

GIANNI MARCELLO CASTIGLIONE, PH.D.

Assistant Professor, Department of Biological Sciences, The Vanderbilt University, MRB III, Room 7261
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PROFESSIONAL EXPERIENCE

Assistant Professor

Department of Biological Sciences, Vanderbilt University (primary) 2022-present
Department of Ophthalmology & Visual Sciences, Vanderbilt University (secondary)
Evolutionary Studies Initiative
Vanderbilt-Ingram Cancer Center
Vanderbilt Genetics Institute
Nashville, TN. USA.

Postdoctoral Research Fellow; Advisor: Elia J. Duh (M.D., Harvard)

2018-2022

Wilmer Eye Institute, Johns Hopkins Hospital
Department of Ophthalmology, Johns Hopkins University, School of Medicine
Baltimore, MD. USA.

Postdoctoral Associate; Advisor: Belinda S.W. Chang (Ph.D., Harvard)

2017-2018

Department of Ecology and Evolutionary Biology, University of Toronto,
Toronto, ON. Canada.

EDUCATION

Doctor of Philosophy (Ph.D.); Advisor: Belinda S.W. Chang (Ph.D.)

2011-2017

Department of Cell & Systems Biology, University of Toronto,
Toronto, ON

Bachelor of Science (B.Sc., Honours)

2007-2011

Departments of Philosophy (Bioethics) and Cell and Systems Biology,
University of Toronto, Toronto, ON

GRANTS, HONORS, AND AWARDS

[Pending] **“Reverse Engineering Evolution to Develop Novel Therapeutics”**

Principal Investigator (Total requested: \$300,000 direct; \$24,000 indirect)
Pew Biomedical Scholars Program, The Pew Charitable Trusts, Vanderbilt University Nominee

[Pending] **Avian Auditory and Visual Eco-Evolutionary Synthesis**

Co-PI Castiglione, (5% effort), Simons Foundation, \$9,200,000
direct costs shared amongst 12 Co-PIs.

[Pending] **Structure-function studies of visual arrestin,**

PI Gurevich, Vsevolod V., to be transferred to Castiglione as new PI. (5% effort)
National Eye Institute, \$669,338 direct costs,

Engineering a Preclinical Platform to Test the Role of Oxidative Stress in HD Principal Investigator (Direct: \$ 382,829; indirect: \$ 29,664 indirect) <i>Cure Huntington's Disease Initiative (CHDI) Foundation</i>	2025-2027
"Reverse Engineering the Long Lifespans of Birds" Principal Investigator (Direct: \$1,300,000; no indirect costs allowed) <i>W. M. Keck Foundation</i>	2025-2028
"Evolutionary Mechanisms of Enhanced Environmental Stress Resistance" R35GM155367, Principal Investigator (Direct: \$1,250,000; indirect: \$730,635) <i>National Institutes of Health (National Institute of General Medical Sciences)</i>	2024-2029
"Seeding Success" Award "Testing an Evolution Inspired Gene Therapy for Human Blindness" (Principal Investigator) (\$120,000 direct costs) <i>Vanderbilt University</i>	2023-2025
2018 Harvard Junior Fellow Nominee <i>Harvard University Society of Fellows</i>	2017
Vision Science Research Program Scholarship (\$58 000 total) <i>University Health Network, Toronto</i>	2014-2016

PUBLICATIONS (*corresponding; #equal contribution; members of my lab highlighted in blue)

Upcoming

Taylor, K.E., Eis, J., Dbouk, N.H., Dalvi, P.A., Chen, X., Yang, T.S., Antonellis, A., Ortved, K., **Castiglione, G.M.*** A toxic gene duplication fuels a sulfide-powered metabolic engine in horses. Submitted Jan. 2026.

Peer-reviewed

16. [Castiglione, G.M.*](#), [Chen, X.#](#), Xu, Z.#, [Dbouk, N.H.#](#), [Bose, A.#](#), [Carmona-Berrio, D.](#), [Chi, E.E.](#), Zhou, L., Boronina, T.N., Cole, R.N., Wu, S., Liu, A., Liu, T., Lu, H., Kalbfleisch, T., Rinker, D., Rokas, A., Ortved, K., and Duh, E.J.*. (2025). Running a Genetic Stop Sign Accelerates Oxygen Metabolism and Energy Production in Horses. **Science**. 387, eadr8589.

Featured in:

[Popular Science](#), [NPR](#), [The BBC](#), [NBC News](#), [ABC News](#), [US News](#), [Science News](#), [The Associated Press](#), [San Diego Tribune](#), [Boston Herald](#), [Sciences et Avenir](#), [De Volkskrant](#), [StudyFinds](#), [La Recherche](#)

15. [Castiglione, G.M.*](#), Chiu, Y.L., de A. Gutierrez, E., Van Nynatten, A., Hauser, F.E., Preston, M., Bhattacharyya, N., Schott, R.K., and Chang, B.S.W*. (2023) Convergent Evolution of Dim Light Vision in Owls and Deep-Diving Whales. **Current Biology** 33 (21) P4733-4740.E4.

Featured Article, and Commentary

14. [Castiglione, G.M.*](#), Hauser, F.E, Van Nynatten, A. and Chang, B.S.W* (2023). Adaptation of Antarctic Icefish Vision to Extreme Environments. ***Molecular Biology and Evolution*** 40 (4) msad030

Editors highlight
Journal Cover
13. [Castiglione, G.M.](#), Zhou L., Xu Z., Neiman Z., Hung, C.F. and Duh, E.J. (2021). Evolutionary pathways to SARS-CoV-2 resistance are opened and closed by epistasis acting on ACE2. ***PLoS Biology*** 19(12): e3001510.
12. Lam, B., Kung, Y.J., Lin, J., Tseng, S.H., Tsai, Y.C., He, L., [Castiglione, G.](#), Egbert, E., Duh, E., Bloch, E.M., Tobian, A.A.R., Milstone, A.M., Roden, R.B.S., Wu, T.C., and Hung, C.F. (2021). In vivo characterization of emerging SARS-CoV-2 variant infectivity and human antibody escape potential. ***Cell Reports***. 37 (3): 109838
11. Van Nynatten, A., [Castiglione, G.M.](#), Gutierrez, E.A., Lovejoy N.R., and Chang, B. S.W. (2021). Recreated ancestral opsin associated with marine to freshwater croaker invasion reveals kinetic and spectral adaptation. ***Molecular Biology and Evolution*** 38 (4):2076-2087
10. Zhou, L., Xu, Z., [Castiglione, G.M.](#), Soiberman, U.S., Eberhart, C.G., & Duh, E.J. (2020). ACE2 and TMPRSS2 are expressed on the human ocular surface, suggesting susceptibility to SARS-CoV-2 infection. ***The Ocular Surface*** 18 (4):537-544
9. [Castiglione, G. M.](#), Xu, Z., Zhou, L. & Duh, E. J. (2020). Adaptation of the master antioxidant response connects metabolism, lifespan and feather development pathways in birds. ***Nature Communications*** 11, 2476

Editor's highlight 2020
Featured in: Baltimore Sun, Washington Post
8. [Castiglione G.M.](#) & Chang B.S.W. (2018). Functional trade-offs and environmental variation shaped ancient trajectories during the evolution of dim-light vision. ***eLife***. 7: e35957
7. Gutierrez, E.A., [Castiglione, G.M.](#), Morrow, J.M., Schott, R.K., Loureiro, L.O., Lim, B.K., and Chang B.S.W. (2018). Functional shifts in bat dim-light visual pigment are associated with differing echolocation abilities and reveal molecular adaptation to photic-limited environments. ***Molecular Biology and Evolution***. 35 (10): 2422-2434.
6. [Castiglione, G.M.](#), Schott R.K., Hauser F.E., and Chang B.S.W. (2018). Convergent selection pressures drive the evolution of rhodopsin kinetics at high altitudes *via* nonparallel mechanisms. ***Evolution***. 72 (1): 170-186.
5. Hauser FE, Ilves KL, Schott RK, [Castiglione G.M.](#), López-Fernández H, and Chang BSW. (2017). Accelerated evolution and functional divergence of the dim light visual pigment accompanies cichlid colonization of Central America. ***Molecular Biology and Evolution***. 34 (10): 2650-2664.

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. and Chang B.S.W. (2017). Evolution of nonspectral rhodopsin function at high altitudes. ***Proc. Natl. Acad. Sci. U.S.A.*** 114 (28): 7385-7390.
3. Morrow J.M., [Castiglione G.M.](#), Dungan S.Z., Tang P.L., Bhattacharyya N., Hauser F.E., Chang B.S.W. (2017). An experimental comparison of human and bovine rhodopsin provides insight into the molecular basis of retinal disease. ***FEBS Letters***. 591: 1720-1731.
2. Hauser F.E., Schott R.K., [Castiglione G.M.](#), Van Nynatten A., Kosyakov A., Tang P., Gow D., Chang B.S.W. (2016). Comparative sequence analyses of rhodopsin and RPE65 reveal patterns of selective constraint across hereditary retinal disease mutations. ***Visual Neuroscience***. 33 (E002): 13 pages
1. Peek J., [Castiglione G.](#), Shi T., Christendat D. (2014). Isolation and molecular characterization of the shikimate dehydrogenase domain from the *Toxoplasma gondii* AROM complex. ***Molecular and Biochemical Parasitology***. 194(1-2):16-9

INVITED TALKS

1. **International Havemeyer Foundation Horse Genome Workshop** (upcoming)
2. **Vanderbilt Genetics Institute Seminar Series** (upcoming)
3. **Universitat de Barcelona**. Barcelona, Spain. Department of Genetics, Microbiology and Statistics. On behalf of the selenocysteine biology research network. May 2025.
4. **University of Kentucky**. Lexington, KY. Department of Veterinary Science, Gluck Equine Research Center. March 2025.
5. **Southeastern Vision Research Conference**. Nashville TN. Retina Biology and Degeneration Session. Nov 2024
6. **Princeton University**, Princeton, NJ. Department of Ecology and Evolutionary Biology. Oct 2024.
7. **Illinois Institute of Technology**. Chicago, IL. Department of Biology. Apr 2024. (Virtual)
8. **Yale University**. New Haven CT. Department of Ecology and Evolutionary Biology. Oct 2023.
9. **University of Michigan**, School of Medicine. Ann Arbor MI. Department of Human Genetics. Feb 2022.
10. **9th Annual Canadian Science Policy Conference**. 2017. Ottawa ON.
11. **University of Toronto**, Toronto ON. Is God Relevant, Debate. 2016.
12. **Our Whole Society: Bridging the Religious-Secular Divide**, 2015. Vancouver B.C.

PATENTS**Provisional**

[Pending] Structure-Guided, Signaling-Null, and Stabilized Molecular Sinks for Retinal Degeneration. *Disclosure ID: IPD2343112425*

[Pending] Engineered Xenogeneic tRNA-Synthetase Systems for Context-Selective Treatment of Nonsense-Mediated Diseases. *Disclosure ID: IPD2344112425*

TEACHING**Courses Taught**

2026 Spring	Molecular Evolution & Disease (BSCI-3240-01/BSCI-5240-01) 3-hour course (Instructor) 8 undergraduates, 1 graduate student 12 lectures, 16 sessions
2025 Fall	Biochemistry (BSCI 2520-01/5520-01) 3-hour course (co-Instructor with Xiaohua Jiang) 145 undergraduates, 8 graduate students, 16 lectures (my half)
2025 Spring	Molecular Evolution & Disease (BSCI-3240-01/BSCI-5240-01) 3-hour course (Instructor) 2 undergraduates, 19 graduate students, 12 lectures, 16 sessions Being a Scientist (IGP 8002) Co-Instructor with Dawn Newcomb 12 graduate students, 12x 1-hour sessions
2024 Fall	Biochemistry (BSCI 2520-01/5520-01) 3-hour course (co-Instructor with Xiaohua Jiang) 126 undergraduates, 9 graduate students, 16 lectures (my half) Becoming a Scientist (IGP 8001) Co-Instructor with Dawn Newcomb 12 graduate students, 12x 1-hour sessions Vanderbilt Visions (VV 0700) Faculty facilitator 20 undergraduate students, 5x 1-hour sessions
2024 Spring	Molecular Evolution & Disease (BSCI-3890-02/5890-02) 3-hour course (Instructor) 4 undergraduates, 24 lectures, 4 sessions Being a Scientist (IGP 8002) Co-Instructor with Alexandre Tiriach

12 graduate students, 12 1-hour sessions

Anatomy and Physiology II (BSCI 3101)
1 guest lecture (Instructor was Rachel Racichot)

2023 Fall Becoming a Scientist (IGP 8001)
Co-Instructor with Maulik Patel
12 graduate students, 12 1-hour sessions
Taught while on parental leave

2023 Spring Graduate Seminar in Biological Sciences (BSCI-6320-01)
1-hour course (co-instructor with Alexandre Tiriac)
21 graduate students, 15 sessions

New Courses Introduced

Molecular Evolution & Disease (BSCI-3240-01/BSCI-5240-01)
3-hour course, Instructor, offered each Spring starting 2024
Completely revised from previous Molecular Evolution offering (BSCI-3247)

MENTORING

Research Faculty

2025-present Dr. Sergey Vishnivetskiy, PhD (co-mentor; Research Assistant Professor)
2024-present Dr. Shimian Qu, PhD (Research Assistant Professor)

Research Staff

2025-present Weihong Huo (Senior Research Assistant)
2025-present Narmin Musayeva, MS (Senior Research Assistant)
2022-2024 Xin Chen, MS (now Staff Scientist at Cleveland Clinic)
2023-2024 Eugene Chi, BA (now pursuing DVM at UC Davis)
2023-2024 David Carmona-Berrio, BS (now pursuing PhD at U Miami)

Graduate Students

Lab members

2025-present Rohan Kasthuri (Masters in Biomedical Science)
2024-present Kaitlin Taylor (IGP)
 Madeleine Bagshaw (BioSci)
 Joshua Eis (BioSci)
 Awards: NIH T32 fellowship
2023-present Anamika Bose (IGP)
 Awards: DoD NDSEG fellowship
2022-present Nadir Dbouk (BioSci)
 Awards: Vanderbilt A&S Outstanding Graduate Student Laboratory Instructor
2022-2023 Jinger Hayes (Masters in Biomedical Science; now in a MD program)

Committees

2025-present	Amy Longtin (BioSci) Cassandra Probert (BioSci) Jiaying Yang (BioSci) Srujan Vadlamudi (BioSci) Leah Oswalt (BioSci) Salisha Baranwal (Pharmacology)
2024-2025	Greg Konar (BioSci) Marie-Clarie Harrison (BioSci)
2023-present	Ximena Leon (BioSci) Thodoris Danis (BioSci)
2023-2025	Crissey Cameron (Chemistry)

Rotation Graduate Students

2025-2026	Wanda Schlumpf (BioSci) Alexis Janke (IGP)
2024-2025	Katie Jo Gelasco (QCB) Abby Callahan-Muller (BioSci) Melissa Sobanko (IGP)
2023-2024	Jiaying Yang (BioSci) Srujan Vadlamudi (BioSci) Amy Longtin (BioSci)
2022-2023	Hellen Valencia (BioSci)

Undergraduate Students

2025-present	Marin McElhinney (coauthor on manuscript in review) Jiahui Li Hanabi Geiger (Honors student, co-mentor) Anthony Kim (co-mentor) Sophia Lin (co-mentor) Ethan Zhao (co-mentor) Daniel Li (co-mentor)
2024-present	Mahlet Mesfin Pratham Dalvi (coauthor on manuscript in review) Cynthia Xu Clara Mannes (co-mentor) Rohita Kotyada (honors co-mentor) Benson Yang (co-mentor)
2023-present	Isabella Bautista (pursuing MD program in 2026) Honors: Phi Beta Kappa Awards: Vanderbilt Undergraduate Summer Research Program
2024-2025	Kyle Vallone (honors, co-mentor)
2023-2025	Kaitlyn Russell Robert McFadden (honors, co-mentor) Maggie Zhou (honors, co-mentor) Rohit Khurana (honors, co-mentor)

High School Students

2024-2025	Jaida Parr (School for Science and Math at Vanderbilt) Marqueze Williams (School for Science and Math at Vanderbilt) Olivia Blanchard
2023-2024	Neena Praveen (School for Science and Math at Vanderbilt)

SERVICE

International

Peer reviewer, *Investigative Ophthalmology and Visual Sciences*, 2024-present
 Member, Hosting Committee, [International Society for Evolution, Medicine and Public Health](#), Nashville TN, July 2025
 Peer reviewer, *Animals*, 2025
 Peer reviewer, *Molecular Biology and Evolution*, 2024
 Peer reviewer, *Genetics*, 2023
 Peer reviewer, *eLife*, 2022
 Peer reviewer, *Journal of Fish Biology*, 2019

National

Grant reviewer, SuRE Special Emphasis Panel (R16), National Institutes of Health, virtual, 2024
 Consultant, Wired Magazine, 2024

University

Member, Computational Evolutionary Approaches to Disease T32 oversight committee, 2025-present
 Instructor, Interdisciplinary Graduate Program, August 2023-May 2025
 Reviewer, Vanderbilt Undergraduate Summer Research Program, 2024
 Faculty facilitator, Vanderbilt Visions, August-October 2024
 Member, Evolutionary Studies Initiative Seminar Series, 2023

College

Advisor, Undergraduates with Biological Sciences major/minors, 2022-present

Department

Member, Biological Sciences Seminar Series Committee, 2023-present
 Reviewer, Biological Sciences Graduate Student Admissions, 2023-present
 Mentor, BCB3201 Independent Laboratory Research, 2024-present
 Mentor, BSCI3860 Research Internship, 2024-present
 Mentor, BSCI3861 Directed laboratory research, 2024-present
 Mentor, BSCI3961 Independent Laboratory Research, 2025-present
 Mentor, BSCI 4999, Honors Research, 2025-present

CONTRIBUTED PRESENTATIONS (*corresponding author; members of my lab highlighted in blue)

1. **Castiglione, G.M.** (presenter), [Chen, X.](#), [Xu, Z.](#), [Dbouk, N.H.](#), [Bose, A.](#), [Carmona-Berrio, D.](#), [Chi, E.E.](#), Zhou, L., Boronina, T.N., Cole, R.N., Wu, S., Liu, A., Liu, T., Lu, H., Kalbfleisch, T., Rinker, D., Rokas, A., Ortved, K., and Duh, E.J. **2025**. Adaptive stop codon recoding outside of viruses boosts energy production in horses. *Society for Molecular Biology and Evolution* (SMBE). Beijing, China. **Oral**. Selected from the abstracts.
2. **Castiglione, G. M.** **2025**. Clinical strategies inspired by evolutionary adaptations. *International Society for Evolution, Medicine, and Public Health*. (ISEMPH). Nashville, TN. **Oral**. Selected from the abstracts.
3. **Castiglione, G.M.**, Science in Action, [BBC Radio](#), Virtual, March 2025
4. **Castiglione, G.M.**, Duh, E.J., All Things Considered, [NPR Radio](#), Virtual, March 2025
5. **Castiglione, G.M.** (presenter), Chiu, Y.L., de A. Gutierrez, E., Van Nynatten, A., Hauser, F.E., Preston, M., Bhattacharyya, N., Schott, R.K., and Chang, B.S.W. **2024**. *3rd Joint Congress on Evolutionary Biology* (Montreal, Canada). Symposium: A Vision of The Future: Integrating Perspectives In The Evolution of Visual Systems". **Oral**. Selected from the abstracts.
6. [Bautista, I.](#) (presenter), [Dbouk, N.](#), [Bose, A.](#), and **Castiglione, G.M.** **2024**. *3rd Joint Congress on Evolutionary Biology*. Montreal, Canada. (Poster)
7. [Dbouk, N.](#) (presenter), [Bautista, I.](#), [Bose, A.](#), and **Castiglione, G.M.** **2024**. *3rd Joint Congress on Evolutionary Biology*. Montreal, Canada. (Poster)
8. Chiu Y.L.I. (presenter), **Castiglione G.M.**, Gutierrez E.A., and Chang B.S.W. **2019**. *Society for Molecular Biology and Evolution*. Manchester, United Kingdom. (Poster)
9. Van Nynatten A. (presenter), **Castiglione G.M.**, Lovejoy N.R., and Chang B.S.W. **2018**. *Society for Molecular Biology and Evolution*. Yokohama, Japan. (Poster)
10. Hauser F.E. (presenter), Ilves K.L., Schott R.K., **Castiglione G.M.**, Lopez-Fernandez H., and Chang B.S.W. **2018**. *Society for Molecular Biology and Evolution*. Yokohama, Japan. (Poster)
11. Gutierrez E.A. (presenter), **Castiglione G.M.**, Morrow J., and Chang B. **2017**. *Society for Molecular Biology and Evolution*. Austin, TX. U.S.A. (Oral)
12. **Castiglione G.M. (presenter)** and Chang B. **2017**. *Evolution*. Portland, OR. U.S.A. (Poster)
13. **Castiglione G.M. (presenter)**, Lujan N., and Chang B. **2017**. *Evolution*. Portland, OR. U.S.A. (Oral)
14. Hauser F. (presenter), Ilves K., Schott R., **Castiglione G.M.**, Lopez-Fernandez H., and Chang B. **2017**. *Evolution*. Portland, OR. U.S.A. (Oral)
15. Gutierrez E. A. (presenter), **Castiglione G.M.**, Morrow, J.M., and Chang B. **2017**. *Evolution*. Portland, OR. U.S.A. (Oral)

16. **Castiglione** G.M. (presenter) and Chang B.S.W. 2016. *58th Annual Vision Science Research Day, University Health Network*. Toronto, ON. (*Poster*)
17. Hauser F.E. (presenter), Tang P.L., Schott R.K., **Castiglione** G.M., Van Nynatten A., Heon E., Chang B.S.W. 2016. *Great Lakes Bioinformatics and Canadian Computational Biology Conference*, Toronto ON. (*Poster*)
18. Cook T. (M.D.), Dias A. (Ph.D.), Richards M. (M.D.), **Castiglione** G.M. (moderator). 2016. *University of Toronto*, Toronto ON. (*Oral, panel*)
19. **Castiglione** G.M. (presenter), Chang B.S.W. 2015. *Department of Cell and Systems Biology, University of Toronto*, Toronto ON. (*Oral, Departmental Seminar*)
20. **Castiglione** G.M. (presenter), Liao B.S., Lujan N.K., and Chang B.S.W. 2015. *57th Annual Vision Science Research Day, University Health Network*, Toronto, ON. (*Poster*)
21. Rizvi A., **Castiglione** G. (moderator). 2014. *University of Toronto*, Toronto ON. (*Oral*)