

## Karen Crow-Sanchez

Professor, Department of Biology  
San Francisco State University,

1600 Holloway Avenue, San Francisco, CA 94132.

Tel: (415)405-2760; e-mail: [crow@sfsu.edu](mailto:crow@sfsu.edu); <http://biology.sfsu.edu/people/karen-crow-sanchez>

## Professional Preparation

California State University Northridge, CA, Ecology and Evolutionary Biology, B.A., 1986

San Francisco State University-Moss Landing Marine Laboratories, CA, Ichthyology, M.S., 1995

University of California Santa Cruz, CA, Ecology and Evolutionary Biology, Ph.D., 2003

Yale University, CT, Ecology and Evolutionary Biology, Postdoctoral Associate, 2003-2007

## Appointments

2018- present	Professor, Department of Biology, San Francisco State University
2013-2018	Associate Professor, Department of Biology, San Francisco State University
2007-2013	Assistant Professor, Department of Biology, San Francisco State University
2003-2007	Postdoctoral Associate, Yale University, Department of Ecology and Evolutionary Biology
1994-1996	Research Technician, Stanford University, Hopkins Marine Station
1990-1994	Teacher and Curriculum Specialist, California State University, Long Beach; National Science Foundation, Young Scholars Ocean Science Institute
1988-1990	Interpretive Ranger Channel Islands National Park
1986-1991	Teacher and Department Chairperson, Los Angeles Unified School District, El Sereno Junior High School

## Selected publications on body plan evolution, phylogenomics, and the role of Hox gene evolution:

(<sup>U</sup>Undergraduate, <sup>G</sup>Graduate, \*URM)

Jones, R. C<sup>U</sup>, Hall, K.<sup>G</sup>, & Crow, K. D. (2023). Are vertebrates constrained to two sets of paired appendages?

The morphology, development, and evolution of pre-pelvic claspers in the Holocephali. *Journal of Morphology*, 284, e21632. <https://doi.org/10.1002/jmor.21632>

**Karen D. Crow**, Ara Sadakian<sup>U</sup>, Noelle Kassly<sup>U</sup>. 2020. The role of the 5' HoxA genes in the development of the hindgut, vent, and a novel sphincter in a derived teleost (bluebanded goby, *Lythrypnus dalli*). *Journal of Experimental Zoology-B: Molecular and Developmental Evolution* 08102020, DOI: [10.1002/jez.b.22982](https://doi.org/10.1002/jez.b.22982)

John D. Swenson<sup>G</sup>, Jeff Klomp, Robert A. Fisher, **Karen D. Crow**. 2018. How the Devil Ray Got Its Horns: The Evolution and Development of Cephalic Lobes in Myliobatid Stingrays (Batoidea: Myliobatidae). *Frontiers in Ecology and Evolution*. <https://doi.org/10.3389/fevo.2018.00181>

Kayla Hall<sup>U</sup>, Peter Hundt<sup>+</sup>, John Swenson<sup>G</sup>, Adam Summers, **Karen D. Crow**. 2018. The evolution of underwater flight: the redistribution of pectoral fin rays, in manta rays and their relatives (Myliobatidae). *Journal of Morphology*. DOI: 10.1002/jmor.20837

Shannon Barry<sup>G</sup>, **Karen D. Crow**. 2017. *HoxA13* and *HoxA11* are associated with specification of novel morphological features in batoids. *EvoDevo* 8:24

Sophie Archambeault<sup>G</sup>, Julia Taylor<sup>G</sup>, **Karen D. Crow**. 2014 HoxA and HoxD expression in a variety of vertebrate body plan features reveals an ancient origin for the reverse collinear expression pattern. *EvoDevo*. 5:44 (19 November 2014).

**Crow, Karen D.**, Christopher D. Smith, Jan-Fang Cheng, Günter P. Wagner and Chris T. Amemiya. 2012. An independent genome duplication inferred from Hox paralogs in the American paddlefish—a representative basal ray-finned fish and important comparative reference. *Genome Biology and Evolution*. 4(9):825-841.

**Crow, Karen D.**, Chris Amemiya, Jutta Roth and Günter P. Wagner. 2009. Hypermutability of *HoxA13a* and functional divergence from its paralog are associated with the origin of a novel developmental feature in zebrafish and related taxa (Cypriniformes). *Evolution*. 63(6): 1574-1592.

**Crow, Karen D.**, Peter F. Stadler, Vincent J. Lynch, Chris Amemiya, and Günter P. Wagner. 2006. The “fish specific” Hox cluster duplication is coincident with the origin of teleosts. *Molecular Biology and Evolution*. 23(1): 121-136.

Metscher, B. D., K. Takahashi, **K. D. Crow**, C. Amemiya, D. F. Nonaka, and G. P. Wagner. 2005. Expression of *Hoxa-11* and *Hoxa-13* in the pectoral fin of a basal ray finned fish, *Polyodon spathula*: implications for the origin of tetrapod limbs. *Evolution and Development*. 7:186-195.

### **Selected Publications on reproductive strategies in fishes:**

Ito, Takeshi<sup>G</sup>, Breana N. Goldman<sup>G</sup>, Satoshi Awata, Karen D. Crow. 2024. Mating Season, Egg-Laying Season, and Internal Gametic Association in the Sympatrically Occurring Fluffy Sculpin (*Oligocottus snyderi*) and Rosy Sculpin (*O. rubellio*). Ichthyology & Herpetology 112, No. 1, 2024. <https://doi.org/10.1111/jfb.14920>

Awata, S., Ito, T. <sup>G</sup>, Crow, K. D., Koya, Y., & Munehara, H. (2021). The first record of egg masses in tunicates deposited by the snubnose sculpin, *Orthonopias triacis*, from the Northeastern Pacific: evidence for convergent evolution of an unusual reproductive strategy. *Journal of Fish Biology*, 1–10  
<https://doi.org/10.1111/jfb.14920>

Mandy Hansen<sup>U</sup>, **Karen D. Crow**, and Katharyn Boyer. 2020. Invasive mangroves produce unsuitable habitat for endemic goby and burrowing shrimp pairs in Kāneʻohe Bay, Oahu, Hawaiʻi. *Scientias Marinas* 46:4

Michael Izumiyama<sup>G</sup>, Satoshi Awata, **Karen D. Crow**. 2020. Evaluating the reproductive strategy and correlation between mating success and reproductive success of *Ditrema temminckii*: Is the number of fathers a good approximation for the number of mates? *Copeia*: 108(3); 532-537. <https://doi.org/10.1643/CE-19-271>

Michael Izumiyama<sup>G</sup>, Michael Westphal, **Karen D. Crow**. 2020. In the surf zone: Reproductive strategy of the calico surfperch (*Amphistichus koelzi*) in a comparative context. *Journal of Fish Biology* 2020; 96: 939– 949. <https://doi.org/10.1111/jfb.14283>.

Healy Hamilton, Norah Saarman, Graham Short, Beth Moore, Tinya Hoang, Chris Grace<sup>G</sup>, Martin Gomon, **Karen Crow**, W. Brian Simison. 2016. Molecular phylogeny and patterns of diversification in syngnathid fishes. *Molecular Phylogenetics and Evolution*. 107 (2017) 388-403.

John R. LaBrecque<sup>\*U</sup>, Yvette R. Alva-Campbell\*, Sophie Archambeault<sup>G</sup>, **Karen D. Crow**. 2014. Multiple paternity is a shared reproductive strategy in the live-bearing surfperches (Embiotocidae) that may be associated with female fitness. *Ecology and Evolution*. 4(12) 2316-2329.

Sophie Archambeault<sup>G</sup>, Eric Ng<sup>U</sup>, Lyle Rapp<sup>U</sup>, Andrew Rhyne, and **Karen D. Crow**. 2014. Reproduction, larviculture, and early development of the Bluebanded goby, *Lythrypnus dalli*, an emerging model organism for studies in evolutionary developmental biology and sexual plasticity. *Aquaculture Research*.

Kelcie Chiquillo<sup>\*U</sup>, David A. Ebert, Christina Slager, **Karen D. Crow**. 2014. The secret of the mermaid's purse: Phylogenetic affinities within the Rajidae and the evolution of a novel reproductive strategy in skates. *Molecular Phylogenetics and Evolution*. 75 (2014) 245–251.

Jessica M. Maxfield<sup>G</sup>, James L. Van Tassell, Colette M. St. Mary, Jean-Christophe Joyeux, and **Karen D. Crow**. 2012. Extreme gender flexibility: Using a phylogenetic framework to infer the evolution of variation in sex allocation, phylogeography, and speciation in a genus of bidirectional sex changing fishes (*Lythrypnus*, Gobiidae). *Molecular Phylogenetics and Evolution*. 64 (2012), pp. 416-427.

**Crow, Karen D.**, Hiroyuki Munehara, and Giacomo Bernardi. 2010. Sympatric speciation in a genus of marine reef fishes (*with cover photo and perspective written by Kathryn Elmer & Axel Meyer*). *Molecular Ecology*. 19(10): 2089-2105.

### **Synergistic Activities**

- **Review Editor** for *Frontiers in Ecology and Evolution-Evolutionary Developmental Biology*.
- **Elected Secretary** of the Pan American Society for Evolution and Developmental Biology (Jan 2020-present)
- **Faculty Director** “Margaret Bradbury Memorial Fish Collection (housing over 2000 jars of specimens). Responsibilities include organization, cataloguing, and implementation of an electronic record keeping system. The collection is used to support laboratory and lecture curricula for upper division courses and original research at SFSU, 2007-present.

- **Panelist:** National Science Foundation, IOS Development panel 2016, 2014, 2013, 2012, 2011, REU Biology Directorate 2009, International Division-East Asia programs 2001.
- **Symposium organizer:** *Evolution and morphological diversification of vertebrate appendages* International Congress for Vertebrate Morphology in Prague, Cech Republic, July 2019.
- **Participant:** SFSU Science Education Partnership and Assessment Laboratory (SEPAL) workshop on Biology Education Reform following the guidelines of "Vision and Change in Biology Undergraduate Education-A Call to Action, 2013-2014.
- **Mentor:** Six REU undergraduate participants in the SFSU-BREED program (2009-2014), NSF-RUI supplement for Postdoctoral Fellow Yvette Alva 2012-2013, Peter Hundt 2019, and NIH-IRACDA Postdoctoral Scholars in Science (ISIS) Betty Booker Fall 2013, Aaron Hardin Fall 2017.