Benjamin (Ben) A. Sandkam

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Beaty Biodiversity Centre, 140-2212 Main Mall
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UPCOMING APPOINTMENT

2021 **Assistant Professor** | Cornell University, Ithaca NY, USA
Department of Neurobiology and Behavior.

CURRENT APPOINTMENT

2019-2021 **Banting Postdoctoral Fellow** | University of British Columbia, Vancouver BC, Canada
Department of Zoology. Advisor: Prof. Judith Mank

PREVIOUS APPOINTMENTS & EDUCATION

2016-2018 **Postdoctoral Researcher** | University of Maryland, College Park MD, USA
Department of Biology. Advisor: Prof. Karen Carleton
Visiting Scientist (2018 Concurrent) | National Institutes of Health (NIH), Bethesda MD, USA
National Eye Institute. Host: Anand Swaroop

2009-2016 **PhD Biological Sciences** | Simon Fraser University, Burnaby BC, Canada
Department of Biological Sciences. Advisor: Prof. Felix Breden
Thesis: Beauty in the eyes of the beholders: Colour vision and mate choice in the family Poeciliidae

2005-2009 **BSc Integrative Biology** | University of Illinois at Urbana-Champaign, Urbana IL, USA
Graduated with *High Distinction*. School of Integrative Biology. Advisor: Prof. Becky Fuller
Thesis: The influence of cannibalism on egg microhabitat in the Bluefin Killifish (*Lucania goodei*)

FUNDING & AWARDS

Total: $207,475 CAD & $11,200 USD

2019 Banting Postdoctoral Fellowship | Natural Sciences and Engineering Research Council (NSERC) of Canada ($140,000 CAD)
2019 Vice President Research & Innovation Research Allowance | University of British Columbia ($10,000 CAD)
2016 Quirks and Quarks Award for Best PhD Thesis | Simon Fraser University (SFU) ($1,000 CAD)
2015 Travel and Minor Research Award | SFU ($500 CAD)
2014 Graduate Fellowship | SFU ($6,250 CAD)
2013 Graduate Student Research Award | SFU ($12,500 CAD)
2013 President's PhD Scholarship | SFU ($6,250 CAD)

2013 Travel and Minor Research Award | SFU ($500 CAD)

2013 Graduate Fellowship | SFU ($12,500 CAD)

2012 Travel and Minor Research Award | SFU ($500 CAD)

2012 Winner Student Poster Competition in Environment and Ecology | American Association for the Advancement of Science (AAAS) ($500 USD)

2012 Best Student Oral Presentation in Division of Ecology and Evolution | Society for Integrative and Comparative Biology (SICB) ($200 USD)

2011 Travel and Minor Research Award | SFU ($500 CAD)

2011 Professional Development Grant | Graduate Student Society, SFU ($500 CAD)

2011 Graduate Fellowship | SFU ($6,250 CAD)

2011 Graduate International Research Travel Award | SFU ($3,975 CAD)

2010 Rosemary Grant Graduate Student Research Award | Society for the Study of Evolution ($2,500 USD)

2010 Graduate Fellowship | SFU ($6,250 CAD)

2009 Procter and Gamble Research Award for Undergraduates ($500 USD)

2008 Research Experience for Undergraduates (REU) | University of Illinois at Urbana/Champaign ($7,500 USD)

PUBLICATIONS

* Denotes undergraduate author.

Preprint

(23) **Sandkam BA**, Almeida P, Darolti I, Furman BLS, van der Bijl W, Morris J, Bourne G, Breden F, Mank JE. Extreme Y chromosome polymorphism corresponds to five male reproductive morphs. BioRxiv. https://doi.org/10.1101/2020.08.19.258434

In Press

(22) Almeida P, **Sandkam BA**, Morris J, Darolti I, Breden F, Mank JE. Divergence and Remarkable Diversity of the Y Chromosome in Guppies. *Molecular Biology and Evolution*. https://doi.org/10.1101/2020.07.13.200196

(21) Carleton KL, Conte M, Malinsky M, Nandamuri SP, **Sandkam BA,** Meier JI, Mwaiko S, Seehausen O, Kocher T. Movement of transposable elements contributes to cichlid diversity. *Molecular Ecology.* https://doi.org/10.1101/2020.02.26.961987

2020

(20) **Sandkam BA**, Campello L, O'Brien C, Nandamuri SP, Gammerdinger W, Conte M, Swaroop A, and Carleton KL. *Tbx2a* modulates switching of *RH2* and *LWS* opsin gene expression. *Molecular Biology and Evolution*. 37(7):2002-2014. https://doi.org/10.1093/molbev/msaa062

(19) Furman BLS, Metzger DCH, Darolti I, Wright AE, **Sandkam BA**, Almeida P, Shu JJ, Mank JE. Sex chromosome evolution: So many exceptions to the rules. *Genome Biology and Evolution*. 12(6):750-763. https://doi.org/10.1093/gbe/evaa081

2019

(18) Darolti I, Wright AE, **Sandkam BA**, Morris J, Bloch NI, Farré M, Fuller RC, Bourne GR, Larkin DM, Breden F, and Mank JE. Extreme heterogeneity in sex chromosome differentiation and dosage compensation in livebearers. *Proceedings of the National Academy of Sciences*. 116(38):19031-19036 https://doi.org/10.1073/pnas.1905298116

(17) Yourick MR, **Sandkam BA**, Gammerdinger WJ, Escobar-Camacho D, Nandamuri SR, Clark FE, Joyce B*, Conte MA, Kocher TD, and Carleton KL. Diurnal variation in opsin expression and common housekeeping genes necessitates comprehensive normalization methods for quantitative real- time PCR analyses. *Molecular Ecology Resources*. 2019; 00: 1-14. https://doi.org/10.1111/1755-0998.13062

(16) Wright AE, Darolti I, Bloch NI, Oostra V, **Sandkam BA**, Buechel SD, Kolm N, Breden F, Vicoso B, and Mank JE. On the power to detect rare recombination events. *Proceedings of the National Academy of Sciences.* 116(26):12607-12608. https://doi.org/10.1073/pnas.1905555116

(15) Gammerdinger WJ, Conte MA, **Sandkam BA**, Penman DJ, and Kocher TD. Characterization of sex chromosomes in three deeply diverged species of Pseudocrenilabrinae (Teleostei: Cichlidae). *Hydrobiologia.* 382(1):397-408. https://doi.org/10.1007/s10750-018-3778-6

2018

(14) **Sandkam B**, Dalton B, Breden F, and Carleton K. Re-viewing guppy color vision: Integrating the molecular and physiological variation in visual tuning of a classic system for sensory drive. *Current Zoology* 64 (4): 535-545. https://doi.org/10.1093/cz/zoy047

(13) Gammerdinger W, Conte M, **B Sandkam B**, Ziegelbecker A, Koblmuller S, and Kocher T. Novel sex chromosomes in three cichlid fishes from Lake Tanganyika. *Journal of Heredity* 109(5): 489–500. https://doi.org/10.1093/jhered/esy003 ** *"Editor's Choice" Paper* **

2017

(12) **Sandkam, BA**, JB Joy, CT Watson, and F Breden. Genomic Environment Impacts Color Vision Evolution in a Family with Visually Based Sexual Selection. *Genome Biology & Evolution* 9 (11): 3100–3107. https://doi.org/10.1093/gbe/evx228

(11) Wright AE, Darolti I, Bloch NI, Oostra V, **Sandkam B**, Buechel SD, Kolm N, Breden F, Vicoso B, and Mank JE. Convergent recombination suppression suggests a role of sexual selection in guppy sex chromosome formation. *Nature Communications* 8: 14251. https://doi.org/10.1038/ncomms14251

2016

(10) **Sandkam BA**, Deere-Machemer KA, Johnson AM, Grether GF, Rodd FH, and Fuller RC. Exploring visual plasticity: Dietary carotenoids can change color vision in guppies (*Poecilia reticulata*). *Journal of Comparative Physiology A*. 202(7): 527-534. https://doi.org/10.1007/s00359-016-1097-9

(9) Taves MD, Losie JA*, Rahim T*, Schmidt KL, **Sandkam BA**, Ma C, Silversides FG, and Soma KK. Locally elevated cortisol in lymphoid organs of developing altricial but not precocial birds. *Developmental & Comparative Immunology*, 54(1): 116-125. https://doi.org/10.1016/j.dci.2015.09.004

2015

(8) **Sandkam BA**, Young CM*, Breden FW*, Bourne GR, and Breden F. Color vision varies more among populations than species of live-bearing fish from South America. *BMC Evolutionary Biology*, 15 (225). https://doi.org/10.1186/s12862-015-0501-3

(7) **Sandkam BA**, Young CM*, and Breden F. Beauty in the eyes of the beholders: colour vision is tuned to mate preference in the Trinidadian guppy (*Poecilia reticulata*). *Molecular Ecology*, 24 (3): 596-609. https://doi.org/10.1111/mec.13058 ** *Cover Story* **

(6) Ehlman S, **Sandkam BA**, Breden F, and Sih A. Developmental plasticity in vision and behavior may help guppies overcome increased turbidity. *Journal of Comparative Physiology A*, 201 (12):1125-1135. https://doi.org/10.1007/s00359-015-1041-4

(5) Lindholm A, **Sandkam BA**, Pohl K*, and Breden F. *Poecilia picta*, a close relative to the guppy, exhibits red male coloration polymorphism: a system for phylogenetic comparisons. *PLoS One* 10(11): e0142089. https://doi.org/10.1371/journal.pone.0142089

(4) Taves MD, Plumb AW, Ma C, **Sandkam BA**, Close DA, Abraham N, and Soma KK. Steroid profiling reveals widespread local regulation of glucocorticoid levels during mouse development. *Endocrinology*, 156 (2): 511-522. https://doi.org/10.1210/en.2013-1606

2013

(3) **Sandkam BA**, Joy JB, Watson CT, Gonzales-Bendicksen P*, Gabor CR, and Breden F. Hybridization leads to sensory repertoire expansion in a gynogenetic fish, the Amazon molly (*Poecilia formosa*): a test of the hybrid-sensory expansion hypothesis. *Evolution*, 67 (1): 120–130. http://doi.org/10.1111/j.1558-5646.2012.01779.x

2011

(2) **Sandkam BA***, and Fuller RC. The effects of water depth and light on oviposition and egg cannibalism in the Bluefin Killifish *Lucania goodei*. *Journal of Fish Biology*, 78 (3): 967-972. https://doi.org/10.1111/j.1095-8649.2011.02909.x

(1) Watson CT, Gray SM, Hoffmann M, Lubieniecki KP, Joy JB, **Sandkam BA**, Weigel D, Loew E, Dreyer C, Davidson WS, and Breden F. Gene duplication and divergence of long wavelength-sensitive opsin genes in the Guppy, *Poecilia reticulata*. *Journal of Molecular Evolution* 72 (2): 240-252. https://doi.org/10.1007/s00239-010-9426-z

SERVICE

Invited Reviewer for Journals (Total: 43 reviews. Publons profile: https://bit.ly/2KVEHOT)

Aquaculture Research
Behavioral Ecology
Behavioural Ecology and Sociobiology
BMC Evolutionary Biology
Conservation Physiology
Current Zoology

Ecology and Evolution
Environmental Pollution
Evolution
Evolution Letters
Evolutionary Biology
Functional Ecology
General and Comparative Endocrinology
Genome Biology and Evolution
International Journal of Molecular Sciences
Journal of Fish Biology
Molecular Ecology
Nature Communications
North American Journal of Fisheries Management
PLoS ONE
Proceedings of the Royal Society of London- B
Royal Society Open Science
Vision Research

Invited Reviewer for Grants and Competitions

2019-20 Judge for the undergraduate Animal Behavior poster competition | University of British Columbia

2018 Judge for the national level (USA & Canada) of the ExploraVision K-12 Science Competition https://www.exploravision.org

2016 External Reviewer for Operating Grant | National Science Foundation

TEACHING EXPERIENCE

Course Designer and Lecturer | Population Genetics

Simon Fraser University

Designed and taught upper undergraduate/early graduate level course in population genetics. Developed syllabus, prepared and gave 1.5 hour lectures twice per week, developed weekly problem sets, developed computer simulation-based labs, wrote exams, oversaw TA and held office hours. (Fall 2014)

Teaching Assistant

Simon Fraser University

Taught 3-4 discussion groups per week supplementing lectures, graded assignments/exams and held office hours.

- General Biology for the Non-Major (Spring 2011)
- General Biology (Spring 2010)
- Genetics (Fall 2011)
- Evolution (Fall 2009, Spring 2013)

Tutor Marker | Online course in Genetics

Simon Fraser University

All grading and student interaction of online course in Genetics (Summer 2012, Summer 2014)

Outreach & Inclusion

2019 Volunteer with the STEM Mentoring Café – discuss STEM careers with small groups of primary school students https://www.opensciencenet.org

2019 Made video as part of the 'Researchers Revealed' series with the Beaty Biodiversity Museum

2019 Participation in the 'Diversity By Design Workshop', UBC Equity Office

2017 Completion of the Diversity and Inclusion Workshop series at the University of Maryland https://bit.ly/2Nx7R8w

2017 Volunteer with the Biology department at Maryland Day | Caught fish and aquatic insects from the local creek and shared with the public https://marylandday.umd.edu

2016 Led tours of our fish lab and discussed fish with the Center for Young Children (ages 3-5) at the University of Maryland

2011-13 Gave lab tours and discussion of the role of research in undergraduate degree to first year undergraduate students | Simon Fraser University

2012 Research presentation to local high school teachers | Simon Fraser University

Mentorship

Simon Fraser University & University of Maryland

I have directly mentored 12 undergraduate students (8 women; 4 minority) conducting research in the lab. I trained them in molecular and behavioral techniques, and theory. While working with me:

- Two were awarded Undergraduate Student Research Awards (USRAs) from the Natural Sciences and Engineering Research Council (NSERC) of Canada.
- One received the Biological Sciences Excellence in Undergraduate Research Award from Simon Fraser University.
- One graduated with Honors from the University of Maryland.

Guest Lectures

Evolution | Simon Fraser University (2012, 2013)

Population Genetics | Simon Fraser University (2015)

Sexual Selection in Nature | University of Maryland (2017, 2018)

The Biology of Vision | University of Maryland (2018)

Animal Behavior | University of British Columbia (2020)

CONFERENCE PRESENTATIONS

2020 European Molecular Biology Organization: The Molecular Basis and Evolution of Sexual Dimorphism. Online (***Invited Talk***)

2019 Poeciliid Research Conference. Mexico City, Mexico (Poster)

2019 Gordon Research Conference (GRC) in Ecological and Evolutionary Genomics. Manchester, NH (Poster)

2019 Gordon Research Seminar (GRS) in Ecological and Evolutionary Genomics. Manchester, NH (Poster)

2018 Joint Congress on Evolution. Montpellier, France (***Invited Talk***)

2018 International Congress of Neuroethology. Brisbane, Australia (Poster)

2017 Society for the Study of Evolution. Portland, OR (Talk & Poster)

2016 Society for the Study of Evolution. Austin, TX (Talk)

2015 European Society for Evolutionary Biology. Lausanne, Switzerland (Poster)

2015 GRS in Neuroethology: Behavior, Evolution & Neuroethology. Tuscany, Italy (***Invited Talk***)

2015 GRC in Neuroethology: Behavior, Evolution & Neuroethology. Tuscany, Italy (Poster)

2013 Animal Behavior Society. Boulder, CO (Poster)

2012 Society for Integrative and Comparative Biology (SICB). Charleston, SC (Talk)

** *Winner Best Talk Award* **

2012 American Association for the Advancement of Science (AAAS). Vancouver, BC (Poster)

** *Winner Best Poster Award* **

2012 World Congress of Herpetology and Ichthyology. Vancouver, BC (Talk)

2012 EcoEvo UBC/SFU/UVic Retreat. Brackendale, BC (Poster)

** *Winner Best Poster Award* **

2012 Joint Congress on Evolution. Ottawa, ON (Poster)
2011 Society for the Study of Evolution. Norman, OK (Talk)
2010 Ecology and Evolutionary Ethology of Fishes. Vancouver, BC (Talk)
2009 EcoEvo UBC/SFU/Uvic Retreat. Brackendale, BC (Poster)
2009 Undergraduate Research Symposium. Champaign, IL (Talk)
2009 Integrative Biology Research Symposium. Champaign, IL (Talk)
2009 GEEB student symposium. Champaign, IL (Poster)
2008 Society for the Study of Evolution. Minneapolis, MN (Poster)
2008 Ecology Society of America. Milwaukee, WI (Poster)

REFERENCES

Judith Mank, Professor and Canada 150 Chair
University of British Columbia
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+1 (604) 822-1185, mank@zoology.ubc.ca

Felix Breden, Professor Emeritus,
Simon Fraser University
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University of Maryland
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+1 (301) 405-6929, kcarleto@umd.edu

Rebecca Fuller, Professor
University of Illinois at Urbana-Champaign
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