

Kristin M. O'Brien
Curriculum Vitae
Department of Biology and Wildlife
Institute of Arctic Biology
University of Alaska
Fairbanks, AK 99775
(907) 474-5311
kmobrien@alaska.edu

EDUCATION

Duke University, North Carolina	Zoology	B.S., 1990
University of Maine, Orono	Zoology	Ph.D., 1999

PROFESSIONAL EXPERIENCE

2018- present	Professor of Biology	University of Alaska, Fairbanks
2010- present	Affiliate Professor of Chemistry and Biochemistry	University of Alaska, Fairbanks
2010-2018	Associate Professor	University of Alaska, Fairbanks
2008- 2010	External Faculty Member School of Marine Sciences	University of Maine, Orono
2004 –2010	Assistant Professor	University of Alaska, Fairbanks
2003	Instructor in Biology	Metropolitan St. College, Denver
1999-2003	N.I.H. NRSA Postdoctoral Fellow	University of Colorado, Boulder

RESEARCH INTERESTS

I am an integrative physiologist and biochemist with a broad interest in the phenotypic plasticity of fishes in response to a changing environment. Much of my research focuses on questions related to thermal biology, metabolism, and hypoxia tolerance in fishes.

RESEARCH GRANTS

Pending	Collaborative research: A workshop for evaluating the value and scope of a biological repository of Antarctic specimens, \$57,293.
Pending	ANT LIA: Hypoxia tolerance in notothenioid fishes, P.I., <i>National Science Foundation</i> , \$918,722.
2019-2020	The effect of polyglutamine and glutamic acid repeats on HIF-1 function, P.I., <i>Alaska INBRE Pilot Grant</i> , \$75,000.
2019-2024	Alaska INBRE- One Health, <i>National Institutes of Health</i> , \$19,152,477.
2018-2021	An energy-sensitive pathway of cold-induced metabolic remodeling in threespine stickleback, P.I., <i>National Science Foundation</i> , \$689,579.

- 2017-2018 The effect of polyglutamine and glutamic acid repeats on HIF-1 function, P.I., *Alaska INBRE* Pilot Grant, \$75,000.
- 2014-2019 Collaborative research: The physiological and biochemical underpinnings of thermal tolerance in Antarctic notothenioid fishes, P.I., *National Science Foundation*, \$543,642.
- 2011-2014 Collaborative research: Redox balance in Antarctic notothenioid fishes: Do icefish have an advantage? P.I., *National Science Foundation*, \$404,970.
- 2008-2011: Collaborative research: Linkages among thermal tolerance and mitochondrial form and function in notothenioid fishes, P.I., *National Science Foundation*, \$556,600.
- 2007-2012: CAREER: The molecular mechanisms of cold-induced mitochondrial biogenesis, P.I., *National Science Foundation*, \$887,946.
- 2006-2007: The mitochondrion as a temperature sensor: molecular mechanisms regulating cold-induced mitochondrial biogenesis in the oxidative muscle of *Gasterosteus aculeatus*, P.I., *AK EPSCoR*, \$50,000.
- 2005-2008: Collaborative research: differential expression of oxygen-binding proteins in Antarctic fishes affects nitric oxide-mediated pathways of angiogenesis and mitochondrial biogenesis, Co-P.I., *National Science Foundation*, \$204,171.
- 2005-2007: Cellular protection against nitrosative stress, P.I., *American Heart Association*, \$130,785.

FELLOWSHIPS

- 2000-2003: Mitochondrial Adaptation to Hypoxia, *National Institutes of Health* National Research Service Award.
- 1998: *Association of Graduate Students* Research Award, University of Maine.
- 1996-1998: *Sea Grant Center for Marine Studies* Graduate Fellowship, University of Maine.
- 1996: *American Heart Association* Graduate Student Summer Fellowship, University of Maine.

TEACHING GRANTS

- 2016: *Biomedical Learning and Student Training (BLaST)* award for UAF to join the International Genetically Engineered Machine Foundation (iGEM) and obtain the registry of parts, \$500.

- 2008: Intramural award from the UAF Provost, Support for a laboratory in cell biology, \$16,000.
- 2008: *GCAT* and the *National Science Foundation*, Equipment grant for teaching microarray technology in cell biology, \$15,000.
- 2007: *UAF Technology Advisory Board*, Enhancing the laboratory for cell biology, \$21,857.
- 2005: Intramural award from the UAF Provost, Support for developing a laboratory in cell biology, \$40,000.

PUBLICATIONS (* graduate student, † undergraduate student)

In prep:

O'Brien, K.M., Joyce, W., Crockett, E.L., Axelsson, M., Egginton, S., and A.P. Farrell (202X). Resilience of cardiovascular performance of Antarctic notothenioid fishes in a warming climate. Invited review for *J. Exp. Biol.*

Ressel, K., Sarimanolis, J.†, and **K. M. O'Brien** (202X). Thermal acclimation alters cardiac aerobic metabolism and aerobic scope in threespine stickleback. In prep for *J. Fish Biol.*

Jasmin, A.†, and **K.M. O'Brien** (202X). A molecular response to hypoxia is muted but not lost in *Notothenia coriiceps*. In prep for *J. Exp. Biol.*

In review:

O'Brien, K.M., Oldham, C.A.*, Sarrimanolis, J.†, Fish, A.†, Castellini, L.†, Vance, J.†, and E.L. Crockett. (202X) Warm acclimation alters antioxidant defenses but not capacities for energy metabolism in *Notothenia coriiceps*. *Conserv. Physiol.*

Published:

45. Biederman, A.*, **O'Brien, K.M.**, and E.L. Crockett (2021). Homeoviscous adaptation occurs with thermal acclimation in biological membranes from heart and gill, but not the brain, in the Antarctic fish *Notothenia coriiceps*. *J. Comp. Physiol. B.*

44. Evans, E.E. *, Farnoud, A., **O'Brien, K.M.**, and E.L. Crockett (2021). Thermal profiles reveal stark contrasts in properties of biological membranes from heart among Antarctic notothenioid fishes which vary in expression of hemoglobin and myoglobin. *Comp. Biochem. Physiol. B.*

43. **O'Brien, K.M.**, Rix, A.S.*, Grove, T., Sarrimanolis, J.† Brookings, A.†, Roberts, M., and E.L. Crockett, (2020). Characterization of the hypoxia-inducible factor-1 pathway in hearts of Antarctic notothenioid fishes. *Comp. Biochem. Physiol. B.*, 250:110505.

42. Egginton, S.E., Axelsson, M., Crockett, E.L., **O'Brien, K.M.**, and A.P. Farrell. (2019). Nature's knockouts: Maximum in situ cardiac performance at ambient and elevated temperatures in Antarctic fishes lacking haemoglobin and myoglobin. *Conserv. Physiol.* 7(1).
41. Biederman, A.M.* , Kuhn, D.E., **O'Brien, K.M.**, and E.L. Crockett. (2019). Mitochondrial membranes in cardiac muscle from Antarctic notothenioid fishes vary in phospholipid composition and membrane fluidity. *Comp Biochem. Physiol. B* 235:46-53.
40. Biederman, A.M.* , Kuhn, D.E., **O'Brien, K.M.**, and E.L. Crockett. (2019). Physical, chemical, and functional properties of neuronal membranes vary between species of Antarctic notothenioids differing in thermal tolerance. *J. Comp Physiol. Biochem.* 189(2) 213-222.
39. Joyce, W.* , Axelsson, M., Egginton, S.E., Farrell, A.P., Crockett, E.L., and **K.M. O'Brien**. (2018). The effects of thermal acclimation on cardio-respiratory performance in an Antarctic fish (*Notothenia coriiceps*). *Conserv. Physiol.* 6(1)
38. Joyce, W.* , Egginton, S., Farrell, A. P., Crockett, E.L., **O'Brien, K.M.**, and M. Axelsson. (2018). Exploring nature's natural knockouts: In vivo cardiorespiratory performance of Antarctic fishes during acute warming. *J. Exp. Biol.* 221.
37. **O'Brien, K.M.**, Rix, A.S.* , Egginton, S., Farrell, A.P., Crockett, E.L., Schlauch, K., Woolsey, R., Hoffman, M., and S.E. Merriman[†]. (2018). Mitochondrial metabolism may contribute to differences in thermal tolerance of red- and white-blooded Antarctic notothenioid fishes. *J. Exp. Biol.* 221.
36. **O'Brien, K.M.**, Crockett, E.L., Philip, J., Oldham, C.A.* , Hoffman, M., Kuhn, D.E., Barry, R., and J. McLaughlin[†]. (2018). The loss of hemoglobin and myoglobin does not confer an advantage in management of oxidative stress in Antarctic icefishes. *J. Exp. Biol.* 221.
35. Rix, A.S.* , Grove, T.J., and **K.M. O'Brien**. (2017). Hypoxia-inducible factor-1 α in Antarctic fishes contains a polyglutamine and glutamic acid insert that varies in length with phylogeny. *Polar Biol.* 40(12) 2537-2545.
34. Ainley, D.A., Crockett, E., Eastman, J.E., Fraser, W., Nur, N., **O'Brien, K.**, Salas, L., Siniff, D. (2017). How overfishing a large piscine mesopredator explains growth in Ross Sea penguin populations: a framework to better understand impacts of a controversial fishery. *Ecolog. Model.*
33. Keenan, K.A.* , Grove, T.J., Oldham, C. A.* , and **K.M. O'Brien** (2017). Characterization of glycerol-3-phosphate acyltransferase in notothenioid fishes. *Comp. Biochem. Physiol. Part B* 204: 9-26.
32. Keenan, K.* , Hoffman, M., Dullen K.[†], and **K.M. O'Brien** (2017). Molecular drivers of

- membrane proliferation in response to cold acclimation in threespine stickleback. *Comp. Biochem. Physiol. Part A*. 203: 109-114.
31. **O'Brien, K.M.** (2016). New lessons from an old fish: what Antarctic icefishes may reveal about the functions of oxygen-binding proteins *Integr Comp Biol*. 56: 531-41.
 30. Kuhn, D.E., **O'Brien, K.M.**, and E. L. Crockett (2016). Expansion of capacities for iron transport and sequestration reflects plasma volumes and heart mass among white-blooded notothenioids. *Am J Physiol Regul Integr Comp Physiol*. 311: R649- R657
 29. Devor, D.P.* , Kuhn, D.E., **O'Brien, K.M.**, and E.L. Crockett (2016). Hyperoxia does not extend critical thermal maxima (CTMax) in white- or red-blooded Antarctic notothenioid fishes. *Physiol. Zool*. 89: 1-9.
 28. Teigen, L.E.* , Orczewska, J.I.* , McLaughlin, J. †, and **K.M. O'Brien** (2015). Cold acclimation increases levels of some heat shock proteins and sirtuin isoforms in threespine stickleback. *Comp. Biochem. Physiol. Part A*. 188: 139-148.
 27. Lewis, J.M., Grove, T.J., and **K.M. O'Brien** (2015). Energetic costs of protein synthesis do not differ between red- and white- blooded Antarctic notothenioid fishes. *Comp. Biochem. Physiol. Part A*. 187: 177-183.
 26. **O'Brien, K.M.**, Mueller, I.A.* , Orczewska, J.I.* , Dullen, K.R.†, and M. Ortego† (2014). Hearts of some Antarctic fishes lack mitochondrial creatine kinase. *Comp. Biochem. Physiol. Part A*. 178: 30-36.
 25. Mueller, I.A.* , Hoffmann, M., Dullen, K†., and **K.M. O'Brien** (2014). Moderate elevations in temperature do not increase oxidative stress in oxidative muscles of Antarctic notothenioid fishes. *Polar Biol*. 37: 311-320.
 24. **O'Brien, K.M.** and E.L. Crockett (2013). The promise and perils of Antarctic fishes. *EMBO Rep*. 14: 17-24.
 23. Woo, D.K., Jung, Y.W., **O'Brien, K.M.**, and R.O. Poyton (2013). Molecular characterization of a mitochondrial mutant carrying point mutations in the 3' untranslated region of COX3 mRNA from *Saccharomyces cerevisiae*. *Animal Cell Sys* 17: 80-87.
 22. Mueller, I.A.* , Devor, D.P, Grim, J.M., Beers, J.M., Crockett, E.L., and **K.M. O'Brien** (2012). Exposure to critical thermal maxima causes oxidative stress in hearts of white-but not red-blooded Antarctic notothenioid fishes. *J. Exp. Biol*. 215: 4655-3664.
 21. Mueller, I.A*., and **K.M. O'Brien** (2011). Nitric oxide synthase is not expressed, nor up-regulated in response to cold acclimation in liver or muscle of threespine stickleback (*Gasterosteus aculeatus*). *Nitric Oxide*. 25: 416-422.

20. Mueller*, I.M., Grim, J., Beers, J., Crockett, E.L., and **K.M. O'Brien** (2011). Interrelationship between mitochondrial function and susceptibility to oxidative stress in red- and white-blooded Antarctic notothenioid fishes. *J. Exp. Biol.* 214: 3732-3741
19. Kammer*, A.R., Orczewska*, J.I., and **K.M. O'Brien** (2011). Oxidative stress is transient and tissue-specific during cold acclimation of threespine stickleback. *J. Exp. Biol.* 214: 1248-1256
18. **O'Brien, K.M.** (2011). Mitochondrial biogenesis in cold-bodied fishes. *J. Exp. Biol.* 214: 275-285.
17. **O'Brien, K.M.**, and I. Mueller* (2010). The unique mitochondrial form and function of Antarctic channichthyid icefishes. *Integ. Comp. Physiol.* 50(6):993-1008.
16. Orczewska*, J.I., Hartleben*, G., and **K.M. O'Brien**. (2010). The molecular basis of aerobic metabolic remodeling differs between oxidative muscle and liver in threespine sticklebacks in response to cold acclimation. *Am J Physiol Regul Integr Comp Physiol* 299: R352-64.
15. Urschel*, M., and **K.M. O'Brien**. (2009). Mitochondrial function in Antarctic notothenioid fishes that differ in the expression of oxygen-binding proteins. *Polar Biol.* 32: 1323-1330.
14. Urschel*, M., and **K.M. O'Brien**. (2008). High mitochondrial densities in hearts of Antarctic icefishes are maintained by an increase in mitochondrial size, rather than mitochondrial biogenesis. *J. Exp. Biol.* 211:2638-2646.
13. Sidell, B.D., and **K.M. O'Brien**. (2006). When bad things happen to good fish: the loss of hemoglobin and myoglobin expression in Antarctic icefishes. *J. Exp. Biol.* 209: 1791-1802.
12. Cassanova, N., **O'Brien, K.M.**, Stahl, B., McClure, T., and R. O. Poyton. (2005). Yeast flavohemoglobin, a nitric oxide oxidoreductase, is located in both the cytosol and mitochondrial matrix: Effects of respiration, anoxia, and the mitochondrial genome on its intracellular level and distribution. *J. Biol. Chem.* 280: 7645-7653.
11. **O'Brien, K.M.**, Dirmeier, R., Engle, M., and R.O. Poyton. (2004). Mitochondrial protein oxidation in yeast mutants lacking Mn or CuZn superoxide dismutase: Evidence that MnSOD and CuZnSOD have both unique and overlapping functions in protecting mitochondrial proteins from oxidative damage. *J. Biol. Chem.* 279: 51817-51827.
10. Dirmeier, R., **O'Brien, K.M.**, Engle, M., Dodd, A., Spears, E., and R.O. Poyton. (2004). Measurement of oxidative stress in cells exposed to hypoxia and other changes in oxygen concentration. *Meth. Enzymol.* 381:589-603.
9. Poyton, R.O., Dirmeier, R., **O'Brien, K.M.**, David, P., and A. Dodd. (2004). Experimental

strategies for analyzing oxygen sensing in yeast. *Meth. Enzymol.* 381: 644-662.

8. Poyton, R.O., Dirmeier, R., **O'Brien, K.M.**, and E. Spears. (2003). A role for the mitochondrion and reactive oxygen species in oxygen sensing and adaptation to hypoxia in yeast. In: *Oxygen Sensing: Responses and Adaptation to Hypoxia*. Editors: Lahiri, S., Semenza, G., and N. Prabhakar. Marcel Dekker Inc., N.Y., Basel.
7. **O'Brien, K.M.**, Skilbeck, C., Sidell, B.D., and S. Egginton. (2003). Muscle fine structure may maintain the function of oxidative muscle fibres in haemoglobinless Antarctic fishes. *J. Exp. Biol.* 206: 411-421.
6. Dirmeier, R., **O'Brien, K.M.**, Engle, M., Dodd, A., Spears, E., and R.O. Poyton. (2002). Exposure of yeast cells to anoxia induces transient oxidative stress. *J. Biol. Chem.* 277: 34773-34789.
5. Dagsgaard, C., Taylor, L., **O'Brien, K.M.**, and R.O. Poyton. (2001). Effects of anoxia and the mitochondrion on expression of aerobic nuclear COX genes in yeast: Evidence for a signaling pathway from the mitochondrial genome to the nucleus. *J. Biol. Chem.* 276: 7593-7601.
4. **O'Brien, K.M.**, and B.D. Sidell. (2000). The interplay among cardiac ultrastructure, metabolism and the expression of oxygen-binding proteins in Antarctic fishes. *J. Exp. Biol.* 203: 1287-1297.
3. **O'Brien, K.M.**, Xue, H., and B.D. Sidell. (2000). Quantification of oxygen diffusion distance within the spongy myocardium of hearts from Antarctic fishes. *Resp. Physiol.* 122:71-80.
2. McCleave, J.D., Brickley, P.J., **O'Brien, K.M.**, Kistner, D.A., Wong, M.W., Gallagher, M., and S.M. Watson. (1998). Do leptocephali of the European eel swim to reach continental waters? Status of the question. *J. Mar. Biol. Ass. U.K.* 78:285-306.
1. **O'Brien, K.M.**, and B.D. Sidell. (1997). The loss of hemoglobin and/or myoglobin affects cardiac ultrastructure in Antarctic fishes. *Antarc. J. U.S.* 32:98-100.

PRESENTATIONS

O'Brien, K.M., Oxygen sensing in Antarctic fishes. May, 2020. Oct, 2020. INBRE Retreat. Virtual.

Jasmin, A., J. Sarrimanolis, Rix, A., Schilkey, F., Lavelle, E., Sena, J., and K.M. O'Brien. Characterizing the hypoxia response in *Notothenia coriiceps*. Oct, 2020. INBRE Retreat. Virtual.

Jasmin, A., Rix, A., Schilkey, F., Lavelle, E., Sena, J., and K.M. O'Brien Hypoxia biomarkers in *Notothenia coriiceps*. May, 2020. Midnight Sun Symposium. Fairbanks, AK.

- Rix, A.S., and K. M. O'Brien. Characterizing the hypoxia inducible factor-1 pathway in response to acute thermal stress and hypoxia in Antarctic notothenioid fishes. *Society for Integrative and Comparative Biology*. Jan. 2020. Austin, TX.
- Rix, A.S., and K. M. O'Brien. Characterization of the HIF-1 pathway in response to an acute heat stress in Antarctic fishes. *Intersociety Meeting of the American Physiological Society, Comparative Physiology: Complexity and Integration*, Oct 25-28, 2018, New Orleans, LA.
- Rix, A.S., and K. M. O'Brien. Characterization of the HIF-1 pathway in response to an acute heat stress in Antarctic fishes. *Alaska INBRE Retreat*, Oct. 2018, Talkeetna, AK.
- Brooking, A., Rix, A.S., and K.M. O'Brien. Sequencing Hypoxia Responsive Genes in Antarctic Fish. *UAF URSA Undergraduate Research Day*, April 10, 2018, Fairbanks, AK.
- Rix, A.S., and K.M. O'Brien. The cDNA sequence of hypoxia inducible factor -1 in Antarctic notothenioid fishes. *UAF BGSA Midnight Sun Symposium*, April 13, 2018, Fairbanks, AK.
- Rix, A.S., and K.M. O'Brien. Molecular underpinnings of hypoxia and thermal tolerance in Antarctic fishes. *UA Biomedical Research Conference*. May 18, 2018, Anchorage, AK.
- Rix, A.S., and K.M. O'Brien. Probing the hypoxic response of Antarctic fish. *Western States INBRE Conference*, Oct 2017, Jackson, WY.
- Rix, A.S., and K.M. O'Brien. Probing the hypoxic response of Antarctic fish. *Alaska INBRE Retreat*, Sept 2017, Denali, AK. *Placed 2nd in graduate student competition.*
- O'Brien, K.M., and A.S. Rix. Mitochondrial adaptations associated with the loss of hemoglobin and myoglobin may constrain cardiac performance of Antarctic fishes, *APS Conference: Physiological Bioenergetics: Mitochondria from Bench to Bedside*, Aug 2017, San Diego, CA.
- Farrell, A.P., Egginton, S., Axelsson, M., Crockett, E.L., and K.M. O'Brien. Nature's natural knockouts: Cardiac capacities of Antarctic fishes without haemoglobin and myoglobin. *Canadian Society of Zoology*. May 2017. University of Manitoba, Winnipeg, Canada
- Rix, A.S. and K.M. O'Brien. Polyglutamine and glutamic acid repeats within hypoxia inducible factor 1- α in notothenioids may alter the hypoxic response. *Society for Integrative and Comparative Biology*. Jan. 2017. New Orleans, LA.
- O'Brien, K.M., and A.S. Rix. Mitochondrial function may contribute to thermal tolerance of red-white-blooded notothenioid fishes, *Society for Experimental Biology*, Brighton, England, July 2016.
- Egginton, S.E., Crockett, E.L., O'Brien, K.M., and A.P. Farrell. Is cardiovascular scope in

- Antarctic fishes adequate in the face of global warming? *Society for Experimental Biology* meeting, Brighton, England, July 2016.
- Grove, T.J., E.L. Crockett, K.M. O'Brien, and S.E. Egginton. Chilled out vasoactivity in Antarctic icefish. *Society for Experimental Biology*, Brighton, England, July 2016.
- O'Brien, K.M. Mitochondrial function and thermal tolerance in Antarctic notothenioids. *International Congress on the Biology of Fishes*, San Marcos TX, June 2016.
- Rix, A.S., and K.M. O'Brien. The cDNA sequence of hypoxia-inducible factor-1 α in Antarctic notothenioid fishes. *UAF Biomedical Research Conference*, May 2016.
- Brookings, A., O. Toien, B., Barnes, K.M. O'Brien. Mitochondrial DNA copy number does not change during hibernation. Undergraduate Research Day, UAF. April 2016.
- Oldham, C, A., and K.M. O'Brien. Activity of the 20S proteasome is not strongly correlated with the expression of oxygen-binding proteins in Antarctic notothenioids. *American Physiological Society Intersociety Meeting: Comparative Approaches to Grand Challenges in Physiology*, San Diego, CA, Oct. 2014
- Dullen, K., Orczewska, J., Mueller, I., and K.M. O'Brien. Creatine kinase isoforms are differentially expressed between hearts of red- and white-blooded Antarctic fishes. *Society for Integrative and Comparative Biology*, San Francisco, CA, Jan. 2013.
- Devor, D., O'Brien, K.M., and E.L. Crockett. Thermal tolerance is not limited by oxygen-carrying capacity in Antarctic notothenioid fishes. *SCAR 2012*, Portland, OR, July. 2012.
- Mueller, I.A., and K.M. O'Brien. Loss of hemoglobin and myoglobin in Antarctic icefish is correlated with changes in mitochondrial ultrastructure and function, which might contribute to their lower thermal tolerance. *Gordon Conference on Mitochondrial Biology*, Proctor Academy, NH, June 2011.
- Mueller, I.A., and K.M. O'Brien. Oxidative stress occurs in cardiac muscle of some Antarctic icefishes in response to an increase in temperature. *Society for Integrative and Comparative Biology*, Salt Lake City, UT, Jan. 2011
- Mueller, I.A., and K.M. O'Brien. The effect of mitochondrial ultrastructure on function in Antarctic notothenioid fishes. *Society for Integrative and Comparative Biology*, Seattle, WA, Jan. 2010.
- Kammer, A.R., and K.M. O'Brien. Oxidative stress in response to cold acclimation in threespine sticklebacks (*Gasterosteus aculeatus*). *Society for Integrative and Comparative Biology*, Seattle, WA, Jan. 2010.

- Orczewska, J.I., and K.M. O'Brien. Timecourse for metabolic remodeling in response to cold acclimation in threespine sticklebacks *Society for Integrative and Comparative Biology*, Seattle, WA, Jan., 2010.
- O'Brien, K.M. How do fish swim when it's cold? Studying threespine sticklebacks to understand how muscles maintain function at cold temperature. *Barrow Arctic Science Consortium Schoolyard Project*, Barrow, AK, Aug. 2008.
- Urschel, M., and K.M. O'Brien. Molecular mechanisms regulating high densities of mitochondria in the heart ventricle of Antarctic icefishes, *Society for Integrative and Comparative Biology*, San Antonio, TX, Jan. 2008.
- Hartleben, G., Tawney, R., and K.M. O'Brien. Reactive oxygen species may stimulate mitochondrial biogenesis in response to cold temperature in aerobic muscle of threespine sticklebacks, *Society for Integrative and Comparative Biology*, San Antonio, TX, Jan. 2008.
- O'Brien, K.M., Urschel, M., and I. Mueller. NO-mediated pathway of mitochondrial biogenesis in hearts of Antarctic fishes, *Gordon Conference- Mitochondria and Chloroplasts*, Oxford, England, Aug. 2006.
- O'Brien, K.M., Hartleben, G., and R. Tawney. The potential role of reactive oxygen species in muscle remodeling in response to cold temperature in *Gasterosteus aculeatus*, *International Conference on Stickleback Behavior and Evolution*, Anchorage, AK, July 2006.
- Mueller, I., and K.M. O'Brien. Identification of proteins involved in mitochondrial morphology, *UA Biomedical Research Conference*, Anchorage, AK, May 2006.
- Schmoll, M., and K.M. O'Brien. Translocation of yeast flavohemoglobin into the mitochondrion, *UA Biomedical Research Conference*, Anchorage, AK, May 2006.
- Smith, L., and K.M. O'Brien. Regulation of expression of yeast flavohemoglobin in *Saccharomyces cerevisiae*, *UA Biomedical Research Conference*, Anchorage AK, May 2006.
- O'Brien, K.M., Smith, L., and R. Tawney. Yeast flavohemoglobin is upregulated by reactive oxygen species and protects SOD mutants against nitrosative stress, *Experimental Biology*, San Francisco, CA, April 2005.
- O'Brien, K.M., Engle, M., Dirmeier, R., and R.O. Poyton. Characterization of oxidative stress in yeast mutants lacking superoxide dismutase, *American Physiological Society*, San Diego, CA, Aug. 2002.
- O'Brien, K.M., Engle, M., Dirmeier, R., and R.O. Poyton. Yeast flavohemoglobin may protect mutants lacking superoxide dismutase from oxidative stress, *International Congress of Physiological Sciences*, Christchurch, NZ, Aug. 2001.

O'Brien, K.M., and B.D. Sidell. A new method for quantifying oxygen-diffusion distance within spongy myocardium, *Society for Integrative and Comparative Biology*, Atlanta, GA, Jan. 2000.

O'Brien, K.M., and B.D. Sidell. Ultrastructural modifications may maintain metabolic capacity in hearts of Antarctic fishes that lack oxygen-binding proteins. *Biology of Antarctic Fish SCAR VII Mini-symposium*, Auckland, NZ, Sept. 1998.

O'Brien, K.M., and B.D. Sidell. The loss of hemoglobin and/or myoglobin affects the cardiac physiology of Antarctic fishes, *Society for Integrative and Comparative Biology*, Boston, MA, Jan. 1998.

INVITED PRESENTATIONS

O'Brien, K.M. The impact of climate warming on Antarctic fishes: Can notothenioids respond to hypoxia? *Stress and Immune Responses of Antarctic Notothenioid Fishes*, Fago, Portugal, May 2, 2019.

O'Brien, K.M. Is there an advantage to being an icefish, lacking oxygen-binding proteins? *Society for Integrative and Comparative Biology*, Portland, OR, Jan. 2016.

O'Brien, K.M. How will Antarctic notothenioid fishes fare as the Southern Ocean warms? Invited plenary speaker, *International Congress on the Biology of Fishes*, Edinburgh, Scotland, Aug. 2014.

O'Brien, K.M. Multiplying mitochondria in the cold: How do fish do it and why? *Society for Integrative and Comparative Biology*, San Francisco, CA, Jan. 2013.

O'Brien, K.M. Insights into the physiological underpinnings of thermal tolerance in Antarctic notothenioid fishes. *International Congress on the Biology of Fishes*, Madison, WI, July 2012.

O'Brien, K.M. Polar Science: From the field to the classroom. *American Geophysical Union*, San Francisco, CA, Dec. 2010

O'Brien, K.M. Pumping without iron: The unique architecture of cardiomyocytes in the hemoglobinless Channichthyids. *Society for Integrative and Comparative Biology Symposium on Advances in Antarctic Marine Science*, Seattle, WA, Jan. 2010.

O'Brien, K.M. Mitochondrial biogenesis in the cold. *Journal of Experimental Biology Symposium on the Biology of Energy Expenditure*, Mürren, Switzerland, March 2010.

TEACHING EXPERIENCE

University of Alaska Fairbanks

- Fundamentals of Biology I (BIOL 115X): 4-credit course with laboratory, team-taught

- Introduction to Cell and Molecular Biology (BIOL/CHEM 261): A new 4-credit course for which I developed both the lecture and laboratory
- Cell and Molecular Biology (BIOL/CHEM 360)
- Cell and Molecular Biology (BIOL/CHEM 360); asynchronous online
- Cell Biology (BIOL/CHEM 461/661): 4-credit course with laboratory
- Cell Physiology (BIOL 693): 2-credit graduate seminar course focused on physiological, biochemical, and molecular responses of organisms to abiotic stress
- Synthetic Biology (BIOL/MATH 393): A new 3-credit course co-taught with Dr. Elizabeth Allman in the Math Dept. Lecture and laboratory
- Advanced Laboratory in Cell and Molecular Biology (BIOL 466) A new laboratory course

PROFESSIONAL ACTIVITIES

Public Service

- Editor, judge or mentor for the Alaska Statewide High School Science Symposium, Fairbanks, 2004-2007, 2009, 2010, 2017
- Elementary School Science Fair Judge, Fairbanks, AK, 2004-2007, 2009

University Service

- Co-Leader, Alaska INBRE Research Experience Training Core, fall 2016 – present
- Search committee member for a vertebrate physiologist in IAB & B&W, spring 2016
- Radiation Safety Committee, fall 2014 – present
- Biomedical Curriculum Development Committee, 2014-2015
- Green Bikes Steering Committee, summer 2012- 2014
- Irving-Scholander Committee, 2010-2011, Co-Chair 2012-present
- Teaching Advisory Committee, Biology and Wildlife, 2009- 2010
- Advanced Instrumentation Laboratory Committee, 2007- 2013
- Affiliate Faculty Review Committee for IAB and Biology and Wildlife, 2007- present
- Provost Council for Biomedical Health Research and Education, 2006-08
- BIOS Planning and Bioscience Users Committee, 2006-2011
- EPSCoR Travel Committee, 2004-06

Professional Service

- Advisory board, *Journal of Comparative Physiology B* 2018- present
- Editorial board, *Comp. Biochem. Physiol. Part B.*, summer 2014 - present
- Program Officer, Division of Comparative Physiology and Biochemistry for the Society of Integrative and Comparative Biology. Jan 2011- Dec 2012
- Palmer Station Area Users Committee, Sept. 2009- 2012
- Chief Scientist, U.S. Antarctic R/V *Laurence M. Gould*, April -June 2011, April-July 2013, April-July, 2013, June 2015
- Station Science Leader at the U.S. Antarctic Research Station, Palmer Station, April -June 2009, April –July 2013, July 2017
- *Genome Consortium for Active Teaching* Steering Committee, Jan 2011- 2015

- NSF panelist (Integrative Organismal Biology, Polar Programs, and CAREER) Sept. 2006, Oct. 2008, Oct. 2010, Sept. 2011, Sept. 2018, Nov. 2020
- Ad-hoc reviewer for *FEBS Journal*, *Journal of Biological Chemistry*, *Journal of Experimental Biology*, *Journal of Fish Biology*, *Marine Biology*, *Nature Ecology and Evolution*, *PNAS*, and the *National Science Foundation*

Professional Memberships

- *American Physiological Society*
- *Society for Integrative and Comparative Biologists*
- *Oroboros O2k-Network*

AWARDS

- Outstanding Teacher in Biology and Wildlife, 2017-18
- CAREER Award, *National Science Foundation*, 2007-2012

TRAINING

Oct., 2019	Mentoring Workshop, UAF, 5 hrs
June, 2019	Oroboros workshop on high-resolution respirometry, Schröcken, Austria, 5 days
May, 2019	iTeach Online workshop, UAF, 5 days
Nov., 2018	NIH-Grant Writing Workshop, UAF, 1 day
Sept., 2018	Suicide Prevention Training, UAF, 1.5 hrs
April, 2018	Responsible Conduct in Research Training, UAF, 6 hrs
June, 2018	Mindful Leadership Workshop, UAF, 1.5 days
June, 2012	Genome Consortium for Active Teaching (GCAT)/HHMI workshop on using synthetic biology in the classroom, Janelia Research Campus, VA, 3 days
June, 2010	HHMI/ National Academies Summer Institute on Scientific Teaching, Madison, WI, 6 days
July, 2007	GCAT workshop on using microarrays in the classroom, Madison, WI, 5 days
July, 2004	Molecular Genetics of Stickleback, Stanford University, 7 days

GRADUATE STUDENT ADVISEES

Current Graduate Student Advisees (* Chair or Co-Chair)

Michelle Johannsen* (Ph.D.), Cassandra Duncan (M.S.), Marina Washburn (Ph.D.), Kelly Ireland (Ph.D.)

Former graduate advisees (* Chair)

Elizabeth Evans (M.S., 2019, Ohio University), Saurav Bhowmick (Ph.D., 2017), Mitchell Reed (Ph.D., 2017), Corey Oldham* (M.S., 2015), Kelly Keenan* (M.S., 2015), Laura Teigen* (M.S., 2013), Irina Mueller* (Ph.D., 2012), Julieanna Orczewska* (M.S., 2011), Aaron Kammer* (M.S., 2010), Matthew Urschel* (M.S., 2008), Sayali Kulkaarni (M.S., 2008), Brian Barth (Ph.D., 2009), Anshul Pandya (Ph.D., 2009), Lori Bogren (Ph.D., 2013), Kimberley Iceman (Ph.D., 2013), Shannon Uffenbeck (Ph.D., 2013), Rebekah Hare-Sanford (Ph.D., 2013), Kenneth Shin (M.S.)