

# Christopher James Clark, Ph.D.

Assistant Professor  
Dept. of Evolution, Ecology and Organismal Biology  
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orcid: 0000-0001-7943-9291 Google scholar: <https://scholar.google.com/citations?user=9Bpr4-4AAAAJ&hl=en>

## Positions

2013 – present: Assistant Professor, Department of EEOB, UC Riverside  
2009-2013. Postdoctoral Associate, Peabody Museum of Natural History, Yale University.  
2009 Ph.D., Museum of Vertebrate Zoology, UC Berkeley.  
2001 B.S., Washington State University

## Grants and Fellowships

2018 Co-PI: UCR Collaborative Seed Grant " Effect of pollinator flight duration on pollen loss and pollen deposition rates". PI: Erin Rankin, Entomology (\$10k).  
2017-2018 National Geographic Society WW-047R-17 "The singing feathers of the *Chaetocercus* woodstars" (\$19k). PI; Co-PIs: Nacho Areta (CONICET [Argentina]), Alejandro Rico (UCB), Anand Varma (National Geographic)  
2017-2020 PI: NSF: #IOS-1656867. Animal Behavior. "Collaborative research: Admixture mapping of a hybrid zone to test Tinbergen's emancipation hypothesis" (\$385k). Co-PIs: Alan Brelsford (UCR), Kevin Burns (SDSU).  
2016-2018 Co-PI: NSF #EF-1638728. Emerging Frontiers/Macrosystems "Local and Migratory Spatial Foraging Affects Plant-Pollinator-Pathogen Networks". PI: Erin Rankin, Co-PI, Quinn McFredrick, (UCR-Entomology) (\$300k).  
2016 UCR Collaborative Seed Grant " Admixture mapping of Allen's and Rufous hummingbirds". PI; Co-PI: Alan Brelsford (UCR). (\$5k)  
2015 Co-PI: UCR Collaborative Seed Grant "Pollination biology of the Channel Islands". PI: Erin Rankin, Entomology (\$10k).  
2009-2013 NSF IOS-0920353, "Mechanics and Evolution of Tonal Sounds Produced by Feathers". PI: Richard Prum (\$449k).  
2009 Donnelley Postdoctoral Fellowship for research in biodiversity (2 years)

## Awards

2014 Carl Gans Young Investigator Award for Comparative Biomechanics (Society for Integrative and Comparative Biology)  
2009 Outstanding Graduate Student Instructor Award (Dept. of Integrative Biol.)  
2009 Teaching Effectiveness Award (Graduate Division, UC Berkeley)

## Peer-reviewed Publications

32. **Clark, C. J.**, Rankin, D, and Johnson, K. Female song in Costa's Hummingbird (*Calypte costae*). *Wilson J. of Ornith*, accepted 15 July 2018.
31. **Clark, C. J.** 2018. Signal or cue? Locomotion-induced sounds and the evolution of communication. *Anim. Behav.* 143:83-91.
30. **Clark, C. J.**, and Mistick, E. A. 2018. Kinematic control of Allen's Hummingbird wing trill over a range of flight speeds. *J. Exp. Biol.*, *in press*. DOI: 10.1242/jeb.173625

## Christopher James Clark, Ph.D.

29. **Clark, C. J.**, and Mistick, E. A. 2018. Strategic acoustic control of a hummingbird courtship dive. *Current Biology*. 28: 1-8. 10.1016/j.cub.2018.03.021
28. Rankin, D, **Clark, C. J.** and Rankin, E. 2018. Hummingbirds use taste and touch to discriminate against nectar resources that contain Argentine ants. *Behav. Ecol. Sociobiol.* 72:44. DOI: 10.1007/s00265-018-2456-z
27. **Clark, C. J.**, McGuire, J. A., Bonaccorso E., Berv, J. and Prum, R. 2018. Complex coevolution of wing, tail, and vocal sounds of courting male bee hummingbirds. *Evolution*, 72: 630-646. DOI: 10.1111/evo.13432
26. **Clark, C. J.**, Mountcastle, A. M., Mistick, E. A., Elias, D. O. 2017. Resonance frequencies of honeybee (*Apis mellifera*) wings. *J. Exp. Biol.*, 220: 2697-2700. DOI: 10.1242/jeb.154609
25. **Clark, C. J.** 2017. eBird records show substantial growth of the Allen's Hummingbird (*Selasphorus sasin sedentarius*) population in urban Southern California. *The Condor: Ornithological Applications*. 119: 122-130. doi: 10.1650/CONDOR-16-153.1
24. **Clark, C. J.**, Kirschel, A. N. G., Hadjioannou, L., and Prum, R. O. 2016. *Smithornis* broadbills produce loud wing song by aeroelastic flutter of medial primary wing feathers. *J. Exp. Biol.*, 219: 1069-1075. doi:10.1242/jeb.131664
23. **Clark, C. J.** and Prum, R. O. 2015. Aeroelastic flutter of feathers, flight, and the evolution of nonvocal communication in birds. *J. Exp. Biol.* 218: 3520-3527. doi:10.1242/jeb.126458
22. Feo, T. J., Musser, J., Berv, J. and **Clark, C. J.** 2015. Divergence in morphology, calls, song, mechanical sounds, and genetics supports species status for the Inagan hummingbird (Trochilidae: *Calliphlox "evelynae" lyrura*). *Auk*, 132: 248-264. [10.1642/AUK-14-108.1](https://doi.org/10.1642/AUK-14-108.1)
21. **Clark, C. J.** 2014. Harmonic hopping, and both punctuated and gradual evolution of acoustic characters in *Selasphorus* hummingbird tail feathers. *PLOS ONE*, 9: 10.1371/journal.pone.0093829
20. **Clark, C. J.**, Elias, D. O., Girard, M. B. and Prum, R. O. 2013. Structural resonance and mode of flutter of hummingbird tail feathers. *J. Exp Biol.*, 216: 3404-3413.
19. **Clark, C. J.**, Elias, D. O., and Prum, R. O. 2013. Hummingbird feather sounds are produced by aeroelastic flutter, not vortex-induced vibration. *J. Exp Biol.*, 216: 3395-3403.
18. **Clark, C. J.**, Feo, T. J. and van Dongen, W. 2013. Sounds and courtship displays of the Peruvian Sheartail, Chilean Woodstar, Oasis Hummingbird, and a hybrid male Peruvian Sheartail × Chilean Woodstar. *Condor*, 115: 560-577.
17. **Clark, C. J.** 2012. The role of power versus energy in courtship: what is the “energetic cost” of a courtship display? *Anim. Behav.*, 84: 269-277.
16. **Clark, C. J.**, Feo, T. J., and Bryan, K. B. 2012. Courtship displays and sonations of a male hybrid Broad-tailed × Black-chinned Hummingbird (*Selasphorus platycercus* × *Archilochus alexandri*). *Condor*, 114: 329-340.

## Christopher James Clark, Ph.D.

15. **Clark, C. J.**, Elias, D., and Prum, R. O. 2011. Aeroelastic flutter produces hummingbird feather songs. *Science*, 333: 1430-1433.
14. **Clark, C. J.** 2011. Wing, tail, and vocal contributions to the complex signals of a courting Calliope Hummingbird. *Curr. Zool*, 57: 187-196.
13. **Clark, C. J.**, Feo, T. J. and Escalante, I. 2011. Courtship displays and natural history of the Scintillant (*Selasphorus scintilla*) and Volcano (*S. flammula*) hummingbirds. *Wilson J. Ornith.*, 123: 218-228.
12. Feo, T. J. and **Clark, C. J.** 2010. The displays and mechanical sounds of the Black-chinned Hummingbird (Trochilidae: *Archilochus alexandri*). *Auk*, 127: 787-796.
11. **Clark, C. J.** 2010. Effects of tail length on an escape maneuver of the Red-billed Streamertail. *J. Ornith.*, 152: 397-408. DOI: 10.1007/s10336-010-0550-8.
10. **Clark, C. J.** and Dudley, R. 2010. Hovering and forward flight energetics in Anna's and Allen's Hummingbirds. *Physiol. Biochem. Zool.* 83: 654-662. DOI: 10.1086/653477
9. Brennan, P. L. R., **Clark, C. J.** and Prum, R. O. 2010. Explosive eversion and functional morphology of the waterfowl penis supports sexual conflict in genitalia. *Proc. R. Soc. Lond. B*, 277: 1309-1314. DOI: 10.1098/rspb.2009.2139.
8. **Clark, C. J.** 2010. The evolution of tail shape in hummingbirds. *Auk*, 127: 44-56.
7. **Clark, C. J.** and Feo, T. J. 2010. Why do *Calypte* hummingbirds "sing" with both their tail and their syrinx? An apparent example of sexual sensory bias. *Am. Nat.*, 175: 27-37.
6. **Clark, C. J.** 2009. Courtship dives of Anna's Hummingbird offer insights into flight performance limits. *Proc. R. Soc. Lond. B*. 276: 3047-3052.
5. **Clark, C. J.** and Dudley, R. 2009. Flight costs of long, sexually selected tails in hummingbirds. *Proc. R. Soc. Lond. B*. 276: 2109-2115.
4. **Clark, C. J.** 2008. Fluttering wing feathers produce the flight sounds of male streamertail hummingbirds. *Biology Letters*, 4: 341-344.
3. **Clark, C. J.** and Feo, T. J. 2008. The Anna's Hummingbird chirps with its tail: a new mechanism of sonation in birds. *Proc. R. Soc. Lond. B*. 275: 955-962.
2. Tobalske, B. W., Warrick, D. R., **Clark, C. J.**, Powers, D. R., Hedrick, T. L., Hyder, G. & Biewener, A. A. 2007. Three-dimensional kinematics of hummingbird flight. *J. Exp. Biol.*, 210: 2368-2382.
1. **Clark, C. J.** 2006. Observations on the Vervain Hummingbird's (*Mellisuga minima*) display dive and territorial behavior. *Ornitologia Neotropical* 17: 403-408.

**Other Academic Publications** (non-peer reviewed):

## Christopher James Clark, Ph.D.

- Clark, C. J. 2016. North American Hummingbirds: an Identification Guide. By George C. West. [Book Review]. *Wilson Journal of Ornithology*, 128: 465-467.
- Clark, C. J. 2016. Locomotion-Induced Sounds and Sonations: Mechanisms, Communication Function, and Relationship with Behavior. In *Vertebrate Sound Production and Acoustic Communication* (Suthers, R., and Fitch, T., eds.). **Springer Handbook of Auditory Research**, 53: 83-117.
- Clark, C. J. 2013. Peruvian Sheartail (*Thaumastura cora* Lesson and Garnot). *Neotropical Birds Online* (T. S. Schulenberg, Ed.). Ithaca: Cornell Lab of Ornithology; retrievable from [http://neotropical.birds.cornell.edu/portal/species/overview?p\\_p\\_spp=276376](http://neotropical.birds.cornell.edu/portal/species/overview?p_p_spp=276376)
- Clark, C. J. and Mitchell, D. 2013. Allen's Hummingbird (*Selasphorus sasin*). *The Birds of North America* # 501 (Alan Poole, Ed.). Cornell Lab of Ornithology, Ithaca, NY. Retrievable from: <http://bna.birds.cornell.edu/bna/species/501>
- Clark, C. J., and Russell, S. M. 2012. Anna's Hummingbird (*Calypte anna*). *The Birds of North America* # 226 (Alan Poole, Ed.). Cornell Lab of Ornithology, Ithaca, NY. Retrievable from: [bna.birds.cornell.edu/bna/species/226](http://bna.birds.cornell.edu/bna/species/226)
- Clark, C. J. 2011. Scintillant Hummingbird (*Selasphorus scintilla* Gould), *Neotropical Birds Online* (T. S. Schulenberg, Ed.). Ithaca: Cornell Lab of Ornithology; retrievable from: [http://neotropical.birds.cornell.edu/portal/species/overview?p\\_p\\_spp=281496](http://neotropical.birds.cornell.edu/portal/species/overview?p_p_spp=281496)
- Clark, C. J. 2009. Vervain Hummingbird (*Mellisuga minima* Linnaeus), *Neotropical Birds Online* (T. S. Schulenberg, Ed.). Ithaca: Cornell Lab of Ornithology; retrievable from: [http://neotropical.birds.cornell.edu/portal/species/overview?p\\_p\\_spp=25694](http://neotropical.birds.cornell.edu/portal/species/overview?p_p_spp=25694)
- Altshuler, D. L., and Clark, C. J. 2003. Darwin's Hummingbirds [Perspective]. *Science*, 300: 588-589.

### Popular Publications (non-peer reviewed):

Clark, C. J. 2018. Shaping a Soundscape. *Biosphere*, 27: 17-25

### Selected Press and Popular Coverage (favorites in bold)

- 2018 [Nature](#), [Science Friday \(NPR\)](#), [Science News](#), [Gizmodo](#), [LA Times](#), [The Atlantic](#), [Phys.org](#), [UPI.com](#), [Vetenskapens Värld](#) (Swedish Television), [dpa](#) (German Press Agency), [Le Monde](#) (French), [Quirks and Quarks](#), [UCR press release](#),
- 2017 [National Geographic](#), [KCET](#), [eBird.org](#), BBC 2 "Nature's Weirdest Events" Episode 7, [Livescience](#)
- 2016 [Science Update](#), [New York Times](#), [Science](#), [Audubon](#), [Smithsonian](#), [Las Voces Del Mundo](#), [UFA Show & Factual](#) ("Wer weiß denn sowas?") (German TV), [F Yeah Fluid Dynamics](#) (blog), BBC One "Life in the air" Program 3: [Crowded Skies](#), PBS Nature "[Super Hummingbirds](#)"

## Christopher James Clark, Ph.D.

- 2015 [KQED](#) (owls), [The Southern Review](#); [Press release by the Cornell Lab of Ornithology](#); [UCR press release](#); [Birdwatching Magazine blog](#); [Discovery News](#); [sci-news.com](#)
- 2013 Irish Public Radio: *NewsTalk*, *Horizon Air Magazine*
- 2011 [New York Times](#) ×2, [Discover Magazine](#), [Wired Magazine](#), [msnbc.com](#), [Australian Geographic](#), [Der Standard](#), [Geek.com](#), [Berkeley Daily Planet](#), [earthsky.org](#) (NPR), [LiveScience.com](#), [National Wildlife magazine](#), [Swiss public radio](#), [The Daily Californian](#), [Science](#), [International Business Times](#)
- 2010 *PBS Nature* (“[Hummingbirds: Magic in the Air](#)”), [Yale Alumni Magazine](#)  
(not including extensive coverage of Brennan et al. 2010. Google the phrase "high-speed duck penis" for examples. The associated [youtube video](#) has >1 M views)
- 2009 *Nature*; *Cage & Aviary Birds*; *The Daily Californian*; *Harper's Magazine*; [Science News](#); [BBC News](#); [National Geographic](#); *As It Happens* (CBC radio); *National Geographic*; [Scientific American](#); *Science*; Irish Public Radio; *Brink* (CBS Discovery Science Channel); *CBS News*; *BBC Wildlife*; *Yes Magazine*; *Anchorage Daily News*, [Discover Magazine](#), [The Guardian](#), [The Independent](#)
- 2008 *Science*; [BBC News](#); [National Geographic News](#); [New Scientist](#); *Quirks and Quarks* (CBC radio); [Discovery News](#); [LiveScience](#); *DDP*; *London Daily Telegraph*; [COSMOS Magazine](#); *ABC Channel 7 News*; [San Francisco Chronicle](#); *Current Biology*; *Australian Broadcasting Corporation*; [New York Times](#); [The Daily Californian](#); *Discovery Channel*; *Nature*; *Popular Science*; *Birding Magazine*; *KNOW magazine*; *GEO magazine*; *Audubon Magazine*; *Berkeley Science Review*; *California Magazine*; ([Berkeley Press Release](#))
- 2007 *Science News*; *BBC Natural History Magazine*

### Invited Presentations:

- 2018 Mechanical Engineering & Mechanics, Lehigh University, PA  
Evolution, Ecology, & Organismal Biology, UC Irvine, Irvine, CA  
Phi Beta Kappa induction ceremony, UC Riverside
- 2017 El Dorado Audubon Society, Long Beach, CA  
University of Illinois at Chicago, Chicago, IL  
Museum of Vertebrate Zoology, Berkeley, CA  
Biological Sciences Department, Cal Poly, San Luis Obispo, CA
- 2016 Department of Physics, Georgia Tech, Atlanta, GA  
Laguna Hills Audubon Society, Laguna Hills, CA  
Pomona Valley Audubon Society, Claremont, CA  
Newport Bay Conservancy, Irvine, CA  
Sea and Sage Audubon Society, Irvine, CA  
Animal Behavior Graduate Group, UC Davis, Davis CA
- 2015 Saddleback College, Mission Viejo, CA

## **Christopher James Clark, Ph.D.**

- San Diego Field Ornithologists, San Diego, CA  
Evolution, Ecology, & Organismal Biology, UC Irvine, Irvine, CA  
Redwood Region Audubon Society, Humboldt, CA  
Department of Wildlife, Humboldt State University, Humboldt, CA
- 2014 Department of Ecology and Evolutionary Biology, UCLA, Los Angeles, CA  
San Bernardino Audubon Society, San Bernardino, CA  
Osher/LIFE Lecture, UC Cooperative Extension, Riverside, CA  
Ecology, Evolution and Marine Biology, UCSB, Santa Barbara, CA  
Biology Department, University of La Verne, La Verne, CA
- 2013 Department of Biology, CSU San Bernardino, CA  
Biology Department, San Diego State University, San Diego, CA  
School of Biological Sciences (Integrative Biology), University of Texas, Austin, TX
- 2012 Biology Department, University of Massachusetts, Amherst, MA  
The Hummingbird Society's Hummingbird Festival, Sedona, AZ  
Biology Department, University of California, Riverside CA.  
Biological Sciences, California State University, Long Beach, CA.  
Biology Department, Duke University, Durham, NC.  
LSU Museum of Natural History (Graduate Student Invited Speaker), Baton Rouge, LA  
Baton Rouge Audubon Society, Baton Rouge, LA
- 2011 Arlington Bird Club, Arlington, MA  
Yale Institute for Biospheric Studies, New Haven, CT  
Columbia University Population Biology Seminar, New York, NY  
Western CT Bird Club, Southbury, CT
- 2010 Cornell Lab of Ornithology, Ithaca, NY  
Yale Institute for Biospheric Studies, New Haven, CT  
Concord Field Station, Harvard University, Bedford, MA  
Pontificia Universidad Catolica del Ecuador, Quito, Ecuador
- 2009 New Haven Bird Club, New Haven, CT
- 2008 Division of Biological Sciences, University of Montana, Missoula, MT.

### **Professional affiliations:**

Ecology, Evolution and Organismal Biology Graduate Program (UC Riverside)  
San Diego State University/UC Riverside Joint Doctoral Program in Evolutionary Biology  
Research Associate, San Diego Natural History Museum  
National Geographic Explorer (2017-present)

Neotropical Ornithology Society (lifetime member)  
Society for Integrative and Comparative Biology (SICB, 20 year member)  
Animal Behavior Society (ABS; Lifetime member)  
American Ornithologist's Union (AOU); Elective Member, 2015  
Society for the Conservation & Study of Caribbean Birds (SCSCB)

### **Professional and University Service**

2013-present: Associate Editor for *Auk: Ornithological Advances*

## Christopher James Clark, Ph.D.

Peer Review, **General:** *Science, eLIFE, Current Biology, Proceedings of the Royal Society of London B; Integrative and Comparative Biology, Biology Letters, PLOS ONE, Biological Journal of the Linnean Society, Proceedings of the Biological Society of Washington; Zoology; Canadian Journal of Zoology* **Behavior:** *Journal of Ethology, Animal Behavior, Ethology, Behaviour, Behavioral Ecology; Behavioral Ecology and Sociobiology;* **Acoustics:** *Bioacoustics;* **Ecology:** *Ecology, American Naturalist, BMC Ecology, Oikos, Functional Ecology, Evolutionary Ecology, Natural Areas Journal;* **Evolution:** *Evolution; J. Nat. History,* **Physiology:** *Journal of Experimental Biology, Journal of Comparative Physiology A and B, Journal of Morphology;* **Biomechanics:** *Proceedings of the Royal Society Interface, Royal Society Open Science, Bioinspiration & Biomimetics, Mechanical Behavior of Biomedical Materials; Interface Focus (Royal Society)* **Ornithology:** *Ardeola, The Auk: Ornithological Advances, Avian Biology Research, Journal of Avian Biology, Wilson Journal of Ornithology, Journal of Caribbean Ornithology, Journal of Field Ornithology, Journal of Ornithology, Ornitología Neotropical, Western Birds;* **Funding agencies:** *National Geographic Society, NSERC, NSF, Army Research Lab*

### Consulting

*TV/Documentaries:* BBC, National Geographic, PBS, Discovery, KQED (PBS San Francisco)  
*Nonprofits:* The Pollinator Partnership ([Pollinator.org](http://Pollinator.org))

### Teaching

#### *Graduate students supervised:*

2013 - present	Sean Wilcox, Ph.D. student, EEOB (UCR),
2014- present	Katherine Johnson, Ph.D. student, EEOB (UCR),
2015- present	Krista Le Piane, Ph.D. Student, EEOB (UCR),
2014- present	Brian Myers, Ph.D. Student, SDSU-UCR joint doctoral program
2016-present	Ayala Berger, Ph.D. student, EEOB (UCR)

#### *Committee member, non-UCR students:*

2017-present:	Valentina Gómez, University of Illinois at Chicago. Advisor: John Bates
2014-present:	Robert Niese, University of Montana , Advisor: Bret Tobalske

#### *Ph.D. Defense committee:*

2013	Andrea Grunst, UC Riverside. (PI: John Rotenberry)
2016	Alexandra (Sasha) Prokuda, UC Riverside (PI: Derek Roff)
2017	Jarren Kay, UC Riverside (PI: Ted Garland)
2018	Jacob Andrew, UC Riverside (PI: Wendy Saltzman)
2018	Meng (Gemma) Zhao, UC Riverside (PI: Wendy Saltzman)
2018	Richard Simpson, Arizona State University (PI: Kevin McGraw)

#### *MS Defense Committee:*

2016	Daniel Goldberg, UC Riverside (PI: David Reznick)
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*Graduate Courses:* Behavioral Ecology, EEOB 213 (W 2015, W 2017).

*Undergraduate courses, UCR:*

3 October, 2018

## **Christopher James Clark, Ph.D.**

Biol. 161B: Vertebrate Anatomy (team taught, usually with Tim Higham) (W2014-2018)

Biol. 163: Evolutionary Ecology of the Terrestrial Vertebrates (F2014 - F2018)