



BioOne COMPLETE

Cover

Source: The Auk, 135(3)

Published By: American Ornithological Society

URL: <https://doi.org/10.1642/AUK-2018.135.3.cover>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to

Journal Mission and Scope

The Auk: Ornithological Advances is an international, peer-reviewed journal that publishes original research and scholarship advancing the fundamental scientific knowledge of bird species and broad biological concepts (e.g., ecology, evolution, behavior, physiology, genetics) through studies of bird species. Articles often introduce or employ innovative empirical and theoretical approaches and analyses.

Topics covered in the journal include:

- Evolutionary history and paleontology
- Systematics and nomenclature
- Behavioral ecology
- Foraging strategies and tactics
- Population biology and ecology
- Molecular ecology
- Community and landscape ecology
- Migration and orientation
- Spacing patterns and habitat use
- Genetics and genomics
- Epigenetics, and evolutionary development
- Physiology and biochemistry
- Morphology and anatomy
- Integrative and cross-disciplinary studies
- Theoretical and methodological advances
- Thematic reviews and opinion pieces

Journals of the American Ornithological Society

The American Ornithological Society publishes two peer-reviewed, international journals of ornithology. *The Auk: Ornithological Advances* focuses on basic ornithological science. *The Condor: Ornithological Applications* focuses on applied ornithological study. The redefined, separate missions of the journals in 2014 created an opportunity for them to work together to publish the best science in basic and applied ornithology and to build on their long histories as top journals in the field of avian biology.



The Auk

Ornithological Advances

Volume 135 Number 3 July 2018



The Auk: Ornithological Advances

Volume 135, Number 3, Pages 385-819

July 2018

Editor-in-Chief: Mark E. Hauber



The Auk Ornithological Advances

EDITOR-IN-CHIEF Mark E. Hauber

University of Illinois at Urbana-Champaign, mhauber@illinois.edu

EDITORS Kimberly Bostwick, ksbstwick@icloud.com

James S. Sedinger, University of Nevada Reno, jsedinger@cabnr.unr.edu

Journals Director: Kathleen E. Erickson, AOSpubs@AmericanOrnithology.org

Managing Editor: Mark C. Penrose, AOSpubs@AmericanOrnithology.org

Copyeditors: Richard Earles, Scott W. Gillihan, Thalia Sachtleben

Translators: Lucio R. Malizia, Karl S. Mokross, Hélène Senechal

ASSOCIATE EDITORS

Zachary Aidala, Bloomfield College
Lauryn Benedict, University of Northern Colorado
Camille Bonneaud, University of Exeter
Melissa Bowlin, University of Michigan-Dearborn
Luke K. Butler, The College of New Jersey
Bruce Byers, University of Massachusetts Amherst
C. Daniel Cadena, Universidad de los Andes
Christopher J. Clark, University of California Riverside
James Dale, Massey University
Donald Dearborn, Bates College
Mark E. Deutschlander, Hobart and William Smith Colleges
Jack Dumbacher, California Academy of Sciences
Jeanne M. Fair, Los Alamos National Laboratory
Megan D. Gall, Vassar College
Ismael Galván, Doñana Biological Station - CSIC
Jennifer Gee, James San Jacinto Mountains Reserve
Sharon Gill, Western Michigan University
D. Caldwell Hahn, USGS Patuxent Wildlife Research Center
Thomas P. Hahn, University of California Davis
Stefanie Ismar, GEOMAR Helmholtz Center for Ocean Research Kiel
Douglas H. Johnson, USGS Northern Prairie Wildlife Research Center
David Koons, Utah State University
David Lahti, Queens College, The City University of New York
Adam Z. Lendvai, Virginia Tech
Catherine Lindell, Michigan State University
Bernard Lohr, University of Maryland, Baltimore County
Kathleen S. Lynch, Hofstra University
Elizabeth A. MacDougall-Shackleton, Western University-Canada

Rafael Maia, Columbia University
Gerald Mayr, Senckenberg Research Institute Frankfurt
Bill Monahan, USDA Forest Service
Troy G. Murphy, Trinity University
Paul M. Nolan, The Citadel (Military College of South Carolina)
Raul Ortiz-Pulido, Universidad Autónoma del Estado de Hidalgo
Sara Oyler-McCance, USGS Fort Collins Science Center
Juan L. Parra, Universidad de Antioquia
Stephen Pruett-Jones, University of Chicago
Wendy L. Reed, North Dakota State University
Christina Riehl, Harvard University
James W. Rivers, Oregon State University
Kristen C. Ruegg, University of California Santa Cruz
Rebecca J. Safran, University of Colorado Boulder
Terry Shaffer, USGS Northern Prairie Wildlife Research Center
Frederick H. Sheldon, Louisiana State University
Dave Shutler, Acadia University
Jill Soha, Duke University
Garth M. Spellman, Denver Museum of Nature & Science
Benjamin N. Taft, University of Wisconsin-Parkside
Sabrina S. Taylor, Louisiana State University
Daniel B. Thomas, Massey University
Andrea K. Townsend, Hamilton College
Eric Walters, Old Dominion University
Michael P. Ward, University of Illinois at Urbana-Champaign
Karen L. Wiebe, University of Saskatchewan
L. LaReesa Wolfenbarger, University of Nebraska at Omaha

Book Review Editor: Jay Mager, Ohio Northern University, j-mager@onu.edu

In Memoriam Editor: Ted Anderson, McKendree University, ted020@centurytel.net

On the Cover: Vegetarian Finch (*Platypiza crassirostris*), one of Darwin's finches, on Santa Cruz Island in the Galápagos, March 2016. In this issue (pp. 561–571), Funk and Burns explore the biogeographic history of Darwin's finches and their relatives, including the origin of the Darwin's finch radiation. Photographer: Scott A. Taylor

Journal Information: *The Auk: Ornithological Advances* publishes original research and scholarship advancing the fundamental scientific knowledge of bird species and broad biological concepts (e.g., ecology, evolution, behavior, physiology, genetics) through studies of bird species. Appropriate topics include documentation, analysis, and interpretation of laboratory and field studies; theoretical or methodological developments; and reviews of information or ideas. Authors are encouraged to write papers from the perspective of general concepts and theories and to consider the relevance of their findings to taxa in addition to birds. Contributions are welcomed from around the world but must be written in English. *The Auk* was published from 1884 to 2016 by the American Ornithologists' Union (AOU), and as of 2016 is published by the American Ornithological Society (a merger of the AOU and the Cooper Ornithological Society). *The Auk* became *The Auk: Ornithological Advances* in 2014. *The articles in this journal reflect the research and opinions of the individual authors. As such, the articles do not necessarily reflect the opinions of the editors or any official policy of the American Ornithological Society.*

Submit manuscripts online at www.editorialmanager.com/auk. **Author instructions** are at <http://americanornithologypubs.org/page/instructions>.

Copying and permissions notice: To obtain rights and permission to reprint papers, figures, tables, etc., or parts thereof, previously published in *The Auk* and *The Auk: Ornithological Advances*, contact the Publications Office at AOSpubs@AmericanOrnithology.org.

Abstracting and indexing: Articles appearing in *The Auk: Ornithological Advances* are abstracted and indexed in the databases listed online at www.AmericanOrnithologyPubs.org.

The Auk: Ornithological Advances is published weekly online (ISSN 1938-4254) by the American Ornithological Society, 1400 S Lake Shore Drive, Chicago, IL 60605. Print copies (ISSN 0004-8030) are available from Sheridan Press at <http://aos.sheridan.com>



AMERICAN ORNITHOLOGICAL SOCIETY

THE COUNCIL FOR 2018–2019

OFFICERS AND EDITORS

President: Kathy Martin, *Department of Forest and Conservation Sciences, University of British Columbia*, 2424 Main Mall, Vancouver, BC, V6T 1Z4 Canada, kathy.martin@ubc.ca

President-Elect: Thomas W. Sherry, *Department of Ecology & Evolutionary Biology, Tulane University*, 6055 General Meyer Avenue, New Orleans, LA 70131, tsherry@tulane.edu

Secretary: Andrew W. Jones, *Department of Ornithology, Cleveland Museum of Natural History*, 1 Wade Oval Drive, University Circle, Cleveland, OH 44106, ajones@cmnh.org

Treasurer: Rebecca T. Kimball, *Department of Biology, University of Florida*, 528 Bartram Hall, Gainesville, FL 32611, rkimball@ufl.edu

Editor-in-Chief of *The Auk: Ornithological Advances*: Mark E. Hauber, *Department of Animal Biology, School of Integrative Biology, University of Illinois at Urbana-Champaign*, 515 Morrill Hall, 505 S. Goodwin Avenue, Urbana, IL 61801, mhauber@illinois.edu

Editor-in-Chief of *The Condor: Ornithological Applications*: Philip C. Stouffer, *School of Renewable Natural Resources, Louisiana State University*, Baton Rouge, LA 70803, pstouffer@lsu.edu

Editor-in-Chief of *Studies in Avian Biology*: Kathryn P. Huyvaert, *Warner College of Natural Resources, Colorado State University*, 400 University Avenue, Fort Collins, CO 80523, kate.huyvaert@colostate.edu

Executive Director: Melinda Pruett-Jones, 1400 S. Lake Shore Drive, Chicago, IL 60605, mpruettjones@americanornithology.org

ELECTIVE COUNCILORS

2019: Melissa S. Bowlin, Renee A. Duckworth, Scott V. Edwards, Nathaniel T. Wheelwright

2020: Anna D. Chalfoun, Abby N. Powell, Andrea K. Townsend, Michael S. Webster

2021: Peter O. Dunn, Sharon A. Gill, Sara R. Morris, Christopher C. Witt

MEMBERSHIP

Any person interested in avian biology may become a member of the American Ornithological Society. Regular membership costs \$90 per year; Early Professional membership is \$55; Emeritus/retired and student memberships are \$32. Membership is \$32 for persons in all countries except the United States, Canada, Israel, Japan, Australia, New Zealand, and the following Western European countries: Iceland, Norway, Sweden, Finland, Denmark, Germany, The Netherlands, Belgium, Luxembourg, France, the United Kingdom, Ireland, Switzerland, Austria, Italy, Spain, and Portugal. All members receive free access to the online version of *The Auk: Ornithological Advances* and *The Condor: Ornithological Applications* and Birds of North America Online (www.birdsna.org). A life membership is \$2880, paid in one sum or four annual installments of \$720. To JOIN, RENEW, or UPDATE your membership, visit the AOS website membership page to link to the membership portal. To report changes of address or to request assistance, contact: osnamembers@gmail.com, (312) 883-4670.

SUPPORT THE AOS

AOS is grateful to receive contributions of any amount. Donations help support AOS's programs to advance ornithology as a profession and promote ornithologists at every career stage. Contributions may be sent to: AOS, 1400 S. Lake Shore Drive, Chicago, IL, 60605; or, can be made online through AOS's website, AmericanOrnithology.org. Gifts to the AOS are tax-deductible to the full extent permitted by law.

INSTITUTIONAL SUBSCRIPTIONS

Institutional subscriptions are handled by the American Ornithological Society, 1400 South Lake Shore Drive, Chicago, IL 60605, 312-665-7571, 312-883-4114 FAX, cruiz@americanornithology.org. \$400 for an annual online subscription to *The Condor: Ornithological Applications*, \$400 for an annual online subscription to *The Auk: Ornithological Advances*, and \$700 for both *The Condor: Ornithological Applications* and *The Auk: Ornithological Advances*.

PRINT ISSUES

To order 2018 print single issues or print annual subscriptions, go to: <http://aos.sheridan.com>. To order print issues for journals issued prior to 2018, email a request to OSNAmembers@gmail.com, providing the journal name and issue requested.