R. BRIAN LANGERHANS

Associate Professor

Department of Biological Sciences and W.M. Keck Center for Behavioral Biology,
North Carolina State University, Box 7617, Raleigh, NC 27695-7617, U.S.A.
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EDUCATION

2008	Ph.D.	Harvard University, Department of Organismic and Evolutionary Biology
2006	M.A.	Washington University in St. Louis, Department of Biology
2002	M.S.	Texas A&M University, Department of Wildlife & Fisheries Sciences
2000	B.S.	Texas A&M University, Department of Wildlife & Fisheries Sciences

PROFESSIONAL APPOINTMENTS

2012-Present	Director, Undergraduate Biology Major Concentration in Ecology, Evolution, and Conservation Biology, North Carolina State University
2017-Present	Associate Professor, Department of Biological Sciences, North Carolina State University
2010-2017	Assistant Professor, Department of Biological Sciences, North Carolina State University
2008-2010	Postdoctoral Research Fellow, Biological Station and Department of Zoology, University of Oklahoma
2007-2008	National Science Foundation IGERT Fellow, Harvard University
2004-2007	U.S. Environmental Protection Agency STAR Fellow, Washington University in St. Louis and Harvard University

PUBLICATIONS

- 88 peer-reviewed journal articles
- > 5,500 citations, *h*-index: 37, i10: 59
- Superscripts denote: *undergraduate student, †graduate student, ‡post-doctoral fellow

In Press

†Vinterstare, J., †Ekelund Ugge, G., ‡Hulthén, K., †Hegg, A., Brönmark, C., Nilsson, P.A., Zellmer, U.R., †Lee, M., †Pärssinen, V., †Sha, Y.C., †Bjömerås, C., †Zhang, H., †Gollnisch, R., †Herzog, S.D., Hansson, L-A., †Škerlep, M., †Hu, N., †Johansson, E. and **Langerhans, R.B.** Predation risk and the evolution of a vertebrate stress response: parallel evolution of stress reactivity and sexual dimorphism. *Journal of Evolutionary Biology*.

‡Hulthén, K., †Heinen-Kay, J.L., *Schmidt, D.A. and **Langerhans, R.B.** Predation shapes behavioral lateralization: insights from an adaptive radiation of livebearing fish. *Behavioral Ecology*.

†Vinterstare, J., Brönmark, C., Nilsson, P.A., **Langerhans, R.B.**, Berglund, O., Örjes, J., Brodin, T., Fick, J. and ‡Hulthén, K. Anti-predator phenotype in crucian carp altered by a psychoactive drug. *Ecology and Evolution*.

†Jenkins, M.R., *Cummings, J.M., *Cabe, A.R., ‡Hulthén, K., Peterson, M.N. and **Langerhans, R.B.** Natural and anthropogenic sources of habitat variation influence exploration behaviour, stress response, and brain morphology in a coastal fish. *Journal of Animal Ecology*.

†Sha, Y.C., †Zhang, H., †Lee, M., †Björnerås, C., †Škerlep, M., †Gollnisch, R., †Herzog, S.D., †Ekelund Ugge, G., †Vinterstare, J., †Hu, N., †Pärssinen, V., ‡Hulthén, K., Nilsson, P.A., Rengefors, K., Brönmark, C., **Langerhans, R.B.** and Hansson, L-A. Diel vertical migration of copepods and its environmental drivers in subtropical Bahamian blue holes. *Aquatic Ecology*.

2021 ‡Hulthén, K, *Hill, J.S., †Jenkins, M.R. and **Langerhans, R.B.** Predation and resource availability interact to drive life-history evolution in an adaptive radiation of livebearing fish. *Frontiers in Ecology and Evolution* 9:619277.

Langerhans, R.B. and Rosa-Molinar, E. A novel body plan alters diversification of body shape and genitalia in live-bearing fish. *Frontiers in Ecology and Evolution* 9:619232.

†Pärssinen, V., ‡Hulthén, K., Brönmark, C., †Björnerås, C., †Ekelund Ugge, G., †Gollnisch, R., Hansson, L.-A., †Herzog, S.D., †Hu, N., †Johansson, E., †Lee, M, Rengefors, K., †Sha, Y., †Škerlep, M., †Vinterstare, J., †Zhang, H., **Langerhans, R.B.** and Nilsson, P.A. Variation in predation regime drives sex-specific differences in mosquitofish foraging behaviour. *Oikos* 130:790-797.

Langerhans, R.B., *Goins, T.R., *Stemp, K.M., Riesch, R., Araújo, M.S. and Layman, C.A. Consuming costly prey: optimal foraging and the role of compensatory growth. *Frontiers in Ecology and Evolution* 8:603387.

†Casola, W.R., *Oren, J., *Register, M.L., *Littlejohn, J., Peterson, M.N. and **Langerhans, R.B.** Modernization of artisanal fishing communities on Andros Island, The Bahamas, as a treadmill of production. *Ocean and Coastal Management* 201:105487.

2020 †Björnerås, C., †Škerlep, M., †Gollnisch, R., †Herzog, S.D., †Ekelund Ugge, G., †Hegg, A., †Hu, N., †Johansson, E., †Lee, M., †Pärssinen, V., †Sha, Y.C., †Vinterstare, J., †Zhang, H., ‡Hulthén, K., Brönmark, C., Hansson, L-A., Nilsson, P.A., Rengefors, K. and **Langerhans, R.B.** Inland blue holes of The Bahamas - chemistry and biology in a unique aquatic environment. *Fundamental and Applied Limnology* 194(2):95-106.

Langerhans, R.B. and †Kern, E.M.A. Urbanization and evolution in aquatic environments. Pages 157-174 i*n* M. Szulkin, J. Munshi-South and A. Charmantier, eds. *Urban Evolutionary Biology*. Oxford, Oxford University Press.
DOI: 10.1093/oso/9780198836841.003.0010

Riesch R., Martin, R.A. and **Langerhans, R.B.** Multiple traits and multifarious environments: integrated divergence of morphology and life history. *Oikos* 129:480-492. DOI:10.1111/oik.06344.

Peterson, M.N., *Shapiro, H.G., Stevenson, K.T., †McNair, K.N. and **Langerhans, R.B.** What wild animals do kids care about most and why does it matter? *Frontiers for Young Minds* 8:14. doi:10.3389/frym.2020.00014.

2019 †Valdez, R.X., Peterson, N., *Chen, A., *Steward, M., *Hannameyer, K., *Seebaluck, H., ‡Hulthén, K. and **Langerhans, R.B.** Perceptions of resilience in fishery-dependent Bahamian communities following a category 4 hurricane. *Fisheries* 44(11):515-523.

†Lee, M., †Zhang, H., †Sha, Y., †Hegg, A., †Ugge, G.E., †Vinterstare, J., †Škerlep, M., †Pärssinen, V., †Herzog, S.D., †Björnerås, C., †Gollnisch, R., †Johansson, E., †Hu, N., Nilsson, P.A., ‡Hulthén, K., Rengefors, K., **Langerhans, R.B.**, Brönmark, C. and Hansson, L-A. Low-latitude zooplankton pigmentation plasticity in response to multiple threats. *Royal Society Open Science* 6(7):190321. DOI:10.1098/rsos.190321.

†Kern, E.M.A. and **Langerhans, R.B.** Urbanization alters swimming performance of a stream fish. *Frontiers in Ecology and Evolution* 6:229. DOI:10.3389/fevo.2018.00229.

Ruis, B.F., Petry, A.C., **Langerhans, R.B.**, Figueiredo-Barros, M.P., Bozelli, R.L., Honda, L.K., Nova, C.C. and Araújo, M.S. Correlates of life-history variation in the livebearing fish *Poecilia vivipara* (Cyprinodontiformes: Poeciliidae) inhabiting an environmental gradient. *Biological Journal of the Linnean Society* 126(3):436-446.

2018 †Kern, E.M.A. and **Langerhans, R.B.** Urbanization drives contemporary evolution in stream fish. *Global Change Biology* 24:3791-3803.

Riesch R., Martin, R.A., Diamond, S.E., Jourdan, J., Plath, M. and **Langerhans, R.B.** Thermal regime drives a latitudinal gradient in morphology and life history in a livebearing fish. *Biological Journal of the Linnean Society* 125(1):126-141.

*Fowler, A.E., *Lor, D.J., *Farrell, C.E., *Bauman, M.A., Peterson, M.N. and **Langerhans, R.B.** Predator loss leads to reduced antipredator behaviours in Bahamas mosquitofish. *Evolutionary Ecology Research* 19:387-405.

DeWitt, T.J., McCarthy, T.M., Washick, D.L., Clark, A.B. and **Langerhans, R.B.** Predator avoidance behaviour in response to turtles and its adaptive value in the freshwater snail. *Planorbella campanulata. Journal of Molluscan Studies* 84(3):266-274.

†Green, K., **Langerhans, R.B.,** Dempsey, M. and Delgado, C. The evolution of a partnership: how a scientist, a teacher, and a researcher brought real-world science to students. *Science Scope* 41(8):41-46.

*Silvy, E.H., Peterson, M.N., †Heinen-Kay, J.L. and **Langerhans, R.B.** Illegal harvest of marine resources on Andros Island and the legacy of colonial governance. *British Journal of Criminology* 58(2):332-350.

2017 **Langerhans, R.B.** Predictability and parallelism of multi-trait adaptation. *Journal of Heredity* 109(1): 59-70.

- ❖ Invited symposium article.

Araújo, M.S., **Langerhans, R.B.** and Layman, C.A. Body streamlining is related to higher growth rates in Bahamian mosquitofish. *Evolutionary Ecology Research* 18(4):383-391.

*Shapiro, H.G., Peterson, M.N., Stevenson, K.T., †Frew, K.N. and **Langerhans, R.B.** 2018. Wildlife species preferences differ among children in continental and island locations. *Environmental Conservation* 44(4):389-396.

2016 **Langerhans, R.B.**, †Anderson, C.M. and †Heinen-Kay, J.L. Causes and consequences of genital evolution. *Integrative and Comparative Biology* 56(4):741–751.

- ❖ Invited symposium article.
- ❖ Featured in *Science*, *New Scientist*, and *ScienceNews*.

Higham, T.E., Rogers, S.M, **Langerhans, R.B.**, Jamniczky, H.A., Lauder, G.V., Stewart, W.J., and Martin, C.H. and Reznick, D.N. Speciation through the lens of biomechanics: locomotion, prey capture and reproductive isolation. *Proceedings of the Royal Society B* 283:20161294.

- ❖ Invited review article.

†Heinen-Kay, J.L., *Schmidt, D.A., *Stafford, A.T., *Costa, M.T., Peterson, M.N., †Kern, E.M.A. and **Langerhans, R.B.** Predicting multifarious behavioural divergence in the wild. *Animal Behaviour* 121:3-10.

†Kern, E.M.A., *Robinson, D., *Gass, E., Godwin, J. and **Langerhans, R.B.** Correlated evolution of personality, morphology, and performance. *Animal Behaviour* 117:79-86.

- ❖ Won Grossfeld Award for best 2016 publication by a student/postdoc in the W.M. Keck Center for Behavioral Biology.
- ❖ Featured in NC State News, ScienceDaily, Phys.Org, *Popular Science*, and others.
- ❖ 99th percentile for media coverage for this journal (Altmetric ranking).

Riesch R., Tobler, M., Lerp, H., Jourdan, J., Doumas, T., Nosil, P., **Langerhans, R.B.** and Plath, M. Extremophile Poeciliidae: multivariate insights into the complexity of speciation along replicated ecological gradients. *BMC Evolutionary Biology* 16:136. DOI: 10.1186/s12862-016-0705-1.

Kraus, R.H.S. et al. Peer review: matchmaker aims to cut journal shopping. *Nature* 531:448. (Short correspondence piece on a solution to journal shopping, with many signatories.)

*Shapiro, H.G., *Erickson, K.A., Peterson, M.N., †Frew, K., Stevenson, K.T. and **Langerhans, R.B.** Which species to conserve: evaluating children's species-based conservation priorities. *Biodiversity and Conservation* 25(3):539–553.

2015 †Sharpe, D.M.T., **Langerhans, R.B.**, Low-Décarie, E. and Chapman, L.J. Little evidence for morphological change in a resilient endemic species following the introduction of a novel predator. *Journal of Evolutionary Biology* 28(11):2054-2067.

†Anderson, C.M. and **Langerhans, R.B.** Origins of female genital diversity: predation risk and lock-and-key explain rapid divergence in a livebearing fish. *Evolution* 69(9):2452-2467.

- ❖ Featured in NC State News, ScienceDaily, Phys.Org, Discover Maganize Blog, IFLScience, and others.
- ❖ 99th percentile for media coverage for the journal (Altmetric ranking).

‡Riesch, R., *Easter, T., Layman, C.A. and **Langerhans, R.B.** Rapid human-induced divergence of life-history strategies in Bahamian livebearing fishes (family Poeciliidae). *Journal of Animal Ecology* 84(6):1732-1743.

†Giery, S.T., Layman, C.A. and **Langerhans, R.B.** Anthropogenic ecosystem fragmentation drives shared and unique patterns of sexual signal divergence among three species of Bahamian mosquitofish. *Evolutionary Applications* 8(7): 679-691.

†Heinen-Kay, J.L., *Morris, K.E., *Ryan, N., *Byerley, S.L., *Venezia, R.E., Peterson, M.N. and **Langerhans, R.B.** A tradeoff between natural and sexual selection underlies diversification of a sexual signal. *Behavioral Ecology* 26(2):533–542.

Wellborn, G.A. and **Langerhans, R.B.** Ecological opportunity and the adaptive diversification of lineages. *Ecology and Evolution* 5(1):176–195.

‡Martin, R.A., †McGee, M.D. and **Langerhans, R.B.** Predicting ecological and phenotypic differentiation in the wild: a case of piscivorous fish in a fishless environment. *Biological Journal of the Linnean Society* 114(3):588–607.

- ❖ Featured in Case Western's *think*, Phys.Org, FishSens Magazine, others.
- ❖ 99th percentile for media coverage for the journal (Altmetric ranking).

Okamoto, K.W., **Langerhans, R.B.**, Rashid, R. and Amarasekare, P. Microevolutionary patterns in the common caiman predict macroevolutionary trends across extant crocodilians. *Biological Journal of the Linnean Society* 116(4):834-846.

*Chacin, D.H., Yeager, L., †Giery, S., Layman, C.A. and **Langerhans, R.B.** Does hydrological fragmentation affect coastal bird communities? A study from Abaco Island, The Bahamas. *Wetlands Ecology and Management* 23(3):551-557.

†Hayes, M.C., Peterson, M.N., †Heinen-Kay, J.L, and **Langerhans, R.B.** Tourism-related drivers of support for protection of fisheries resources on Andros Island, The Bahamas. *Ocean & Coastal Management* 106:118-123.

Beckmann, M.C., Gilliam, J.F. and **Langerhans, R.B.** X-ray imaging as a time-saving, non-invasive technique for diet analysis. *Fisheries Research* 161:1-17.

2014 †Heinen-Kay, J.L., *Noel, H.G., Layman, C.A. and **Langerhans, R.B.** Human-caused habitat fragmentation can drive rapid divergence of male genitalia. *Evolutionary Applications* 7(10):1252–1267.

- ❖ Featured in NC State News, ScienceDaily, Phys.Org, TheDodo, and others.
- ❖ 2nd highest media coverage ever scored for the journal (Altmetric ranking).
- ❖ Won Grossfeld Award for best 2014 publication by a student/postdoc in the W.M. Keck Center for Behavioral Biology.

‡Araújo, M.S., **Langerhans, R.B.**, †Giery, S.T. and Layman, C.A. Ecosystem fragmentation drives increased diet variation in an endemic live-bearing fish of the Bahamas. *Ecology and Evolution* 4(16):3298-3308.

Sanger, T.J., *Seav, S., Tokita, M., **Langerhans, R.B.**, *Ross, L.M., Losos, J.B and Abzhanov, A. The oestrogen pathway underlies the evolution of exaggerated male cranial shapes in *Anolis* lizards. *Proceedings of the Royal Society B* 281(1784):20140329.

‡Martin, R.A., ‡Riesch, R., †Heinen-Kay, J.L. and **Langerhans, R.B.** Evolution of male coloration during a post-Pleistocene radiation of Bahamas mosquitofish (*Gambusia hubbsi*). *Evolution* 68(2):397-441.

- ❖ Featured in NC State's *The Abstract*, Phys.Org, Technology.Org.

†Vega-Trejo, R., Zúñiga-Vega, J.J. and **Langerhans, R.B.** Morphological differentiation among populations of *Rhinella marina* (Amphibia: Anura) in western Mexico. *Evolutionary Ecology* 28(1):69-88.

‡Riesch, R., Plath, M., Schlupp, I., Tobler, M. and **Langerhans, R.B.** Colonization of toxic environments drives predictable life-history evolution in livebearing fishes (Poeciliidae). *Ecology Letters* 17(1):65-71.

- ❖ Featured in Research Highlights section of *Nature* and *Evolutionary Applications*; cover of journal issue, NC State's *The Abstract*.

2013 †Heinen-Kay, J.L and **Langerhans, R.B.** Predation-associated divergence of male genital morphology in a livebearing fish. *Journal of Evolutionary Biology* 26(10):2135-2146.

- ❖ Featured in dozens of online media outlets (e.g., Phys.Org, Smithsonian Smart News Blog, Daily Kos, Science Daily), NewScientist Magazine, UNC TV.
- ❖ 99th percentile for media coverage for the journal (Altmetric ranking).

Langerhans, R.B. and *Makowicz, A.M. Sexual selection paves the road to sexual isolation during ecological speciation. *Evolutionary Ecology Research* 15:633-651.

- ❖ Invited article for special issue.

†Heinen, J.L., *Coco, M.W., *Marcuard, M.S., *White, D.N., Peterson, M.N., ‡Martin, R.A. and **Langerhans, R.B.** Environmental drivers of demographics, habitat use, and behavior during a post-Pleistocene radiation of Bahamas mosquitofish (*Gambusia hubbsi*). *Evolutionary Ecology* 27(5):971-991.

Langerhans, R.B. and ‡Riesch, R. Speciation by selection: a framework for understanding ecology's role in speciation. *Current Zoology* 59(1):31-52.

- ❖ Invited article for special issue; featured on cover of journal.

‡Riesch, R., ‡Martin, R.A. and **Langerhans, R.B.** Predation's role in life-history evolution of a livebearing fish and a test of the Trexler-DeAngelis model of maternal provisioning. *American Naturalist* 181(1):78-93.

2012 **Langerhans, R.B.**, Gifford, M.E., Domínguez-Domínguez, O., García-Bedoya, D. and DeWitt, T.J. *Gambusia quadruncus* (Cyprinodontiformes: Poeciliidae): a new mosquitofish species from east-central México. *Journal of Fish Biology* 81(5):1514-1539.

- ❖ Featured in dozens of online media outlets (e.g., Science Daily, National Geographic, MSNBC, Yahoo! News, Huffington Post), and the Canadian Broadcasting Company's *Quirks and Quarks* radio show.
- ❖ 98th percentile for media coverage for the journal (Altmetric ranking).

‡Riesch, R., ‡Martin, R.A., Bierbach, D., Plath, M., **Langerhans, R.B.** and Arias-Rodriguez, L. Natural history, life history, and diet of *Priapella chamulae* Scchartl, Meyer & Wilde 2006 (Teleostei: Poeciliidae). *Aqua, International Journal of Ichthyology* 18(2):95-102.

2011 ‡Riesch, R., Schlupp, I., **Langerhans, R.B.** and Plath, M. Shared and unique patterns of embryo development in extremophile poeciliids. *PLoS ONE* 6(11):e27377.

Langerhans, R.B. Genital evolution. Pages 228-240 *in* J. Evans, A. Pilastro and I. Schlupp, eds. *Ecology and Evolution of Poeciliid Fishes*. Chicago, University of Chicago Press.

2010 **Langerhans, R.B.** Predicting evolution with generalized models of divergent selection: a case study with poeciliid fish. *Integrative and Comparative Biology* 50(6):1167-1184.

- ❖ Invited symposium article.

Langerhans, R.B. and Reznick, D.N. Ecology and evolution of swimming performance in fishes: predicting evolution with biomechanics. Pages 200-248 i*n* P. Domenici and B.G. Kapoor, eds. *Fish locomotion: an etho-ecological perspective*. Enfield, Science Publishers.

Langerhans, R.B., Gifford, M.E. and *Joseph, E.O. Ecological speciation among blue holes in mosquitofish. Pages 13-30 *in* M. Uribe and H. Grier, eds. *Viviparous Fishes II*. Homestead, FL, New Life Publications.

2009 **Langerhans, R.B.** and *Makowicz, A.M. Shared and unique features of morphological differentiation between predator regimes in *Gambusia caymanensis*. *Journal of Evolutionary Biology* 22(11):2231-2242.

Langerhans, R.B. Morphology, performance, fitness: functional insight into a post-Pleistocene radiation of mosquitofish. *Biology Letters* 5(4):488-491.

- ❖ Featured in an undergraduate texts (*Campbell Biology*, Reece et al.).

Langerhans, R.B. Trade-off between steady and unsteady swimming underlies predator-driven divergence in *Gambusia affinis*. *Journal of Evolutionary Biology* 22(5):1057-1075.

Langerhans, R.B. and Gifford, M.E. Divergent selection, not life-history plasticity via food limitation, drives morphological divergence between predator regimes in *Gambusia hubbsi*. *Evolution* 63(2):561-567.

Allan, B.F., **Langerhans, R.B.**, Ryberg, W.A., et. al. Ecological correlates of risk and incidence of West Nile Virus in the United States. *Oecologia* 158(4):699-708.

- ❖ Featured in dozens of online media outlets (e.g., AOL News, Science Daily), several newspapers (e.g., *St. Louis Post-Dispatch*, *Oklahoma City Examiner*).

2008 **Langerhans, R.B.** Predictability of phenotypic differentiation across flow regimes in fishes. *Integrative and Comparative Biology* 48(6):750-768.

- ❖ Invited symposium article.

Langerhans, R.B. Coevolution. Pages 644-648 *in* S.E. Jørgensen and B.D. Fath, eds. General Ecology. Vol. 1 of Encyclopedia of Ecology. Oxford, Elsevier.

2007 **Langerhans, R.B.**, Gifford, M.E. and *Joseph, E.O. Ecological speciation in *Gambusia* fishes. *Evolution* 61(9):2056-2074.

- ❖ Received R.A. Fisher Prize (best dissertation paper in 2007 in *Evolution*), featured in undergraduate texts (e.g., *Campbell Biology*, Reece et al.; *Ecology*, Cain et al.), Faculty of 1000 rating of 'Exceptional' (top 1% of publications), featured in Editors' Choice section of *Science*.

Langerhans, R.B., Chapman, L.J. and DeWitt, T.J. Complex phenotype-environment associations revealed in an East African cyprinid. *Journal of Evolutionary Biology* 20(3):1171-1181.

Landesman, W.J., Allan, B.F., **Langerhans, R.B.**, Knight, T.M. and Chase, J.M. Inter-annual associations between precipitation and human incidence of West Nile Virus in the United States. *Vector Borne and Zoonotic Diseases* 7(3):337-343.

- ❖ Featured in *St. Louis Post-Dispatch*.

Revell, L.J., Harmon, L.J., **Langerhans, R.B.** and Kolbe, J.J. A phylogenetic approach to determining the importance of constraint on phenotypic evolution in the neotropical lizard *Anolis cristatellus*. *Evolutionary Ecology Research* 9(2):261-282.

2006 Losos, J.B., Schoener, T.W., **Langerhans, R.B.** and Spiller, D.A. Rapid temporal reversal of predator-driven natural selection. *Science* 314(5802): 1111.

- ❖ Featured in many media outlets (e.g., *National Geographic News*, *The Times of London*, *Washington Post*, *New York Post*, *Scientific American*), Faculty of 1000 rating of 'Recommended'.

Langerhans, R.B., Knouft, J.H. and Losos, J.B. Shared and unique features of diversification in Greater Antillean *Anolis* ecomorphs. *Evolution* 60(2):362-369.

Langerhans, R.B. Evolutionary consequences of predation: avoidance, escape, reproduction, and diversification. Pages 177-220 i*n* A.M.T. Elewa, ed. *Predation in organisms: a distinct phenomenon*. Heidelberg, Springer-Verlag.

2005 **Langerhans, R.B.**, Layman, C.A. and DeWitt, T.J. Male genital size reflects a tradeoff between attracting mates and avoiding predators in two livebearing fish species. *Proceedings of the National Academy of Sciences, U.S.A.* 102(21):7618-7623.

- ❖ Featured in an undergraduate text (*Evolutionary Analysis*, Herron and Freeman), and in hundreds of media outlets, including MSNBC, Yahoo! News, dozens of U.S. newspapers (e.g., *Chicago Tribune*, *Dallas Morning News*, *Los Angeles Times*, *Philadelphia Inquirer*), dozens of international newspapers (e.g., *The Times of London*, *Toronto Star*, *Folha de Sao Paulo*, *The Australian*), the Canadian Broadcasting Company, and National Public Radio.

Layman, C.A., **Langerhans, R.B.** and Winemiller, K.O. Body size, not other morphological traits, characterizes cascading effects in fish assemblage composition following commercial netting. *Canadian Journal of Fisheries and Aquatic Sciences* 62(12):2802-2810.

Dayton, G.H., Saenz, D., Baum, K.A., **Langerhans, R.B.** and DeWitt, T.J. Body shape, burst speed and escape behavior of larval anurans. *Oikos* 111(3):582-591.

2004 **Langerhans, R.B.**, Layman, C.A., *Shokrollahi, A.M. and DeWitt, T.J. Predator-driven phenotypic diversification in *Gambusia affinis*. *Evolution* 58(10):2305–2318.

Langerhans, R.B. and DeWitt, T.J. Shared and unique features of evolutionary diversification. *American Naturalist* 164(3):335-349.

Layman, C.A., Arrington, D.A., **Langerhans, R.B.** and Silliman, B.R. Degree of fragmentation affects fish assemblage structure in Andros Island (Bahamas) estuaries. *Caribbean Journal of Science* 40(2):232-244.

Kosciuch, K. and **Langerhans, R.B.** Evolution of coloniality via commodity selection: what about variance? *Auk* 121(1):257-262.

DeWitt, T.J. and **Langerhans, R.B.** Integrated solutions to environmental heterogeneity: theory of multimoment reaction norms. Pages 98-111 *in* T.J. DeWitt and S.M. Scheiner, eds. *Phenotypic Plasticity. Functional and Conceptual Approaches*. New York, Oxford University Press.

Layman, C.A., Arrington, D.A., **Langerhans, R.B.** and Silliman, B.R. Effects of estuarine fragmentation on fish assemblage structure on Andros Island. *Bahamas Journal of Science* 12(1):29-38.

2003 **Langerhans, R.B.**, Layman, C.A., Langerhans, A.K. and DeWitt, T.J. Habitat-associated morphological divergence in two Neotropical fish species. *Biological Journal of the Linnean Society* 80:689-698.

DeWitt, T.J. and **Langerhans, R.B.** Multiple prey traits, multiple predators: keys to understanding complex community dynamics. *Journal of Sea Research* 49:143-155.

- ❖ Invited article for special issue.

2002 **Langerhans, R.B.** and DeWitt, T.J. Plasticity constrained: over-generalized induction cues cause maladaptive phenotypes. *Evolutionary Ecology Research* 4:857-870.

GRANTS AND ACADEMIC AWARDS

2017 Swedish Research Council, "Ecology and post-mating isolating barriers during speciation" (with A. Nilsson) (2017-2022). $379,000

2016 National Science Foundation-National Environment Research Council (UK), "The relative roles of preadaptation and contemporary evolution during biological invasions" (with R. Riesch, R.A. Martin) (2016-2019). $1,168,933. Recommended High Priority, but not awarded.

2015 Swedish Research Council, "Causes and consequences of phenotypic integration" (with K. Hulthén) (2015-2019) $373,320

2014 National Science Foundation, "Dissertation Research: Does phenotypic integration reflect local adaptation in Bahamas mosquitofish?" (with J.L. Heinen-Kay) (2014-2016). $19,695

2013 National Science Foundation, "Ecology as a missing link in understanding genital evolution: functional insight into the causes of rapid evolution of male genitalia" Recommended Invitation for Full Proposal, but not invited.

2012 National Science Foundation, "Collaborative Research: Ecology, genotype, phenotype, and reproductive isolation: elucidating mechanistic pathways of speciation in the wild." (with P.A. Hohenlohe). $741,459. Invited Full Proposal. Recommended, but not awarded.

2010 North Carolina State University Study Abroad Program Development Grant, "Development of a Study Abroad Program in Bahamian Conservation Biology"(with Nils Peterson). $2500

2009 National Science Foundation, "Collaborative research: Human-induced phenotypic variation in endemic livebearing fish" (with C.A. Layman) (2009-2013). $393,996

American Society of Naturalists, Young Investigators Prize (outstanding and promising work by investigators who received their doctorates in the three years preceding the application deadline or who are in their final year of graduate school). $1200

2008 Society for the Study of Evolution, R.A. Fisher Prize (best paper published in *Evolution* in 2007 based on a Ph.D. dissertation). $1000

2007 National Science Foundation Integrative Graduate Education and Research Traineeship (IGERT), Program in Biomechanics (2007-2008).

2007 Society for the Study of Evolution Travel Award to attend the Evolution 2007 meeting in Christchurch, New Zealand. $750

UCLA Institute of the Environment Travel Award to attend a summit on Evolutionary Change in Human-altered Environments in Los Angeles, California. $450

2006 National Science Foundation Doctoral Dissertation Improvement Grant. $11,975

Society of Integrative and Comparative Biology Grant in Aid of Research. $1000

2005 Society of Systematic Biologists Student Research Award. $1800

Explorers Club Exploration Fund. $1200

Society of Wetland Scientists Student Research Grant. $1000

Best Presentation in Behavioral Ecology. Midwest Ecology and Evolution Conference. Carbondale, Illinois.

2004 U.S. Environmental Protection Agency (EPA) Science To Achieve Results (STAR) Graduate Fellowship (2004-2007). $111,000

American Museum of Natural History Theodore Roosevelt Memorial Fund. $1770

American Society of Ichthyologists and Herpetologists Raney Fund. $1000

Crescent Hills Research Fund. $600

2003 Society of Wetland Scientists Student Research Grant. $1000

2002 Texas Water Resources Institute Mills Scholarship. $1000

National Science Foundation Graduate Research Honorable Mention

Best Presentation, Student Ecological Integration Symposium, Texas A&M University. $100

Texas A&M University Graduate Student Travel Award to attend the American Society of Naturalists meeting in Banff, Canada. $700

2001 Best Presentation, Student Ecological Integration Symposium, Texas A&M University. $100

TEACHING EXPERIENCE

Fall 2020, Spr 2021, Fall 2021 Instructor, *Biological Sciences Honors Thesis and Communication*, North Carolina State University

Spr 2021, Fall 2021 Instructor, *Introduction to Evolution*, North Carolina State University

2012, 2013, 2014, 2015, 2016, 2017, 2019, 2020, 2021 Instructor, *Evolutionary Ecology*, North Carolina State University

2011, 2013, 2014, 2015, 2016, 2017, 2018, 2019 Instructor, *Ecology, Evolution, and Sociology of Conservation Biology in The Bahamas*, North Carolina State University

2014 Guest Lecturer, *Evolution and Islands*, North Carolina State University

2009 Instructor, *Morphometric Analysis in Biology*, Universidad Michoacana de San Nicolás de Hidalgo de México

2008 Guest Lecturer, *Patterns and Processes in Fish Diversity*, Harvard University

2008 Team-Instructor, *Fundamentals of Evolutionary Biology*, Harvard University

2007 Guest Lecturer, *Patterns and Processes in Fish Diversity*, Harvard University

2005 Guest Lecturer, *Introduction to Ecology*, Washington University

	Teaching Assistant, *Introduction to Ecology*, Washington University
2003	Co-Instructor, *Current Philosophical Issues in Science*, Texas A&M University
2002	Teaching Assistant, *Conservation Biology*, Texas A&M University
	Co-Instructor, *Current Philosophical Issues in Science*, Texas A&M University
2001	Teaching Assistant, *Ornithology Laboratory*, Texas A&M University
	Teaching Assistant, *Conservation Biology*, Texas A&M University

INVITED PRESENTATIONS

Oct. 2021	Department of Biology, Case Western Reserve University, Cleveland, Ohio
Sep. 2019	Invited Symposium Speaker, Society of Population Ecology, Kyoto, Japan
Mar. 2019	Keynote Speaker, Biology at Lund Annual Meeting (BLAM), Lund University, Sweden
Nov. 2018	Department of Biology, University of Toronto, Mississauga, Canada
July 2018	Latin America and Caribbean Congress for Conservation Biology, University of the West Indies, Saint Augustine, Trinidad and Tobago
Oct. 2017	Evolution and Ecology Seminar, Virginia Tech University, Blacksburg, Virginia
Oct. 2017	Bio-Pop Seminar, University of North Carolina, Chapel Hill, North Carolina
Feb. 2017	Gordon Research Conference on Speciation. Barga, Italy
Feb. 2017	Darwin Day Presentation, North Carolina Museum of Natural Sciences, Raleigh, North Carolina
July 2016	American Genetic Association Annual Meeting (President's Symposium Presentation). Asilomar, California
June 2016	International Congress of Vertebrate Morphology (Symposium Presentation). Washington, D.C.
Jan. 2016	American Society of Naturalists (Featured Debate). Asilomar, California
Jan. 2016	Society for Integrative and Comparative Biology (Symposium Presentation). Portland, Oregon
Jan. 2016	Society for Integrative and Comparative Biology (Panel Member, "Explaining the Importance of Oddball Science"). Portland, Oregon

Nov. 2015 Department of Biological Sciences' Big Ideas in Science Talk, North Carolina State University

Oct. 2015 Department of Biology, Duke University, Durham, North Carolina

Feb. 2015 High Point University, North Carolina

Dec. 2014 North Carolina Museum of Natural Sciences, Raleigh, North Carolina

Mar. 2014 Department of Biology, Lund University, Sweden

Jan. 2014 Department of Ecology and Evolutionary Biology, University of Colorado

Apr. 2013 Department of Biology, Virginia Commonwealth University

Oct. 2012 Departments of Environmental Studies and Biology, University of North Carolina at Asheville

Sep. 2012 Periodic Tables Public Lecture, Durham's Science Café, North Carolina

Apr. 2012 Section of Integrative Biology, University of Texas

Mar. 2012 Curriculum for the Environment & Ecology, University of North Carolina at Chapel Hill

Mar. 2012 Department of Biological Sciences, University of Alabama

Nov. 2011 Department of Biology, University of Kentucky

July 2011 Animal Behavior Meeting 2011 (Symposium Presentation). Bloomington, Indiana

Apr. 2011 Department of Biology, Duke University

Apr. 2011 Department of Biology, McGill University

Mar. 2011 College of Veterinary Medicine, North Carolina State University

Mar. 2011 Department of Biology, College of Charleston

Mar. 2011 Department of Biology, Brigham Young University

Feb. 2011 Department of Genetics, North Carolina State University

Jan. 2011 Student Fisheries Society, North Carolina State University

Dec. 2010 Department of Biological Sciences, Sam Houston State University

Nov. 2010 Population Biology Group, Duke University

Nov. 2010	Department of Biological Sciences, Clemson University
Sep. 2010	Department of Biology, East Carolina University
June 2010	Evolution 2010 (American Society of Naturalists Young Investigators Prize Lecture). Portland, Oregon
June 2010	Evolution 2010 (Symposium Presentation). Portland, Oregon
April 2010	Department of Wildlife and Fisheries, Texas A&M University
Jan. 2010	Society for Integrative and Comparative Biology (Symposium Presentation). Seattle, Washington
Oct. 2009	Department of Ecology and Evolutionary Biology, University of Connecticut
July 2009	Joint Meeting of Ichthyologists and Herpetologists (Symposium Presentation). Portland, Oregon
June 2009	Evolution 2009 (American Society of Naturalists Young Investigators Prize Lecture). Moscow, Idaho (cancelled due to illness)
May 2009	Department of Zoology, University of Oklahoma
Feb. 2009	Department of Biological Sciences, Florida International University
Feb. 2009	Department of Zoology, Oklahoma State University
Feb. 2009	Department of Biology, North Carolina State University
Feb. 2009	Department of Ecology and Evolutionary Biology, University of Michigan
Jan. 2009	University of Texas Marine Science Institute
June 2008	Evolution 2008 (Society for the Study of Evolution Fisher Prize Lecture). Minneapolis, Minnesota
Apr. 2008	Ontario Ecology and Ethology Colloquium (Symposium Presentation). Guelph, Canada
Mar. 2008	Department of Biological Sciences, Louisiana State University
Feb. 2008	Center for Population Biology, University of California, Davis
Jan. 2008	Society for Integrative and Comparative Biology (Symposium Presentation). San Antonio, Texas
Nov. 2007	Department of Ecology and Evolutionary Biology, Rice University
Mar. 2007	Young Scientists Symposium. University of Michigan

Dec. 2006 Marine Sciences Program, Florida International University

Nov. 2006 Third International Symposium on Viviparous Fishes. Morelia, Michoacán, México

Oct. 2006 Department of Biology, University of California, Riverside

Jan. 2006 Abaco Science Alliance Conference. Marsh Harbour, Abaco, The Bahamas

Feb. 2005 Andros Science Alliance Conference. Fresh Creek, Andros, The Bahamas

Aug. 2004 Ecological Society of America (Invited Paper Presentation). Portland, Oregon

OTHER SELECTED PRESENTATIONS

June 2019 Evolution 2019, Providence, Rhode Island (2)

June 2016 Evolution 2016. Austin, Texas

Jan. 2016 Society for Integrative and Comparative Biology. Portland, Oregon

Aug. 2015 American Fisheries Society. Portland, Oregon

Aug. 2014 American Fisheries Society. Quebec, Canada

June 2014 Evolution 2014. Raleigh, North Carolina (6)

Aug. 2013 Ecological Society of America. Minneapolis, Minnesota

Aug. 2013 Congress of the European Society for Evolutionary Biology SEB. Lisbon, Portugal

June 2013 Evolution 2013. Snowbird, Utah (3)

July 2012 Evolution 2012. Ottawa, Canada (5)

June 2012 Animal Behavior Meeting 2012. Albuquerque, New Mexico

Jan. 2012 Society for Integrative and Comparative Biology. Charleston, South Carolina (2)

June 2011 Evolution 2011. Norman, Oklahoma

June 2010 Evolution 2010. Portland, Oregon

Nov. 2009 Darwinathon Symposium. University of Oklahoma

Sep. 2008 Oklahoma-Texas Aquatic Research Group Conference. University of Oklahoma

July 2008 Joint Meeting of Ichthyologists and Herpetologists. Montréal, Canada

Oct. 2007 Division of Vertebrate Morphology. Narragansett, Rhode Island

Aug. 2007 Ecological Society of America. San Jose, California

June 2007 Evolution 2007. Christchurch, New Zealand

Feb. 2007 Evolutionary Change in Human-altered Environments: An International Summit to Translate Science into Policy. Los Angeles, California

Jan. 2007 Society for Integrative and Comparative Biology. Phoenix, Arizona

Sep. 2006 EPA Graduate Fellowship Conference. Washington, D.C.

June 2006 Evolution 2006. Stony Brook, New York

March 2006 Midwest Ecology and Evolution Conference. St. Louis, Missouri

July 2005 Joint Meeting of Ichthyologists and Herpetologists. Tampa, Florida

March 2005 Midwest Ecology and Evolution Conference. Carbondale, Illinois

Feb. 2004 Student Ecological Integration Symposium. Texas A&M University

Feb. 2003 Texas Academy of Science. Nacogdoches, Texas

Aug. 2002 American Malacological Society. Charleston, South Carolina

July 2002 American Society of Naturalists. Banff, Canada

Mar. 2002 Student Ecological Integration Symposium. Texas A&M University (2)

Mar. 2001 Student Ecological Integration Symposium. Texas A&M University

SERVICE AS REVIEWER

American Midland Naturalist, American Naturalist, Animal Behaviour, Animal Biology, Aquaculture, Archiv für Hydrobiologie, Axios, Behavioral Ecology, Behavioral Ecology and Sociobiology, Behaviour, Biological Journal of the Linnean Society, Biology Letters, BMC Evolutionary Biology, Canadian Journal of Zoology, Conservation Biology, Copeia, Cybium, Current Zoology, Ecology Ecology Letters, Ecology of Freshwater Fish, Encyclopedia of Molecular Cell Biology and Molecular Medicine, Environmental Biology of Fishes, Ethology, Evolution, Evolutionary Applications, Evolutionary Ecology, Evolutionary Ecology Research, Faculty of 1000, Freshwater Biology, Frontiers in Ecology and Evolution, Functional Ecology, Hydrobiologia, Integrative and Comparative Biology, Journal of Animal Ecology, Journal of Biogeography, Journal of Evolutionary Biology, Journal of Experimental Biology, Journal of Experimental Zoology A, Journal of Fish Biology, Journal of Morphology, Journal of Zoology, Limnology & Oceanography, Marine and Freshwater Research, Methods in Ecology and Evolution, Molecular Ecology, National Geographic Society, National Science Foundation, Naturwissenschaften, Nature Communications, Oecologia, Oikos, Oxford University Press, PLoS ONE, Proc. of the Natl. Acad. of Sci. USA, Proceedings of the Royal Society B., Revista de Biología Tropical, Science, Royal Society Open Science, The Southwestern Naturalist, U.S. Fish and Wildlife, US-Israel Binational Science Foundation, Various Book Chapters and Books, Web Ecology, Western North American Naturalist, Zoological Journal of the Linnean Society

ACADEMIC SERVICE

Undergraduate Advising and Coordiation:
Director of the Department of Biological Sciences Honors Program
Director of the Ecology, Evolution, and Conservation Biology B.S. concentration
Academic advisor for >200 undergraduate students to date

Current Graduate Students:
Matt Jenkins (M.S.), Varpu Pärssinen (Ph.D.), Mark Zimmerman (Ph.D.)

Current Postdoctoral Researchers:
Dr. Kaj Huthén

Past Graduate Students:
Christopher Anderson (M.S.), Dr. Justa Heinen-Kay (Ph.D.), Dr. Elizabeth Kern (Ph.D.)

Past Postdoctoral Researchers:
Dr. Ryan Martin, Dr. Rüdiger Riesch

Other Current Graduate Committees:
Evan Alger-Meyer (M.S., NCSU), Haviv Avrahami (Ph.D., NCSU), Murry Burgess (Ph.D., NCSU), Gina Calabrese (Ph.D., UNC Chapel Hill), James Withrow (Ph.D., NCSU)

Past Graduate Committees:
Kerri-Ann Lalique Bennett (M.Phil., University of the West Indies, Jamaica; external examiner), Diane Biederman (M.S., NCSU), Sandra Binning (Ph.D., The Australian National University; external examiner), Chelsea Blake (Ph.D., Texas State University), Khai Button (Ph.D., NCSU), Sean Giery (Ph.D., NCSU), Kathryn Green (Ph.D., NCSU), Armando Hernández Jiménez (Ph.D., Instituto de Ecología, Mexico), Evan Jevnikar (M.S., NCSU), Patrick Kelly (Ph.D., UNC Chapel Hill), Jens Kosch (M.S., NCSU), Joseph McGirr (Ph.D., UNC Chapel Hill), Anton Norville (M.Phil., University of the West Indies, Barbados; external examiner), Grace Parker (Ph.D., NCSU), Antonio Serrato (Ph.D., UNC Chapel Hill), Joseph Styga (Ph.D., University of Alabama), Nicholas Troendle (Ph.D., University of Georgia), Steven Turner (Ph.D., NCSU), Andrea Vogel (Ph.D., NCSU), Emma Vtipil (M.S., NCSU), Gabriel Zilnick (M.S., NCSU)

Editor:
Axios Review, 2014-2017

International Meeting Organization:
Organizing Committee for the Evolution 2014 Meeting

Departmental Seminar Series:
2012-2013, Co-organizer, Biology Department Seminar Series, North Carolina State University

SYNERGISTIC ACTIVITIES

Undergraduate and young scientist research training since joining NC State: mentored 40 undergraduate students (26 from underrepresented groups; 36 co-authors on published peer-reviewed articles), 5 high-school students (4 from underrepresented groups), and 1 middle-school student.

Online data resource: Creator and Manager, Digital Repository of Information for the Langerhans Laboratory (DRILL; http://gambusia.zo.ncsu.edu/DRILL/), an online searchable database of over 600 catalogued collections, over 23,000 individually preserved whole specimens, over 21,000 tissue samples, over 43,000 digital photographs and 9,000 digital x-rays.

Organized academic activities: led many workshops on Geometric Morphometrics, trained semester-long visiting grad students from other universities in my lab (7 from 3 countries), co-organized an international symposium, led seminars on Ecological and Evolutionary Statistics, Evolutionary Perspectives on Biological Invasions, Philosophical Issues in Science.

Community outreach: Worked with high-school student groups, high-school teacher workshops, middle-school teacher lesson plans, local conservation organizations, and national and international conservation organizations; integration of Bahamians into science research, including hands-on experience for community members, teachers, and high-school / undergraduate students.