

RYAN K SCHOTT

Assistant Professor
Department of Biology, York University
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APPOINTMENTS

Assistant Professor (2021–), Department of Biology, York University

Research Associate (2021–), National Museum of Natural History, Smithsonian Institution

Postdoctoral Research Biologist (2018–2020), National Museum of Natural History, Smithsonian Institution
(Advisor: Rayna Bell)

EDUCATION

PhD (2018), Ecology and Evolutionary Biology, University of Toronto (Advisor: Belinda Chang)

MSc (2011), Ecology and Evolutionary Biology, University of Toronto (Advisor: David Evans)

HBSc (2008), High Distinction, Evolutionary Biology, University of Toronto (Advisor: David Evans)

AWARDS, GRANTS & SCHOLARSHIPS

2022	Minor Research Grant (York University, \$500)
2022	Junior Faculty Fund (York University, \$2000)
2021–2025	NSERC Discovery Grant (\$140,000)
2021	NSERC Discovery Launch Supplement (\$12,500)
2021	NSERC Research Tools and Instruments, <i>co-applicant, applicant: Amro Zayed</i> (\$102,445)
2021	Minor Research Grant (York University, \$3000)
2021	Junior Faculty Fund (York University, \$2000)
2018	SMBE Young Investigator Travel Award (\$2,000)
2017	Peter A. Abrams Prize for Research Excellence (\$500)
2017	Gans Collections and Charitable Fund Conference Attendance Grant (\$600)
2016–2017	Doctoral Completion Award (\$1,350)
2015–2016	Vision Science Research Program Scholarship (\$27,841)
2015	Frederick P. Ide Graduate Scholarship in Ecology and Evolutionary Biology (\$750)
2015	Ontario Graduate Scholarship (\$15,000)
2014–2015	Vision Science Research Program Scholarship (\$18,840)
2014	Ontario Graduate Scholarship (\$15,000)
2013–2014	Vision Science Research Program Scholarship (\$14,840)
2011	Jackson School of Geosciences Student Member Travel Grant (\$400)
2011–2013	NSERC Postgraduate Scholarship D (\$63,000)

2010	Doris O. and Samuel P. Welles Research Fund (\$2,000)
2009	DRI Student Oriject Grant (\$2,000)
2009–2010	NSERC Canada Graduate Scholarship M (\$17,500)
2008	Frederick P. Ide Graduate Scholarship in Ecology and Evolutionary Biology (\$994)
2008	CS Rufus Churcher Graduate Scholarship in Zoology (\$1,164)
2008	Helen Sawyer Hogg Graduate Admission Award (\$5,000)

PEER-REVIEWED PUBLICATIONS

(*equal contribution; undergraduate mentee)

Summary: 11 first authored, 19 co-authored, h-index: 18

30. **Schott RK**, RC Bell, ER Loew, KN Thomas, DJ Gower, JW Streicher, MK Fujita. 2022. Transcriptomic evidence for visual adaptation during the aquatic to terrestrial metamorphosis in leopard frogs. *BMC Biology* (in press).
29. Thomas KN, DJ Gower, JW Streicher, RC Bell, MK Fujita, **RK Schott**, HC Liedtke, CFB Haddad, CG Becker, CL Cox, RA Martins, RH Douglas. 2022. Ecology drives patterns of spectral transmission in the ocular lenses of frogs and salamanders. *Functional Ecology* 36: 850–864.
28. **Schott RK**, L Perez, MA Kwiatkowski, V Imhoff, JM Gumm. 2022. Evolutionary analyses of visual opsin genes in frogs and toads: diversity, duplication, and positive selection. *Ecology and Evolution* 12:e8595.
27. Shrimpton SJ*, JW Streicher*, DJ Gower, RC Bell, MK Fujita, **RK Schott**, KN Thomas. 2021. Eye-body allometry across biphasic ontogeny in anuran amphibians. *Evolutionary Ecology* 35: 337–359.
26. Hauser FE, KL Ilves, **RK Schott**, Alvi E, H López-Fernández, BSW Chang. 2021. Evolution, inactivation, and loss of short wavelength-sensitive opsin genes during the diversification of Neotropical cichlids. *Molecular Ecology* 30: 1688–1703.
25. Thomas KN, DJ Gower, RC Bell, MK Fujita, **RK Schott**, JW Streicher. 2020. Eye size and investment in frogs and toads correlate with adult habitat, activity pattern and breeding ecology. *Proceedings of the Royal Society B* 287: 20201393.
24. Gemmel NJ, ... **RK Schott**, ... Ngatiwai Trust Board [60 authors total]. 2020. The tuatara genome reveals ancient features of amniote evolution. *Nature* 584: 403–409.
23. **Schott RK**, N Bhattacharyya, BSW Chang. 2019. Evolutionary signatures of photoreceptor transmutation in geckos reveal potential adaptation and convergence with snakes. *Evolution* 73: 1958–1971.
22. Gutierrez EA, GM Castiglione, JM Morrow, **RK Schott**, LO Loureiro, BK Lim, BSW Chang. 2018. Functional shifts in bat dim-light visual pigments are associated with differing echolocation abilities and reveal molecular adaptation to photic-limited environments. *Molecular Biology and Evolution* 35: 2422–2434.
21. Perry BW*, DC Card*, ... **RK Schott**, ... TA Castoe [32 authors total]. 2018. Molecular adaptations for sensing and securing prey, and insight into amniote genome diversity, from the garter snake genome. *Genome Biology and Evolution* 10: 2110–2129.
20. Gutierrez EA, **RK Schott**, MW Preston, LO Loureiro, BK Lim, BSW Chang. 2018. The role of ecological factors in shaping bat cone opsin evolution. *Proceedings of the Royal Society B* 285: 20172835.
19. **Schott RK**, A Van Nynatten, DC Card, TA Castoe, BSW Chang. 2018. Shifts in selective pressures on snake phototransduction genes associated with photoreceptor transmutation and dim-light ancestry. *Molecular Biology and Evolution* 35: 1376–1389.

18. Castiglione GM, **RK Schott**, FE Hauser, BSW Chang. 2018. Convergent selection pressures via divergent mechanisms drive the evolution of rhodopsin kinetics at high altitudes. *Evolution* 72: 170–186.
17. **Schott RK**, B Panesar, DC Card, M Preston, TA Castoe, BSW Chang. 2017. Targeted capture of complete coding regions across divergent species. *Genome Biology and Evolution* 9: 398–414.
16. Hauser FE, KL Ilves, **RK Schott**, GM Castiglione, H López-Fernández, BSW Chang. 2017. Accelerated evolution and functional divergence of the dim light visual pigment accompanies cichlid colonization of Central America. *Molecular Biology and Evolution* 34: 2650–2664.
15. Castiglione GM, FE Hauser, BS Liao, NK Lujan, A Van Nynatten, JM Morrow, **RK Schott**, N Bhattacharyya, SZ Dungan, BSW Chang. 2017. Evolution of nonspectral rhodopsin function at high altitudes. *Proceedings of the National Academy of Sciences of the United States of America* 114: 7385–7390.
14. Bhattacharyya N, B Darren, **RK Schott**, V Tropepe, BSW Chang. 2017. Cone-like rhodopsin expressed in the all cone retina of the colubrid pine snake as a potential adaptation to diurnality. *Journal of Experimental Biology* 220: 2418–2425.
13. Morrow JM, S Lazic, DM Fox, C Kuo, **RK Schott**, E Gutierrez, F Santini, V Tropepe, BSW Chang. 2017. A second visual rhodopsin gene, rh1-2, is expressed in zebrafish photoreceptors and found in other ray-finned fishes. *Journal of Experimental Biology* 220: 294–303.
12. **Schott RK**, J Müller, CGY Yang, N Bhattacharyya, N Chan, M Xu, JM Morrow, A-H Ghenu, ER Loew, V Tropepe, BSW Chang. 2016. Evolutionary transformation of rod photoreceptors in the all-cone retina of a diurnal garter snake. *Proceedings of the National Academy of Sciences of the United States of America* 113: 356–361.
11. **Schott RK**, DC Evans. 2016. Cranial variation and systematics of *Foraminacephale brevis* gen. nov. and the diversity of pachycephalosaurid dinosaurs (Ornithischia: Cerapoda) in the Belly River Group of Alberta, Canada. *Zoological Journal of the Linnean Society* doi: 10.1111/zoj.12465.
10. Elbassiouny AA, **RK Schott**, JC Wadell, MA Kolmann, E Lehmborg, A Van Nynatten, WGR Crampton, BSW Chang, NR Lovejoy. 2016. Mitochondrial genomes of the South American electric knifefishes (Order Gymnotiformes). *Mitochondrial DNA Part B* 1: 401–403.
9. Hauser FE, **RK Schott**, GM Castiglione, A Van Nynatten, A Kosyakov, PL Tang, DA Gow, BSW Chang. 2016. Comparative sequence analyses of rhodopsin and RPE65 reveal patterns of selective constraint across hereditary retinal disease mutations. *Visual Neuroscience* 33: E002.
8. Bickelmann C, JM Morrow, J Du, **RK Schott**, I van Hazel, S Lim, J Müller, BSW Chang. 2015. The molecular origin and evolution of dim-light vision in mammals. *Evolution* 69: 2995–3003.
7. **Schott RK***, S Refvik*, FE Hauser, H López-Fernández, BSW Chang. 2014. Positive Selection at Non-Overlapping Sites in Rhodopsin from Lake and Riverine Cichlids. *Molecular Biology and Evolution* 31: 1149–1165.
6. Williams R, X Ma*, **RK Schott***, N Mohammad, CY Ho, CF Li, BSW Chang, M. Demetriou, JW Dennis. 2014. Encoding asymmetry of the n-glycosylation motif facilitates glycoprotein evolution. *PLoS ONE* 9: e86088.
5. Castoe TA, ... **RK Schott**, ... DD Pollock [39 authors total]. 2013. The Burmese python genome reveals the molecular basis for extreme adaptation in snakes. *Proceedings of the National Academy of Sciences of the United States of America* 110: 20645–20650.
4. Evans DC, **RK Schott**, D Larson, C Brown, MJ Ryan. 2013. The oldest North American pachycephalosaurid and the hidden diversity of small-bodied ornithischian dinosaurs. *Nature Communications* 4: 1828.
3. **Schott RK**, DC Evans. 2012. Squamosal ontogeny and variation in the pachycephalosaurian dinosaur *Stegoceras validum* from the Dinosaur Park Formation, Alberta. *Journal of Vertebrate Palaeontology* 32: 903–913.

2. **Schott RK**, DC Evans, MB Goodwin, CM Brown, JR Horner, NR Longrich. 2011. Cranial ontogeny in *Stegoceras validum* (Dinosauria: Pachycephalosauria): a quantitative model of pachycephalosaur dome growth and variation. *PLoS ONE* 6: e21092.
1. **Schott RK**, DC Evans, TE Williamson, TD Carr, MB Goodwin. 2009. The anatomy and systematics of *Colepiocephale lambei* (Dinosauria: Pachycephalosauridae). *Journal of Vertebrate Paleontology* 29: 771–786.

PREPRINT PUBLICATIONS & IN REVIEW

2. Amartya MT, MC Womack, DJ Gower, JW Streicher, Brett C, RC Bell, **RK Schott**, MK Fujita, KN Thomas. 2022. Ocular lens morphology is influenced by ecology and metamorphosis in frogs and toads. (*in revision*)
2. Thomas KN, C Rich, R Quock, JW Streicher, DJ Gower, **RK Schott**, Fujita MK, Bel RC. 2021. Diversity and evolution of amphibian pupil shapes. *bioRxiv* <https://doi.org/10.1101/2021.08.15.456426>. (*in revision*)
1. **Schott RK***, D Gow*, BSW Chang. 2019. BlastPhyMe: A toolkit for rapid generation and analysis of protein-coding sequence datasets. *bioRxiv* doi: 10.1101/059881.

BOOK AND ENCYCLOPEDIA CHAPTERS

2. Gower DJ, E Hauzman, BF Simões and **RK Schott**. 2022. Eyes, Vision, and the Origins and Early Evolution of Snakes. In: Gower DJ, Zaher H, editors. The Origin and Early Evolutionary History of Snakes. Cambridge University Press. p. 316–348. (*in press*)
1. **Schott RK**. 2017. Squamate Sensory Systems. In: Vonk J, Shackelford T, editors. Encyclopedia of Animal Cognition and Behavior. Cham: Springer International Publishing. p. 1–9.

TEACHING EXPERIENCE

- BIOL2060 – Biostatistics (2021–)
- BIOL3060 – Animal Physiology I (2021–)
- BIOL 5081 – Introduction to Biostatics (graduate, 2021–)

MENTORING EXPERIENCE

PhD Students (York University)

- Golnar Jalilvand (incoming Fall 2022)
- Taegan Perez (incoming Fall 2022)

Undergraduate Student Award (USRA) Students (NSERC, DURA)

- Ron Alesker (York University, 2022): Molecular evolution of frog lens crystallin and pigmentation genes during major ecological transitions (NSERC)
- Minoosh Fathi (York University, 2022): Sequencing, assembly, and evolutionary analyses of the first eye transcriptomes from salamanders (DURA)
- Wali Mir (York University, 2021): Molecular Evolution of Turtle Vision (NSERC)

Undergraduate Thesis (BIOL4000) Students

- Amirmohammad Nasiri (York University, 2021–22): Molecular Evolution of Phototransduction Recovery Genes Across Frogs
- Wali Mir (York University, 2021–22): Molecular Evolution of Vision in Side-necked and Hidden-necked Turtles

York Science Scholars Award (YSSA) Students

- Abdullah Hakeem (York University, 2022): Molecular evolution of frog lens crystallin and pigmentation genes
- Saesha Kukreja (York University, 2022): Molecular evolution of frog lens crystallin and pigmentation genes
- Aaiza Khan (York University, 2021): Molecular Evolution of Phototransduction in Frogs
- Sabrina Brusco (York University, 2021): Molecular Evolution of Phototransduction in Frogs

Research at York (RAY) Program Students

- Vanessa Caramanica (York University, 2022): Molecular Evolution Undergraduate Researcher
- Minh-Anne Than (York University, 2022): Molecular Biology Undergraduate Researcher
- Camille Lavoie (York University, 2021): Molecular Evolution Undergraduate Researcher
- Amirmohammad Nasiri (York University, 2021): Bioinformatics Undergraduate Researcher

Undergraduate Research Project and Internship Students

- Phoebe Hall (CAS, 2020): Molecular evolution of phototransduction genes across frogs. *Ongoing project.*
- Angela Adjei (CAS, 2020): Evolution of visual genes in side-necked turtles. *Ongoing project.*
- Ashmika Behere (NMNH, 2020): Genomics of visual system regression in caecilians. *Ongoing project.*
- John Boyette (NMNH, 2019–): Evolution of non-visual opsin genes across the frog tree of life. *Ongoing project.*
- Maya Woolfolk (NMNH, 2018): Molecular evolution of phototransduction genes during major life history transitions in frogs. *Ongoing project.*
- Matthew Preston (U of T, 2015–2017): *De novo* assembly methods for complete coding regions from hybrid enrichment data, co-author on a published article.
- Mark Hibbins (U of T, 2015–2016): Molecular evolution of lens crystallin genes in snakes.
- Daniel Gow (U of T, 2013–2015): BlastPhyMe: A toolkit for rapid generation and analysis of protein-coding sequence datasets, co-lead, preprint on bioRxiv. Also co-author on a published article.
- Bhawandeep Panesar (U of T, 2013–2015): NGS Data Analysis, development of scripts and methods, co-author on a published article.
- Benedict Darren (U of T, 2011–2013): Characterizing the visual pigment complement of the northern pine snake *P. melanoleucus*, co-author on a published article.

Research Assistants, Work Study Students and Volunteers

York University: Renee Gorman (2021), Lauren Grant-Assor (2021)

University of Toronto: Xiaotong Yang, Jiayang (Kelly) Wu, Lubna Waheed, Seemi Qaiser, River Jiang, Trevor Sless, Te (Fred) Chen

INVITED PRESENTATIONS

2022 Centre for Vision Research, York University, *Virtual*
 2020 National Museum of Natural History, Smithsonian Institution, *Virtual*
 2020 Genomic Social Hour, California Academy of Sciences, *Virtual*
 2020 Department of Biology, York University, Toronto, ON
 2019 Department of Biology, University of Oklahoma, Norman, OK
 2019 Department of Biology, University of Texas Arlington, Arlington, TX
 2018 Department of Biology, Utah State University, Logan, UT
 2018 Department of Life Sciences, Natural History Museum, London, UK
 2018 Behavior, Ecology, Evolution, and Systematics (BEES), University of Maryland, College Park, MD
 2018 National Eye Institute, National Institute of Health, Bethesda, MD
 2018 Department of Zoology, Smithsonian National Museum of Natural History, Washington, DC

SELECTED CONFERENCE PRESENTATIONS

(Undergraduate mentee)

Boyette J, RC Bell, KN Thomas, JW Streicher, DJ Gower, **RK Schott**. 2021. Evolution of non-visual opsin genes across life history transitions in frogs. Society for Integrative and Comparative Biology Annual Meeting. *Virtual*. **Winner of Wake Award for Best Student Paper**

Schott RK, RC Bell, ER Loew, KN Thomas, DJ Gower, JW Streicher, MK Fujita. 2021. Visual adaptations in the transition from aquatic to terrestrial light environments in the life cycle of southern leopard frogs. Society for Integrative and Comparative Biology Annual Meeting. *Virtual*.

Schott RK, M Woolfolk, K Thomas, E Loew, J Streicher, D Gower, M Fujita, R Bell. 2019. Evolution of visual pigments and opsin genes in frogs with distinct life histories. Evolution Conference 2019. Providence, RI.

Schott RK, BSW Chang. 2018. Evolution and Molecular Mechanisms of Photoreceptor Transmutation. II Joint Congress on Evolutionary Biology. Montpellier, France.

Schott RK, BSW Chang. 2018. Evolution and Molecular Mechanisms of Photoreceptor Transmutation. Society for Molecular Biology and Evolution Meeting 2018. Yokohama, Japan.

Schott RK and BSW Chang. 2017. Photoreceptor transmutation in snakes and geckos. Evolution Conference 2017. Portland, OR.

Schott RK, A Van Nynatten, DC Card, TA Castoe, BSW Chang. 2017. Transcriptome sequencing reveals divergent selective pressures on snake visual transduction genes associated with rod-cone transmutation. Evolution Conference 2017. Portland, OR.

Schott RK, D Gow, BSW Chang. 2016. BlastPhyMe: A Toolkit for Rapid Generation and Analysis of Protein-Coding Sequence Datasets. Evolution Conference 2016. Austin, TX.

Schott RK, B Panesar, BSW Chang. 2016. Targeted hybrid enrichment of complete coding regions across divergent species. Evolution Conference 2016. Austin, TX.

Schott RK, D Gow, BSW Chang. 2016. RSAT: A toolkit for rapid generation and analysis of protein-coding sequence datasets. Great Lakes Bioinformatics Conference. Toronto, ON.

Schott RK, C Yang, N Bhattacharyya, N Chan, M Xu, ER Loew, JM Morrow, V Tropepe, J Müller, BSW Chang. 2014. Blue-shifted rhodopsin expressed in transmuted cones of the diurnal colubrid snake *Thamnophis proximus*. Society for Molecular Biology and Evolution Meeting 2014. San Juan, Puerto Rico.

Schott RK, F Hauser, S Refvik, H López-Fernández, BSW Chang. 2013. Molecular evolution of rhodopsin in lake and riverine cichlids. Society for Molecular Biology and Evolution Meeting 2013. Chicago, IL.

Schott RK, B. Darren, BSW Chang. 2012 Molecular evolution of reptilian visual pigments. First Joint Congress on Evolutionary Biology. Ottawa, ON.