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Sean Ryan, Ph.D.

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Professional Profile

Dr. Ryan is a broadly trained biologist with over 10 years of experience evaluating the ecological impacts of environmental changes. His work includes expertise on topics such as climate change, invasive species, agricultural systems, fire ecology, entomology, and population genetics.

Dr. Ryan uses a variety of analytical tools that include molecular genetics, bioinformatics, simulation modeling, and statistical and quantitative methods to assess genetic and ecological changes across landscapes and over time. He has used genomic analyses to uncover historical invasion routes and has assessed the ecological and genetic consequences to historical changes in climate. He develops interactive visualizations to facilitate data exploration and scientific communication. His expertise also includes the development, use, and evaluation of publicly generated data (citizen science) to address research questions, for example, in agriculture and food research.

Academic Credentials & Professional Honors

Ph.D., Biological Sciences, University of Notre Dame, 2016

M.S., Biological Sciences, Bowling Green State University, 2010

B.S., Organismal and Conservation Biology, San Jose State University, 2007

Academic Appointments

University of Tennessee, Knoxville, Department of Entomology and Plant Pathology, Assistant Professor (Adjunct)

Prior Experience

USDA-NIFA Postdoctoral fellow, University of Tennessee, Knoxville, TN, 2017-2019

Citizen Science fellow, North Carolina State University, NC, 2017-2019

Research Geneticist, USDA-ARS, Gainesville, FL, 2015-2017

Professional Affiliations

Entomological Society of America, member since 2013

Ecological Society of America, member since 2010

Publications

Menzie, C.A., Horr, T., Kashuba, R., Kierski, M.W., Kulacki, K.J., McArdle, M. E., Ryan, S.R., Taylor, A.A. 2024. Emerging Frameworks and Tools for Environmental Risk Assessment. In D. J. Paustenbach & K. Feinberg (Eds.), Human and Ecological Risk Assessment: Theory and Practice, Third Edition (pp. 26). https://doi.org/10.1002/9781119742975.ch26

Dekovich, A., Ryan, S., Bouwma, A., Calcaterra, L., Silvestre, R., Staton, M., Shoemaker, D. 2023. Population genetic analyses reveal host association and genetically distinct populations of social parasite Solenopsis daguerrei. Frontiers in Ecology and Evolution. 11; https://doi.org/10.3389/fevo.2023.1227847

Wenning, R.J., Gard, N.W., Ryan, S.F., White, C. 2022. The challenges for determining environmental footprints in the food sector. Integrated Environmental Assessment and Management, 18(3):836-838.

Ryan, S.F., Lombaert, E., Espeset, A., Vila, R., Talavera, G., Dinca, V., Doellman, M.M., Renshaw, M.A., Eng, M.W., Hornett, E.A., Li, Y., Pfrender, M.E., Shoemaker, D.W. 2019. Global invasion history of the agricultural pest butterfly Pieris rapae revealed with genomics and citizen science. Proceedings of the National Academy of Science. DOI: 10.1073/pnas.1907492116

Ryan, S.F., Adamson, N.L., Aktipis, A., Anderson, L.K., Austin, R., Barnes, L., Beasley, M.R., Bedell, K.D., Bedell, K.D., Briggs, S., Chapman, B., Cooper, C.B., Corn, J.O., Creamer, N.G., Delborne, J.A., Domenico, P., Driscoll, E., Goodwin, J., Hijarding, A., Hulbert., J.M., Isard, S., Just, M.G., Kar Gupta, K., Lopez-Uribe, M.M., O'Sullivan, J., Landis, E.A., Madden, A.A., McKenney, E.A., Nichols, L.M., Reading, B.J., Russell, S., Sengupta, N., Shapiro, L.R., Shell, L.K., Sheard, J.K., Shoemaker, D.D., Sorger, D.M., Starling, C., Thakur, S., Vatsavai, R.R., Weinstein, M., Winfrey, P., Dunn, R.R. 2018. The role of citizen science in addressing grand challenges in food and agriculture research. Proceedings of the Royal Society B; DOI:10.1098/rspb.2018.1977

Ryan, S.F., Deines, J.M., Scriber, J.M., Pfrender, M.E., Jones, S.E., Emrich, S.J., Hellmann, J.J. 2018. Climate-mediated hybrid zone movement revealed with genomics, museum collection, and simulation modeling. Proceedings of the National Academy of Science, 201714950; DOI: 10.1073/pnas.1714950115

McKinley, D.C., A.J. Miller-Rushing, H.L. Ballard, R.E. Bonney, H. Brown, D.M. Evans, R.A. French, J.K. Parrish, T.B. Philips, S.F. Ryan, L.A. Shanley, J.L. Shirk, K.F. Stepenuck, J.F. Weltzin, A. Wiggins, O.D. Boyle, R.D. Briggs, S.F. Chapin III, D.A. Hewitt, P.W. Preuss, and M.A. Soukup. 2017. Citizen Science Can Improve Conservation Science, Natural Resource Management, and Environmental Protection. Biological Conservation, 208:15–28

Ryan, S.F., Fontaine, M.C., Scriber, J.M., Pfrender, M.E., O'Neil, S.T., Hellmann, J.J. 2017. Patterns of divergence across the geographic and genomic landscape of a butterfly hybrid zone associated with a climatic gradient. Molecular Ecology, 26(18): 4725-4742

Ryan, S.F., Scriber, J.M., Valella, P., Thivierge, G. Aardema, M.L. 2017. The role of latitudinal, genetic and temperature variation in the induction of diapause of Papilio glaucus (Lepidoptera: Papilionidae). Insect Science, 00: 1-9

McKinley, D.C., Miller-Rushing, A.J., Ballard, H.L., Bonney, R.E., Brown, H., Evans, D.M., French, R.A., Parrish, J.K., Philips, T.B., Ryan, S.F., Shanley, L.A., Shirk, J.L., Stepenuck, K.F., Weltzin, J.F., Wiggins, A., Boyle, O.D., Briggs, R.D., Chapin III, S.F., Hewitt, D.A., Preuss, P.W., Soukup, M.A. 2015. Can investing in citizen science improve natural resource management and environmental protection? Issues

in Ecology, 19:1-28

Ryan, S.F., Bidart-Bouzat, G. 2014. Natal insect experience with Arabidopsis thaliana plant genotypes influences plasticity in oviposition behavior. Entomologia Experimentalis et Applicata, 152(3):216-227

Fontaine, M., Roland, K., Calves, I., Austerlitz, F., Palstra, F., Tolley, K., Ryan, S., Ferreira, M., Jauniaux, T., Llavona, A., Ozturk, B., Ozturk, A., Ridoux, V., Rogan, E., Sequeira, M., Siebert, U., Vikingsson, G., Borrell, A., Michaux, J., Aguilar, A. 2014. Postglacial climate changes and rise of three ecotypes of harbor porpoises, Phocoena phocoena, in western Palearctic Waters. Molecular Ecology, 23:3306-3321

Sharma, A., Bouchard, F., Ryan, S.F., Parker, D., Hellmann, J. 2013. Species are the Building Blocks of Ecosystem Services and Environmental Sustainability. Ethics, Policy & Environment, 16:1

Ryan, S.*, & Lambrecht, S. 2011. Seed soaking and age play a factor in heat-stimulated germination of two maritime chaparral Ceanothus (Rhamnaceae) species. Proceedings of the California Native Plant Society, 290:298

Presentations

Select Presentations

Co-organized Symposia

Ryan, S. F., et al. 2018. The role of citizen science in the history and future of agriculture and food science. Program Symposium: Citizen Science in a Changing World: Successes and Challenges Across Projects and Institutions. Entomological Society of America Annual meeting in Vancouver, British Columbia.

Invited Symposia

Ryan, S. F., et al. 2017. Invasion biology meets the 21st century: Harnessing the power of citizen science, in the genomics era. Symposium: Applying Emerging Genomic Techniques to Control Invasive Species. Entomological Society of America Annual meeting in Denver, Colorado.

Ryan, S. F., Hellmann, J. J. 2016. Hybridization in the context of a changing climate. Symposium: Climate Change Impacts and Insect Population Dynamics. International Congress of Entomology in Orlando, Florida.

Ryan, S.F., Shoemaker, D.D. 2016. Reconstructing the global invasion routes of the cabbage white butterfly using citizen science assisted genomics. Symposium: How Human Activities Shape the Global Distribution of Insects. International Congress of Entomology in Orlando, Florida.

Ryan, S. F., et al. 2014. Evaluating the efficacy of the RADseq method for use with historic specimen to explore long-term changes in the population genomics of a butterfly hybrid zone. Ecological Genomics as an Emerging Field: Opportunities for Non-Model Organisms. Ecological Society of America annual meeting in Sacramento, California.

Contributed Oral

Ryan. S. F. 2018. Using genomics and citizen science to assess and monitor genetic variation in a globally invasive agricultural pest and associated pathogen (baculovirus). FY2018 NIFA Fellows PD Meeting. Washington, D.C.

Ryan. S. F., Wade, E. J., Bouwman, A. M., Calcaterra, L., Shoemaker, D. D. 2016. Genetic variation in the ant social parasite Solenopsis daguerrei predicts host specificity at a micro-geographic scale. Evolution. Austin, Texas.

Invited Academic

Ryan, S. F. 2017. Combining Big Data and Public Engagement to Understand Insect Ecology and Evolution in a Changing Environment. Department of Bioagricultural Sciences & Pest Management, Colorado State University, Fort Collins, CO.

Invited General Public

Ryan, S. F. 2013. How citizen science is revolutionizing science and why you should be a part of that revolution. Public lecture at Ideas on Tap. Goshen, Indiana.

Ryan, S. F. 2012. Plant chemistry and insect choices: how experience may alter an ‘herbivore's dilemma. Public lecture for Potawatomi Conservatories, Mishawaka Indiana.

Research Grants

Agriculture and Food Research Initiative | National Institute of Food and Agriculture Postdoctoral Fellowship

Peer Reviews

Proceedings of the National Academy of Science

Nature Scientific Reports

Proceedings of the Royal Society B

Philosophical Transactions of the Royal Society B

Journal of Biogeography

Insect Conservation and Diversity