

Vance Thomas Vredenburg

Professor, Associate Chair
Department of Biology
San Francisco State University

Research Area: ecology, disease ecology, behavior, conservation

University Address: Department of Biology; 1600 Holloway Ave, HH 754; San Francisco, CA 94132, USA
Email: vancev@sfsu.edu; Telephone: 415-338-7296; Web page: <https://www.vredenburglab.com>

Education

2002 Ph.D., Integrative Biology, University of California, Berkeley, *The effects of introduced trout and ultraviolet radiation on anurans in the Sierra Nevada*, Co-advisors: Dr. Mary Power and Dr. David Wake
1992 B.A., Biology, University of California, Santa Barbara

Professional appointments

2021-present Associate Chair Department of Biology, San Francisco State University
2019-2020 *Visiting Fulbright Fellow*; Museo Nacional de Ciencias Naturales, Madrid, Spain
2019-2020 *Visiting Fulbright Fellow*; Abdelmalek Essaâdi University, Tétouan, Morocco
2017-to present *Professor* Department of Biology, San Francisco State University
2012-2017 *Associate Professor* Department of Biology, San Francisco State University
2007-2012 *Assistant Professor* Department of Biology, San Francisco State University
2007-present *Research Associate* Museum of Vertebrate Zoology, University of California Berkeley
2008-present *Research Associate* California Academy of Sciences, San Francisco, California, USA
2003-2007 *Postdoctoral Scholar* Dept. of Integrative Biology and Museum of Vertebrate Zoology, UCB
1998-present *Co-Founder and Associate Director* of AmphibiaWeb.org an online bioinformatics tool promoting science and conservation of the world's amphibians

Honors and Awards

2019-2020 Fulbright Scholar: Morocco and Spain
2012 Elected *Fellow* of the California Academy of Sciences
2012 Presidential Award for Faculty, San Francisco State University
2002 Honorable Mention, Stoye Award, American Society of Ichthyologists and Herpetologists
2002 Best Student Paper, Society for Integrative and Comparative Biology, Division of Ecology and Evolution, Anaheim, California, USA
2001 Carl Hubbs Best Student Paper, Desert Fishes Council, Death Valley, California, USA
2000 Graduate Fellowship Award, Museum of Vertebrate Zoology, University of California Berkeley
1999-2001 Research Fellowship Award, USGS Biological Resources Division / National Park Service
1999 Seed Grant Award, Declining Amphibian Population Task Force / The World Conservation Union / Species Survival Commission
1998 Outstanding Graduate Student Instructor Award – University of California Berkeley
1998 Wilhelm LF Martens Fund Award – Museum of Vertebrate Zoology
1998 Theodore Roosevelt Memorial Award – American Museum of Natural History
1998 Sigma Xi Student Grant-in-aid Award – Berkeley Chapter
1997 Mildred E Mathias Award, University of California Natural Reserve System
1992 Antarctica Service Medal, National Science Foundation

Research Grants

2019-2020 Fulbright Research Scholarship: A global amphibian pandemic: Unravelling pathogen invasion history and present-day dynamics in Morocco and Spain.
2019-2020 US Department of Defense: *Acquisition of a Digital Droplet PRC Platform for Pathogen Detection* A. Swei (PI), VT Vredenburg (co-PI), R Sehgal (co-PI) Award #: W911NF1910524
2016-2021 NSF: Belmont Forum on Climate Change; *People, pollution and pathogens – mountain ecosystems in a human-altered world* (mountain ranges in California, USA, France, Oman, and China)
2015-2018 NSF; *Collaborative Proposal: A Biotic Inventory of Terrestrial Vertebrates, Spiders, and Haemosporidian Parasites of Sulawesi, Indonesia*; J. McGuire (PI), VT Vredenburg (Senior Personnel)
2015-2019 US Fish and Wildlife Service; *Wyoming toad bioaugmentation, immunization and susceptibility trials*
Completed Research Grants: NSF (4), US Fish and Wildlife Service (2), USDA Forest Service (1), The Presidio

Trust (1), Save the Redwoods League (2), Disney Worldwide Conservation Fund (1), Rufford Grant (1), CALFED (1).

Selected Publications

- Lambert, M. R., Womack, M. C., Byrne, A. Q., Grundler, M. R., Hernandez-Gomez, O., Noss, C. F., Rothstein, A. P., Blackburn, D. C., Collins, J. P., Crump, M. L., Koo, M. S., Nanjappa, P., Rollins-Smith, L., **Vredenburg**, V. T., and E. B. Rosenblum. 2020. Response to Scheele et al.: The amphibian chytrid crisis remains data deficient. *Science* 367. DOI:10.1126/science.aay1838
- Byrne, AQ, VT **Vredenburg**, et al. 2019. Cryptic diversity of a widespread global pathogen reveals new threats for amphibian conservation. *Proc. Natl. Acad. Sci. U. S. A.* 2019 116 (41) 20382-20387
<https://doi.org/10.1073/pnas.1908289116>
- Vredenburg** VT, et al. 2019. Pathogen invasion history elucidates contemporary host pathogen dynamics. *PLoS ONE* 14(9): e0219981. <https://doi.org/10.1371/journal.pone.0219981>
- Zumbado-Ulate, H, A García-Rodríguez, VT **Vredenburg**, C Searle. 2019. Infection with *Batrachochytrium dendrobatidis* is common in tropical lowland habitats: Implications for amphibian conservation. *Ecology and Evolution* 9 (8):4917-4930. <https://doi.org/10.1002/ece3.5098>
- Flechas SV, et al, and, **Vredenburg** VT, Amézquita A, Woodhams DC (2019) Microbiota and skin defense peptides may facilitate coexistence of two sympatric Andean frog species with a lethal pathogen. *ISME J* 2019 Feb;13(2):361-373. doi: 10.1038/s41396-018-0284-9.
- Woodhams, D.C., Rollins-Smith, L.A., Reinert, L.K., Lam, B.A., Harris, R.N., Briggs, C.J., **Vredenburg**, V.T., Patel, B.T., Caprioli, R.M., Chaurand, P., Hunziker, P., and Bigler, L. 2019. Probiotics modulate a novel amphibian skin defense peptide that is antifungal and facilitates growth of antifungal bacteria. *Microb Ecol* (2019). <https://doi.org/10.1007/s00248-019-01385-9>
- Ellison S, Knapp RA, Sparagon W, Swei A, **Vredenburg** VT. Reduced skin bacterial diversity correlates with increased pathogen infection intensity in an endangered amphibian host. *Mol Ecol.* 2019;28:127–140. <https://doi.org/10.1111/mec.14964>
- Ellison, S., S Rovito, G Parra-Olea, C Vazquez-Almazan, SV Flechas, K Bi, and VT **Vredenburg**. 2018. The influence of habitat and phylogeny on the skin microbiome of amphibians in Guatemala and Mexico. *Microb Ecol* (2018). <https://doi.org/10.1007/s00248-018-1288-8>
- Martinez, A. E., Parra, E., Muellerklein, O., and VT **Vredenburg**. 2018. Fear-based niche shifts in neotropical birds. *Ecology* (2018), 10.1002/ecy.2217.
- Bird AK, Prado-Irwin SR, **Vredenburg** VT and Zink AG (2018) Skin Microbiomes of California Terrestrial Salamanders Are Influenced by Habitat More Than Host Phylogeny. *Front. Microbiol.* 9:442. doi: 10.3389/fmicb.2018.00442
- Catenazzi A, Flechas SV, Burkart D, Hooven ND, Townsend J and VT **Vredenburg**. 2018. Widespread Elevational Occurrence of Antifungal Bacteria in Andean Amphibians Decimated by Disease: A Complex Role for Skin Symbionts in Defense Against Chytridiomycosis. *Front. Microbiol.* 9:465. doi: 10.3389/fmicb.2018.00465
- Prado-Irwin, SR, Bird, AK, Zink, AG, & **Vredenburg**, VT. Intraspecific variation in the skin-associated microbiome of *Ensatina*, the terrestrial ring-species salamander. *Microb Ecol.* 2017. doi:10.1007/s00248-017-0986-y
- Martínez, A. E., Parra, E., Collado, L. F. and VT **Vredenburg**. 2017. Deconstructing the landscape of fear in stable multi-species societies. *Ecology*, 98: 2447–2455. doi:10.1002/ecy.1935
- Knapp, RA, GM Fellers, PM Kleeman, DAW Miller, VT **Vredenburg**, EB Rosenblum, and CJ Briggs. 2016. Large-scale recovery of an endangered amphibian despite ongoing exposure to multiple stressors *Proc. Natl. Acad. Sci. U. S. A.* 113, 11889-11894, doi:10.1073/pnas.1600983113 (2016).
- Sette, C, VT **Vredenburg**, A Zink 2015. Reconstructing historical and contemporary disease dynamics: a case study using the California slender salamander. *Biological Conservation Vol. 192*, pp. 20–29
doi:10.1016/j.biocon.2015.08.039
- Yap, T, M Koo, RF Ambrose, DB Wake and VT **Vredenburg**. 2015. Averting a biodiversity crisis. 2015. *Science*. Vol. 349 no. 6247 pp. 481-482 DOI: 10.1126/science.aab1052
- Cheng, TL, S Rovito, DB Wake and VT **Vredenburg** 2011 Coincident mass extinction of neotropical amphibians with the emergence of the fungal pathogen *Batrachochytrium dendrobatidis* 2011 *Proceedings of the National Academy of Sciences* 108(23):9502-9507
- Catenazzi A, E Lehr, LO Rodriguez, and VT **Vredenburg** 2011 *Batrachochytrium dendrobatidis* and the collapse of anuran species richness and abundance in the upper Manu National Park, southeastern Peru *Conservation Biology* 25: 382-391

- Vredenburg, VT, RA Knapp, T Tunstall, and CJ Briggs** 2010 Dynamics of an emerging disease drive large-scale amphibian population extinctions *Proceedings of the National Academy of Sciences* 107:9689-9694
- Briggs, CJ, RA Knapp, and VT Vredenburg** 2010 Enzootic and epizootic dynamics of the chytrid fungal pathogen of amphibians *Proceedings of the National Academy of Sciences* 107:9695-9700
- Harris, RN, RM Brucker, JB Walke, MH Becker, CR Schwantes, DC Flaherty, BA Lam, DC Woodhams, CJ Briggs, VT Vredenburg, KPC Minbiole** 2009 Skin microbes on frogs prevent morbidity and mortality caused by a lethal skin fungus *The ISME Journal* 3:818-824
- Wake, DB, and VT Vredenburg** 2008 Are we in the midst of the sixth mass extinction? A view from the world's amphibians *Proceedings of the National Academy of Sciences* 105:11466-11473
- Morgan, JAT, VT Vredenburg, LJ Rachowicz, RA Knapp, MJ Stice, T Tunstall, RE Bingham, JM Parker, JE Longcore, C Moritz, CJ Briggs, JW Taylor** 2007 Population genetics of the frog killing fungus *Batrachochytrium dendrobatidis* *Proceedings of the National Academy of Sciences* 104(34): 13845-13850
- Finlay, JC and VT Vredenburg** 2007 Introduced trout sever trophic connections in watersheds: consequences for a declining amphibian *Ecology* 88(9): 2187-2198
- Vredenburg, VT, R Bingham, R Knapp, JAT Morgan, C Moritz, and D Wake** 2007 Concordant molecular and phenotypic data delineate new taxonomy and conservation priorities for the endangered mountain yellow-legged frog (*Ranidae: Rana muscosa*) *Journal of Zoology* 271(4): 361-374
- Rachowicz, LJ, RA Knapp, JAT Morgan, MJ Stice, VT Vredenburg, JM Parker and CJ Briggs** 2006 Emerging infectious disease as a proximate cause of amphibian mass mortality *Ecology* 87(7): 1671-1683
- Briggs, C, VT Vredenburg, RA Knapp, and LJ Rachowicz** 2005 Investigating the population-level effects of chytridiomycosis, a fungal disease of amphibians *Ecology* 86(12):3149-3159
- Vredenburg, VT** 2004 Reversing introduced species effects: Experimental removal of introduced fish leads to rapid recovery of declining frog *Proceedings of the National Academy of Sciences* 101(20):7646-7650

Student Mentoring 2009-present

Undergraduates: Vredenburg as independent research mentor (105 completed)

Master's Students: Vredenburg as chair (24 students completed); as committee member (15 completed)

PhD Students: (SFSU does not have a PhD program) Vredenburg as committee member (3 completed)

Featured Vredenburg Lab research

University Biology Textbooks: 1) Campbell, NA, & Reece, J B (2015) *Biology*, Benjamin Cummings, 8th edition pp650-651 (*This is the most commonly used Biology textbook in Introductory Biology Courses in the USA*); 2) Cain, ML, WD Bowman, and SD Hacker. (2015) *Ecology*, Sinauer Assoc. 3rd Edition, p 18.

Public Exhibits Natural History Museums: 1) California Academy of Sciences- >1.5 million people visits/ year; 2) University of Kansas Biodiversity Institute and Natural History Museum; 3) Philippines National Museum of Natural History, Manila.

Public Outreach

Co-Founder of ***AmphibiaWeb.org***: online research and conservation resource for all amphibians; average of 7.3 million successful queries / year by students, conservation scientists, and the general public since 2002; ***Amphibian Disease Portal***: providing free access to published data; ***NY Times***, (*Slow to Save Salamanders* by Carl Zimmer, *Toiling against a deadly disease to save a threatened frog* by Erica Rex, *Infection that devastates amphibians already in Europe could spread to U.S.* by James Gorman); ***National Geographic Magazine***, *The Vanishing* by Jenny Holland; ***GEO Magazine*** (Germany), *Amphibians in Crisis* by Markus Wolff; ***Nautilus Magazine***, *When Evolution is Infectious* by Moises Velasquez-Manoff; ***Animal Planet***: *The Vanishing Frog* with Jeff Corwin; ABC-News; CNN; CBS Evening News; CBC Radio *Quirks and Quarks*; ***National Public Radio***-Science Friday; WALO Radio Puerto Rico *in Spanish*; ***National Science Foundation***- Science Nation :NPR KQED QUEST; ***American Association of the Advancement of Science (AAAS)***- *Science Update*

Invited presentations/lectures/forums

AAAS – American Association for the Advancement of Science: Advancing Knowledge of Global Amphibian Decline with International Cooperation; The role of natural history museums (February 2016); ***BAASICS*** – Bay Area art & science interdisciplinary collaborative sessions (2015) ***Ecological Society of America***: The role of the skin microbiome in health and disease; California (2014) ***California Academy of Sciences*** – *Fellows Lecture*, San Francisco, California (2012) ***National Academy of Sciences / Institute of Medicine*** – *Forum on Microbial threats: Fungal Diseases*; Washington, DC (2012)