglione, G.M., Chiu, Y.L., Gutierrez, E.A., **Van Nynatten, A.**, Hauser, F.E., Preston, M., Bhattacharya, N., Schott, R.K., B.S.W., Chang. (2023). Convergent Evolution of Dim Light Vision in Owls and Cetaceans. *Curr. Biol.* 33: 4733-4740.
11. Castiglione, G.M., Hauser, F.E., **Van Nynatten, A.**, Chang, B.S.W. (2023). Adaptation of Antarctic Icefish Vision to Extreme Environments. *Mol. Biol. Evol.* 40: msad030
10. **Van Nynatten, A.**, Castiglione, G.M., Gutierrez, E.A., Lovejoy, N.R., Chang, B.S.W. (2021). Recreated ancestral opsin associated with marine to freshwater croaker invasion reveals kinetic and spectral adaptation. *Mol. Biol. Evol.* 38: 2076-2087
9. Bzonek, P.A., **Van Nynatten, A.**, Mandrak, N.E. (2021). Phylogenetic signal found in a fish-community response to an acoustic deterrent deployed in a wetland. *Freshw Biol.* 66: 1698-1708.
8. Castañeda, R.A., Burliuk C.M.M., Casselman, J.M., Cooke, S.J., Dunmall, K.M., Forbes, L.S., Hasler, C.T., Howland, K.L., Hutchings, J.A., Klein, G.M., Nguyen, V.M., Price, M.H.H., Reid, A.J., Reist, J.D., Reynolds, J.D., **Van Nynatten, A.**, Mandrak, N.E. (2020). A brief history of fisheries in Canada. *Fisheries.* 45: 303-318.

7. Castañeda, R.A., **Van Nynatten, A.**, Crookes, S., Ellender, B., Heath, D., MacIsaac, H., Mandrak, N.E., Weyl, O.L.F. (2020). Detecting native freshwater fishes using novel non-invasive methods. *Front. Environ. Sci.* 8: 1-16.
6. **Van Nynatten, A.**, Janzen, F.H., Brochu, K., Maldonado-Ocampo, J.A., Crampton, W.G.R., Chang, B.S.W., Lovejoy, N.R. (2019). To see or not to see: molecular evolution of the rhodopsin visual pigment in neotropical electric fishes. *Proc. R. Soc. B*: 286: 20191182.
5. Schott, R.K., **Van Nynatten, A.**, Card, D.C., Castoe, T.A., Chang, B.S.W. (2018). Shifts in selective pressures on snake phototransduction genes associated with photoreceptor transmutation and dim-light ancestry. *Mol. Biol. Evol.* 35: 1376-1389.
4. Castiglione, G.M., Hauser, F.E., Liao, B.S., Lujan, N.K., **Van Nynatten, A.**, Morrow, J.M., Schott, R.K., Bhattacharyya, N., Dungan, S.Z., Chang, B.S.W. (2017). Evolution of non-spectral rhodopsin function at high altitudes. *Proc. Natl. Acad. Sci.* 114: 7385–7390.
3. Elbassiouny, A.A., Schott, R.K., Waddell, J.C., Kolmann, M.A., Lehmberg, E.S., **Van Nynatten, A.**, Crampton, W.G.R., Chang, B.S.W., Lovejoy N.R. (2016). Mitochondrial genomes of the South American electric knifefishes (Order Gymnotiformes). *Mitochondrial DNA B* 1: 401-403.
2. Hauser, F., Schott, R.K., Castiglione, G.M., **Van Nynatten, A.**, Kosyakov, A., Tang, P., Gow, D., Chang, B.S.W. (2015). Comparative sequence analyses of rhodopsin and RPE65 reveal patterns of selective constraint across hereditary retinal disease mutations. *Visual Neurosci.* 33:e002.
1. **Van Nynatten, A.**, Bloom, D.D., Chang, B.S.W., Lovejoy, N.R. (2015) Out of the blue: adaptive visual pigment evolution accompanies Amazon invasion. *Biol. Lett.* 11: 20150349.

### Manuscripts in review

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1. **Van Nynatten, A.**, Cuning, R., Tietjen, K.L., Baum, J.K. Marine heatwaves transform coral symbioses with enduring effects. *Ecol. Lett.* ELE-00906-2025. (In review - minor revisions.)
2. Yates, M.C., **Van Nynatten, A.**, Smith, I., Spice, E., Leblanc, J., Thalinger, B., Mandrak, N.E., Bajno, R., Boston, C., MacIsaac, H.J., Heath, D. Longer amplicon metabarcoding primers enhance fish taxonomic resolution in eDNA samples. *Can. J. Fish. Aquat. Sci.* cjfas-2025-0211. (Accepted)
3. Morphet, M., **Van Nynatten, A.**, Yates, M.C., Mandrak, N.E. eDNA improves the sensitivity of fish assemblage surveys in agricultural drains compared to conventional sampling. *Can. J. Fish. Aquat. Sci.* cjfas-2025-0142. (In review.)
4. Buzzoni, D., **Van Nynatten, A.**, Cuning, R., Baum, J.K. Persistent legacy effects of marine heatwaves on coral symbioses. *Glob. Chang. Biol.* (In review.)

### Book and Encyclopedia Chapters

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1. Gutierrez, E.A., **Van Nynatten, A.**, Lovejoy, N.R., B.S.W. Chang (2016). Sensory Systems: Molecular Evolution in Vertebrates. In: *The Encyclopedia of Evolutionary Biology*, Kliman, R.M. (ed.), Oxford: Academic Press, vol. 4, pp. 33–40

## Grant, Honours, and Awards

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2023	Travel award - Society for Molecular Biology and Evolution (\$1000)
2022	GenFish travel grant (\$500)
2021	Presentation award - GLAM EvoGen (\$50)
2021	MITACS accelerate (\$165,000 over 3 years)
2020	Canada 150 Genome Project grant (\$2500)
2019	Milestones and Pathways Grant to instruct data visualization workshop (\$1300)
2019	Society for Molecular Biology and Evolution Registration Award (\$700)
2018	Cell and Systems Biology Travel Grant (\$1000)
2017	Vision Science Research Fellowship - University Health Network (\$24,000)
2017	Cell and Systems Biology Travel Grant (\$1000)
2016	American Society of Ichthyologists and Herpetologists Student Travel Grant (\$762)
2016	Cell and Systems Biology Travel Grant (\$1000)
2016	Vision Science Research Fellowship - University Health Network (\$28,491)
2015	Zoology Sesquicentennial Graduate Award - Cell and Systems Biology, UofT (\$600)
2015	Vision Science Research Fellowship - University Health Network (\$27,829)
2014	Society of Graduate Studies Travel Grant (\$520)
2014	Cell and Systems Biology Travel Grant (\$400)
2014	Vision Science Research Fellowship - University Health Network (\$29,840)
2013	University of Toronto Fellowship (\$8,300)
2013	University of Toronto Fellowship (\$8,270)
2012	Dean's Honor list
2011	Dean's Honor list
2008	Western Scholarship of Distinction (\$1500)

## Invited Presentations

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2024	Invasives Species Council of BC Annual Forum and AGM, New Westminster, BC ( <i>oral</i> )
2024	Shedd Aquarium Lunch and Learn, Chicago, IL ( <i>oral</i> )

2023	Polar Knowledge Canada: Canadian High Arctic Research Station, Cambridge Bay, NU <i>(oral)</i>
2022	Electric Power Research Institute Great Lakes Interest Group Annual Meeting, online <i>(oral)</i>
2016	Vision Science Research Day, University Health Network, Toronto, ON <i>(oral)</i>

## Contributed Presentations

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2024	Canadian Society for Ecology and Evolution Annual Meeting, Vancouver, BC <i>(poster)</i>
2023	Society for Molecular Biology and Evolution Annual Meeting, Ferrara, IT <i>(oral)</i>
2023	Pathway to Increase Standards and Competency of eDNA Surveys Annual Meeting, Guelph, ON <i>(oral)</i>
2022	Gen-Fish Annual General Meeting, Windsor, ON <i>(oral)</i>
2022	The International Conference on Aquatic Invasive Species, online <i>(oral)</i>
2021	Great Lakes Annual Meeting of Evolutionary Genomics, online <i>(oral)</i>
2021	Evolution Meeting, online <i>(oral)</i>
2021	Society for Molecular Biology and Evolution Annual Meeting, online <i>(poster)</i>
2019	Society for Molecular Biology and Evolution Annual Meeting, Yokohama, JP <i>(poster)</i>
2018	Canadian Society for Ecology and Evolution Annual Meeting, Guelph, ON <i>(oral)</i>
2018	Interdisciplinary Graduate Research and Discovery Conference, Scarborough, ON <i>(oral)</i>
2017	Evolution Meeting, Portland, OR <i>(poster)</i>
2017	Vision Science Research Day, University Health Network, Toronto ON <i>(poster)</i>
2017	Canadian Society for Ecology and Evolution Annual Meeting, Victoria, BC <i>(poster)</i>
2016	Joint Meeting of Ichthyologists and Herpetologists, New Orleans, LA <i>(oral)</i>
2016	Great Lakes Bioinformatics Conference, Toronto, ON <i>(poster)</i>
2016	Vision Science Research Day, University Health Network, Toronto ON <i>(poster)</i>
2015	Vision Science Research Day, University Health Network, Toronto ON <i>(poster)</i>
2014	Evolution Meeting, Raleigh, NC <i>(poster)</i>
2013	International Biogeographic Society: Special Meeting, Montreal, QC <i>(poster)</i>
2013	Society for Molecular Biology and Evolution Annual Meeting, Chicago IL <i>(poster)</i>

## Teaching

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2023	Substitute Lecturer – BIOL 103: Non-Majors General Biology
2021	Guest Lecturer – BIOD52: Special Topics in Biodiversity and Conservation
2019	Instructor – Data Visualization Workshop for Grad Students and Postdocs
2019	Teaching Assistant – CSB492: Advanced Topics in Cell and Systems Biology
2018	Teaching Assistant – EEB460: Molecular Evolution and Genomics
2016 – 2018	Teaching Assistant – BIO255: Cell and Molecular Biology Advanced Laboratory
2013 – 2017	Teaching Assistant – BIO130: Molecular and Cellular Biology
2017	Teaching Assistant – BIOC51: Tropical Biodiversity Field Course
2015	Guest Lecturer – BIOB52: Ecology and evolutionary biology lab
2013	Teaching Assistant – BIO230: From Genes to Organisms
2012	Teaching Assistant – BIOC21: Vertebrate Histology – Cells and Tissues

## Mentoring

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Mareike de Breuyn (PhD student, University of Victoria)  
Daisy Buzzoni (PhD candidate, University of Victoria)  
Esme MacPherson (Masters student, University of Toronto Scarborough)  
Markelle Morphet (PhD candidate , University of Toronto Scarborough)  
Adam Poulin (Undergraduate student, University of Toronto Scarborough)  
Elizabeth Patterson (Undergraduate student, University of Toronto Scarborough)  
Benjamin Tudor Price (Undergraduate student, University of Toronto)  
Kavishka Gallage (Masters student, University of Toronto Scarborough)  
Fangyu Ren (Undergraduate student, University of Toronto)  
Matthew Woo (Masters student, University of Toronto)  
Iris Chiu (Masters student, University of Toronto)

## Field Experience

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2025      Kiritimati Island (3 weeks): Co-scientific lead of coral-symbiont survey for DNA metabarcoding.

- 2023 Cambridge Bay, Nunavut (3 weeks): Survey of fish biodiversity in the Arctic. eDNA and seine/electrofishing sampling of small lakes and bottom trawls of coastal waters.
- 2022 Meaford, Ontario (4 months): Deployment of autonomous eDNA sampler in Lake Huron for analysis of deepwater fish community in collaboration with Saugeen Ojibway Nation
- 2022 Cambridge Bay, Nunavut (2 weeks): Planning and logistics expedition for long-term study of Arctic fish diversity and evolution in collaboration with Polar Knowledge Canada
- 2021 Hamilton, Ontario (1 week): Invasive species surveys of urban storm water ponds using eDNA in collaboration with Fisheries and Ocean Canada
- 2019 Cederberg, South Africa (1 week): Fish and invertebrate survey of the Rondegat river in collaboration with the South African Institute for Aquatic Biodiversity
- 2016 Iquitos, Peru Field Expedition (3 weeks): Collection of electric organ tissue for transcriptomic analyses in collaboration with University of Central Florida
- 2015 Santarém, Brazil Field Expedition (3 weeks): Fish survey of the Amazon and Tapajos rivers in collaboration with University of Central Florida
- 2014 Iquitos, Peru Field Expedition (3 weeks): Collection of electric organ tissue for transcriptomic analyses in

### **Professional Memberships**

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Society for Molecular Biology and Evolution  
Society for the Study of Evolution  
Canadian Society for Ecology and Evolution  
Invasives Species Council of BC