

CURRICULUM VITAE

BRUCE DAVID SIDELL

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PERSONAL VITAE -

Born 20 March 1948, Manchester, New Hampshire
Three children

EDUCATION

A.B.	Boston University	(Biology)	1970
M.S.	University of Illinois	(Physiology)	1972
Ph.D.	University of Illinois	(Physiology)	1975

PROFESSIONAL EXPERIENCE -

Professor of Marine Sciences	1996-
Director, School of Marine Sciences	1996-2001
Cooperating Professor of Zoology and Cooperating Professor of Biochemistry	1996-
Professor of Zoology	1988-1996
Associate Dean for Research, College of Sciences	1989-1990
Associate Professor, of Zoology and Cooperating Associate Professor of Biochemistry	1982-1988
Visiting Professor, Department of Physiology and Pharmacology, University of St. Andrews, St. Andrews, Fife, Scotland	1983-1984
Assistant Professor of Zoology, University of Maine	1977-1982
Assistant Research Scientist, Chesapeake Bay Institute, The Johns Hopkins University	1975-1977
Instructor, Evening College, The Johns Hopkins University	1976-1977
Postdoctoral Fellow, Department of Geography and Environmental Engineering, The Johns Hopkins University	1975
U.S.P.H.S. Graduate Trainee, Department of Physiology, University of Illinois	1972-1975

OTHER PROFESSIONAL ACTIVITIES -

Member, Antarctic Research Vessel Oversight Committee (ARVOC), National Science Foundation	1996-2000/2005-
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Member, Palmer Area Users Committee (PAUC), National Science Foundation	2000-2004/2005-
Editorial Board, <i>Physiological Zoology</i>	1995-2000
Editorial Board, <i>Journal of Experimental Zoology</i>	1985-1988
Editorial Advisory Board, <i>Marine Ecology - Progress Series</i>	1983-1990
Editorial Board, <i>Comparative Biochemistry and Physiology</i>	2004-
Research Committee, <i>American Heart Assoc.</i> , Maine Affiliate Inc.	1982-1986
Regional Research Grant Review Panel, <i>American Heart Association</i>	1985, 1986
Faculty Research Funds Committee, <i>University of Maine</i> at Orono; Chairman 1982-83	1980-1983
<i>National Science Foundation</i> Review Panels:	
Instructional Scientific Equipment (ISEP)	1979
Student Science Training Program (SST)	1979
Student Originated Studies Program (SOS)	1979
College Science Instrumentation Program (CSIP)	1985
Postdoctoral Fellowships in the Biosciences	1996 – 1998
Genome-Enabled Environmental Science and Engineering (NSF Biocomplexity)	2002
Board of Directors, <i>University of Maine Press</i>	1994-

HONORS/AWARDS

Elected, AAAS Fellow, <i>American Association for the Advancement of Science</i>	1998
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PROFESSIONAL SOCIETIES/ORGANIZATIONS

Society for Integrative and Comparative Biology
American Physiological Society
Society for Experimental Biology (UK)
The Biochemical Society (UK)
Sigma Xi

PUBLICATIONS -

A. Papers in Scientific Journals

Sidell, B.D., F.R. Wilson, J.R. Hazel and C.L. Prosser (1973): Time course of thermal acclimation in goldfish. *J. Comp. Physiol.*, **84**:119-127.

Sidell, B.D. (1977): Turnover of cytochrome c in skeletal muscle of green sunfish (*Lepomis cyanellus*, R.) during thermal acclimation. *J. Exp. Zool.*, **199**:233-250.

- Shaklee, J.B., J.A. Christiansen, B.D. Sidell, C.L. Prosser and G.S. Whitt (1977): Molecular aspects of temperature acclimation in fish: Contributions of changes in enzyme activities and isozyme patterns to metabolic reorganization in the green sunfish. *J. Exp. Zool.*, **201**:1-20.
- Sidell, B.D., R.G. Otto and D.A. Powers (1978): A biochemical method for distinction of striped bass and white perch larvae. *Copeia* **1978**: 340-343.
- Sidell, B.D. and K.F. Beland (1980): Lactate dehydrogenases of Atlantic hagfish: Physiological and evolutionary implications of a primitive heart isozyme. *Science* **207**:769-770.
- Sidell, B.D., R.G. Otto, D.A. Powers, M. Karweit and J. Smith (1980): Apparent genetic homogeneity of spawning striped bass (*Morone saxatilis*, Walbaum) in the Upper Chesapeake Bay. *Trans. Amer. Fish. Soc.*, **109**:99-107.
- Sidell, B.D. (1980): Responses of goldfish (*Carassius auratus*, L.) muscle to acclimation temperature: Alterations in biochemistry and proportions of different fiber types. *Physiol. Zool.*, **53**:98-107.
- Palumbi, S.R., B.D. Sidell, R. Van Beneden, G.D. Smith and D.A. Powers (1980): Glucosephosphate isomerase (GPI) of the teleost, *Fundulus heteroclitus* (Linnaeus): Isozymes, allozymes and their physiological roles. *J. Comp. Physiol.*, **138**:49-57.
- Stone, B.B. and B.D. Sidell (1981): Metabolic responses of striped bass (*Morone saxatilis*) to temperature acclimation. I. Alterations in carbon sources for hepatic energy metabolism. *J. Exp. Zool.*, **218**:371-379.
- Moerland, T.S. and B.D. Sidell (1981): Characterization of metabolic carbon flow in hepatocytes isolated from thermally acclimated killifish, *Fundulus heteroclitus*. *Physiol. Zool.*, **54**:379-389.
- Jones, P.L. and B.D. Sidell (1982): Metabolic responses of striped bass (*Morone saxatilis*) to temperature acclimation. II. Alterations in metabolic carbon sources and distributions of fiber types in locomotory muscle. *J. Exp. Zool.*, **219**:163-171.
- Driedzic, W.R., B.D. Sidell and J.M. Stewart (1981): Myoglobin content and maximal activities of enzymes of energy metabolism in fish white heart and skeletal muscle. *Bull. Mt. Desert Is. Biol. Lab.*, **20**:32-34.
- Hansen, C.A. and B.D. Sidell (1981): Anoxic tolerance of Atlantic hagfish (*Myxine glutinosa*) cardiac muscle. *Bull. Mt. Desert Is. Biol. Lab.* **20**:71-74.
- Kornfield, I.L., P.S. Gagnon and B.D. Sidell (1981): Inheritance of allozymes in Atlantic

- herring (*Clupea harengus harengus*). *Can. J. Gen. Cytol.* **23**:715-720.
- Kornfield, I.L., B.D. Sidell and P.S. Gagnon (1982): Stock definition in Atlantic herring: genetic evidence for discrete fall and spring spawning populations. *Can. J. Fish. Aquat. Sci.* **39**:1610-1621.
- Hansen, C.A. and B.D. Sidell (1983): Atlantic hagfish cardiac muscle: Metabolic basis of tolerance to anoxia. *Am. J. Physiol.* **244**:R356-R362.
- Sidell, B.D. (1983): Cardiac metabolism in the myxinidae: Physiological and phylogenetic considerations. *Comp. Biochem. Physiol.* **76A**:495-505.
- Sidell, B.D., I.A. Johnston, T.S. Moerland and G. Goldspink (1983): Eurythermal myofibrillar protein complex of the mummichog (*Fundulus heteroclitus*). *J. Comp. Physiol.* **153**:167-173.
- Sidell, B.D., D. Stowe and C.A. Hansen (1984): Carbohydrate is the preferred metabolic fuel of the cyclostome (*Myxine glutinosa*) heart. *Physiol. Zool.* **57**:266-273.
- Johnston, I.A. and B.D. Sidell (1984): Differences in the temperature sensitivity of Mg^{++} - Ca^{++} ATPase activity and contraction velocity of isolated muscle fibers of a cold temperate fish. *J. exp. Biol.*, **111**:179-189.
- Tyler, S. and B.D. Sidell (1984): Changes in mitochondrial distribution and diffusion distances in muscle of goldfish upon acclimation to warm and cold temperatures. *J. Exp. Zool.* **232**:1-9.
- Kleckner, N.W. and B.D. Sidell (1985): Comparison of maximal activities of enzymes from tissues of thermally-acclimated and naturally-acclimatized chain pickerel, (*Esox niger*). *Physiol. Zool.*, **58**:18-28.
- Sidell, B.D. and I.A. Johnston (1985): Thermal sensitivity of contractile function in chain pickerel (*Esox niger*). *Can. J. Zool.*, **63**:811-816.
- Johnston, I.A., B.D. Sidell and W.R. Driedzic (1985): Force-velocity characteristics and metabolism of carp muscle fibres following temperature acclimation. *J. exp. Biol.* **119**:239-249.
- Moerland, T.S. and B.D. Sidell (1986): Biochemical responses to temperature in the contractile protein complex of striped bass, *Morone saxatilis*. *J. Exp. Zool.* **238**:287-295.
- Moerland, T.S. and B.D. Sidell (1986): Contractile responses to temperature in the locomotory musculature of striped bass, *Morone saxatilis*. *J. Exp. Zool.* **240**:25-33.
- Sidell, B.D., W.R. Driedzic, D.B. Stowe and I.A. Johnston (1987): Biochemical correlations

- of power development and metabolic fuel preferenda in fish hearts. *Physiol. Zool.* **60**:221-232.
- Driedzic, W.R., B.D. Sidell, D.B. Stowe and R. Branscombe (1987): Matching of vertebrate cardiac energy demand to energy metabolism: enzyme activity levels and high-energy phosphates. *Amer. J. Physiol.*, **252**:R930-R937.
- Sisson, J.E. III and B.D. Sidell (1987): Effect of thermal acclimation upon muscle fiber recruitment of swimming striped bass (*Morone saxatilis*). *Physiol. Zool.* **60**:310-320.
- Sidell, B.D. and J.R. Hazel (1987): Temperature affects the diffusion of small molecules through cytosol of fish muscle. *J. exp. Biol.*, **129**:191-203.
- Hazel, J.R. and B.D. Sidell (1987): A new method for determining diffusion coefficients for small molecules in aqueous solution. *Anal. Biochem.*, **166**:335-341.
- Egginton, S., H.F. Ross and B.D. Sidell (1987): Morphometric analysis of intracellular diffusion distances. *Acta Stereol.*, **6**:449-454.
- Sidell, B.D. and E.L. Crockett (1987): Characterization of energy metabolism in Antarctic fishes. *Antarc. J. U.S.*, **22**:213-215.
- Sidell, B.D., E.L. Crockett and W.R. Driedzic (1988): Metabolic characteristics of muscle tissues from Antarctic Fishes. *Antarc. J. U.S.* **23**:138-140.
- Egginton, S. and B.D. Sidell (1989): Thermal acclimation induces adaptive changes in subcellular structure of fish skeletal muscle. *Amer. J. Physiol.*, **256**:R1-R9.
- Sidell, B.D., Crockett, E.L., Londrville, R.L. and E. Lund (1989). Metabolic and ultrastructural characteristics of oxidative muscles from Antarctic fishes. *Antarc. J. U.S.* **24**:198-200.
- Crockett, E.L. and B.D. Sidell (1990): Some pathways of energy metabolism are cold adapted in Antarctic fishes. *Physiol. Zool.* **63**:472-488.
- Driedzic, W.R., B.D. Sidell, J.M. Stewart and I.A. Johnston (1990): Maximal activities of enzymes of energy metabolism in cephalopod systemic and branchial hearts. *Physiol. Zool.* **63**:615-629.
- Londrville, R.L. and B.D. Sidell (1990): Ultrastructure of aerobic muscles in Antarctic fishes may contribute to maintenance of diffusive fluxes. *J. exp. Biol.* **150**:205-220.
- Londrville, R.L. and B.D. Sidell (1990): A new method for estimating maximal intramuscular diffusion distances from capillaries. *Resp. Physiol.* **81**:291-302.
- Lund, E.D., and B.D. Sidell (1992): Neutral lipid compositions of Antarctic fish tissues may

- reflect use of fatty acyl substrates by catabolic systems. *Mar. Biol.* **112**:377-382.
- Crockett, E.L. and B.D. Sidell (1992): Polyunsaturated fatty acids are metabolized by both mitochondrial and peroxisomal pathways of Antarctic fishes. *Antarc. J. U.S.* **27**:143-145.
- Crockett, E.L. and B.D. Sidell (1993): Peroxisomal β -oxidation is a significant pathway for catabolism of fatty acids in a marine teleost. *Am. J. Physiol.* **264**:R1004-R1009.
- Crockett, E.L. and B.D. Sidell (1993): Substrate selectivities differ for hepatic mitochondrial and peroxisomal β -oxidation in an Antarctic fish, *Notothenia gibberifrons*. *Biochem. J.* **289**:427-433.
- Rodnick, K.J. and B.D. Sidell (1994): Cold-acclimation increases carnitine palmitoyltransferase I activity in oxidative muscle of striped bass. *Am. J. Physiol.* **266**:R405-R412.
- Sidell, B.D., E.L. Crockett and W.R. Driedzic (1995): Antarctic fish tissues preferentially catabolize monoenoic fatty acids. *J. Exp. Zool.* **271**: 73-81.
- Rodnick, K.J. and B.D. Sidell (1995): Effects of body size and thermal acclimation on parvalbumin concentration in white muscle of striped bass. *J. Exp. Zool.* **272**: 266-274.
- Londrville, R.L. and B.D. Sidell (1995): Purification and characterization of fatty acid-binding protein from aerobic muscle of Antarctic icefish, *Chaenocephalus aceratus*. *J. Exp. Zool.* **273**: 190-203.
- Desaulniers, N., T.S. Moerland and B.D. Sidell (1995): High lipid content enhances the rate of oxygen diffusion in fish skeletal muscle. *Amer. J. Physiol.* **271**: R42-R47.
- Londrville, R.L. and B.D. Sidell (1995). Fatty acid-binding proteins in Antarctic fishes. *Antarc. J. U.S.* **30**(5): 177-179.
- Londrville, R.L. and B.D. Sidell (1996). Cold acclimation increases fatty acid-binding protein concentration in aerobic muscle of striped bass, *Morone saxatilis*. *J. Exp. Zool.* **275**: 36-44.
- Vayda, M.E., M-L. Yuan, D.J. Small, L. Costello and B.D. Sidell (1995). Structure of the myoglobin gene of a hemoglobin-less Antarctic icefish. *Antarc. J. U.S.* **30**(5): 175-177.
- Londrville, R.L., J. Storch and B.D. Sidell (1996). Binding site polarity and ligand affinity of homologous fatty acid-binding proteins from animals with different body temperatures. *Mol. Cell. Biochem.* **159**: 39-45.

- Sidell, B.D., M.E. Vayda, D.J. Small, T.J. Moylan, R.L. Londraville, M-L. Yuan, K.J. Rodnick, Z.A. Eppley and L. Costello (1997). Variation in the expression of myoglobin among species of the Antarctic icefishes. *Proc. Nat. Acad. Sci. (U.S.)* **94**: 340-3424.
- Acierno, R., C. Agnisola, B. Tota and B.D. Sidell (1997). Myoglobin enhances cardiac performance in Antarctic icefish species that express the protein. *Am. J. Physiol.* **273**: R100-R106.
- Rodnick, K.J. and B.D. Sidell (1997). Structural and biochemical analyses of cardiac ventricular enlargement in cold-acclimated striped bass. *Amer. J. Physiol.* **273**: R252-R258.
- Vayda, M.E., D.J. Small, M-L.Yuan and B.D. Sidell (1997). Conservation of the myoglobin gene among notothenioid fishes. *Mol. Mar. Biol. Biotech.* **6**: 207-216.
- Cashon, R.E., M.E. Vayda and B.D. Sidell (1997). Kinetic characterization of myoglobins from vertebrates with vastly different body temperatures. *Comp. Biochem. Physiol.* **117B**: 613-620.
- Sidell, B.D. (1998). Intracellular oxygen diffusion: The roles of myoglobin and lipid at cold body temperature. *J. exp. Biol.* **201**: 1119-1128.
- Vayda, M.E., R.L. Londraville, R. Cashon, L. Costello and B.D. Sidell (1998). Two distinct types of fatty acid-binding protein are expressed in heart ventricle of Antarctic fishes. *Biochem. J.* **330**: 375-382.
- Small, D.J., M.E. Vayda and B.D. Sidell (1998). A novel vertebrate myoglobin gene containing three A+T-rich introns is conserved among Antarctic teleost species which differ in myoglobin expression. *J. Mol. Evol.* **47**: 156-166.
- West, J.L., J.R. Bailey, V.M.F. Almeida-Val, A.L. Val, B.D. Sidell and W.R. Driedzic (1999). Activity levels of enzymes of energy metabolism in heart and red muscle are higher in north-temperate-zone than in Amazonian teleosts. *Can. J. Zool.* **77**: 690-696.
- Dowse, H.B., S.F. Norton and B.D. Sidell (2000). The estimation of the diffusion constant and solubility of O₂ in tissue using kinetics. *J. Theor. Biol.* **207**: 531-541.
- Moylan, T.J. and B.D. Sidell (2000). Concentrations of myoglobin and myoglobin mRNA in heart ventricles from Antarctic fishes. *J. exp. Biol.* **203**: 1277-1286.
- 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.
- O'Brien, K.M. Xue, H. and B.D. Sidell (2000). Quantification of diffusion distance within the

- spongy myocardium of hearts from Antarctic fishes. *Resp. Physiol.* **122**: 71-80.
- Sidell, B.D. (2000). Life at body temperatures below 0°C: The physiology and biochemistry of Antarctic fishes. *Grav. Space Biol. Bull.* **13(2)**: 25-34.
- Norton, S.F., Z.A. Eppley and B.D. Sidell (2000). Allometric scaling of maximal enzyme activities in the axial musculature of striped bass (*Morone saxatilis*, Walbaum). *Physiol. Biochem. Zool.* **73**: 819-828.
- Kawall, H.G., J.J. Torres, B.D. Sidell and G.N. Somero (2002). Metabolic cold adaptation in Antarctic fishes: evidence from enzymatic activities of brain. *Mar. Biol.* **140**: 279-286.
- Dunlap, W.C., A. Fujisawa, Y. Yamamoto, T. Moylan and B.D. Sidell (2002). The vitamin E content of notothenioid fish, krill and phytoplankton from Antarctica includes a vitamin E constituent (α -tocomonoenol) functionally associated with coldwater adaptation. *Comp. Biochem. Physiol.* **133B**: 299-305.
- Riemenschneider, W.K. and B.D. Sidell (2002). Cold acclimation induces proliferation of sarcoplasmic reticulum without increase in Ca^{2+} -ATPase activity in white axial muscle of striped bass (*Morone saxatilis*). *J. Exp. Zool.* **292**: 231-240.
- Grove, T.J. and B.D. Sidell (2002). Myoglobin deficiency in the hearts of phylogenetically diverse Temperate Zone fish species. *Can. J. Zool.* **80**: 833-901.
- Winnard, P., B.D. Sidell and M.E. Vayda (2002). Teleost introns are characterized by high AT-content. *Comp. Biochem. Physiol.* **133B**: 155-161.
- Sidell, B.D. and J.R. Hazel (2002). Triacylglycerol lipase activities in tissues of Antarctic fishes. *Polar Biol.* **25**: 517-522.
- Hazel, J.R. and B.D. Sidell (2002). In memoriam: Clifford Ladd Prosser. *Physiol. Biochem. Zool.* **75**: 525-531.
- Eastman, J.T. and B.D. Sidell (2002). Measurements of buoyancy for 13 species of Antarctic notothenioid fishes from the South Shetland Islands. *Polar Biol.* **25**: 753-760.
- Small, D.J., T.J. Moylan, M.E. Vayda and B.D. Sidell (2003). The myoglobin gene of the Antarctic icefish (*Chaenocephalus aceratus*) contains a duplicated TATAAAA sequence that interferes with transcription. *J. exp. Biol.* **206**: 131-139.
- O'Brien, K.M., C. Skilbeck, B.D. Sidell and S. Egginton (2003). Muscle fine structure may maintain the function of oxidative fibres in haemoglobinless Antarctic fishes. *J. exp. Biol.* **206**: 411-421.
- Winnard, P., R.E. Cashion, B.D. Sidell and M.E. Vayda (2003). Isolation, characterization and nucleotide sequence of the muscle isoforms of creatine kinase from the Antarctic teleost

- (*Chaenocephalus aceratus*). *Comp. Biochem. Physiol.* **134**: 651-667.
- Hazel, J.R. and B.D. Sidell (2004). Substrate specificity of hormone-sensitive lipase from adipose tissue of the Antarctic fish, *Trematomus newnesi*. *J. exp. Biol.* **207**: 897-903..
- Grove, T.J., J. Hendrickson and B.D. Sidell (2004). Two species of Antarctic icefishes (genus *Champscephalus*) share a common genetic lesion leading to the loss of myoglobin expression. *Polar Biol.* **27**: 579-585.
- Grove, T.J. and B.D. Sidell (2004). Fatty acyl CoA synthetase from Antarctic notothenioid fishes may influence substrate specificity of fat oxidation. *Comp. Biochem. Physiol.* **139B**: 53-63.
- Erickson, J.E., B.D. Sidell and T.S. Moerland (2005). Temperature sensitivity of calcium binding to parvalbumins from Antarctic and Temperate Zone teleost fish. *Comp. Biochem. Physiol.* **140A**: 179-185.
- 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. [Invited Commentary]
- Wujcik, J.M., Wang, G., Eastman, J.T. and B.D. Sidell (2007). Vascular morphometry of the retina in Antarctic fishes is dependent upon the level of hemoglobin in circulation. In preparation for submission to *J. exp. Biol.* **210**: 815-824.
- Fenaughty, J.M., Eastman, J.T. and B.D. Sidell (2008). Biological implications of low condition factor "ax handle" specimens of the Antarctic toothfish, *Dissostichus mawsoni*, from the Ross Sea. *Antarc. Sci.* In press.
- Garafaolo, F., Amelio, D., Cerra, M.C., Tota, B., Sidell, B.D. and D. Pelligrino (2009). Morphological and physiological study of the cardiac NOS-NO system in the Antarctic (Hb-/Mb-) icefish, *Chaenocephalus aceratus* and the red-blooded *Trematomus bernacchii*. *Nitric Oxide* **20**: 69-78.

B. Published Abstracts

(specific citations available on request).

C. Book Chapters

- Sidell, B.D. (1983): Cellular acclimatization to environmental change by quantitative alterations in enzymes and organelles. Pp. 103-120. In: *Cellular Acclimatization to Environmental Change* (A.R. Cossins and P. Sheterline, eds.). Cambridge Univ. Press.
- Sidell, B.D. and W.R. Driedzic (1985): Relationship between cardiac energy metabolism and work demand in fishes. Pp. 386-401 In: *Respiration, Metabolism, and Circulation* (R. Gilles, ed.), Springer-Verlag, Berlin.
- Sidell, B.D. (1988): Diffusion and ultrastructural adaptive responses in ectotherms. In: *Microcompartmentation*, D.P. Jones, Ed., CRC Press, Pp. 70-91.
- Sidell, B.D. and T.S. Moerland (1989): Effects of temperature upon muscular function and locomotory performance in teleost fishes. pp. 115-156 In: *Advances in Comparative and Environmental Physiology*, Vol. 5, C.P. Mangum, Ed., Springer-Verlag, New York.
- Sidell, B.D. (1991). Physiological roles of high lipid content in tissues of Antarctic fishes. Pp. 220-231. In: *Biology of Antarctic fishes*. G. DiPrisco, B. Maresca and B. Tota, eds., Springer-Verlag.
- Vayda, M.E., D.S. Barry and B.D. Sidell (1997): Expression of the myoglobin gene in Antarctic icefish. Pp. 57-62. In: *Antarctic Communities - Species Structure and Survival*, B. Battaglia, J. Valencia and D.W.H. Walton, Ed.s.. Cambridge University Press.
- Sidell, B.D. and M.E. Vayda (1998). Physiological and evolutionary aspects of myoglobin expression in the hemoglobinless Antarctic icefishes. Pp. 121-142. In: *Cold Ocean Physiology*, H.O. Pörtner and R.D. Playle, ed.s. Cambridge University Press, London.

PAPERS PRESENTED AT SCIENTIFIC MEETINGS - (Last 5 years)

- Sidell, B.D. Variable Expression of Cardiac Myoglobin in Antarctic Icefishes: Now you see it, now you don't.. University of Illinois, Urbana-Champaign *Annual C. Ladd Prosser Lecture in Comparative Physiology*. March 2003. [Invited Speaker].
- Grove, T.J., J. Hendrickson and B.D. Sidell. Pattern of cardiac myoglobin expression among all known species of Antarctic Icefishes. Annual meeting of *Society for Integrative and Comparative Biology*. New Orleans, LA. January 2004.
- Sidell, B.D. Behold a pale fish: Life without oxygen-binding proteins in the Antarctic icefishes. *VII International Congress on the Biology of Fish*. St. John's, Newfoundland, CANADA. July 2006. [Invited Plenary Speaker].
- Wujcik, J.M. and B.D. Sidell. Retinal vascular densities in Antarctic fishes may reflect nitric

oxide-mediated angiogenesis. *American Physiological Society*. Virginia Beach, VA. October 2006.

Sidell, B.D. The physiology of Antarctic fishes: constraints and relaxations provided by life at chronically cold body temperature. *European Society of Ichthyology*. Cavtat, Croatia. September 2007. [Invited Plenary Speaker].

SUMMARY OF GRANT AND CONTRACT ACTIVITIES -

NSF Research Grant (Regulatory Biology Program): Physiological adaptation of teleost fish to cold temperatures: Possible strategies of metabolic reorganization and their mechanisms. 1977-1980. Total budget = \$55,900 (NSF Grant PCM 77-16838). **Funded**.

Faculty Research Book and Equipment Grant, from Faculty Research Fund, UMO: Equipment for isolation and spectrophotometric characterization of enzyme proteins. 1978-1979. Total budget = \$5,625. **Funded**.

Office of Sea Grant (NOAA), University of Maine/University of New Hampshire joint Sea Grant Program: Genetic variation and population structure of Atlantic herring. 1978-1980. (co-Principal Investigator with I.L. Kornfield). Total budget = \$69,966. **Funded**.

American Heart Association Maine Affiliate, Inc.: Physiology and ultrastructure of a chronically hypoxic heart. 1980-1981. Total budget = \$14,135. **Funded**.

NSF Science Educational Directorate (Instructional Scientific Equipment Program): Implementation of laboratories for a comprehensive physiology curriculum. 1979-1981. (J.M. Shick, Project Director). Total NSF contribution = \$19,470. **Funded**.*
(* Although Shick is listed as named P.I., I contributed equally to the proposal.)

NIH Research Grant (NHLBI): Metabolism of chronically hypoxic vertebrate hearts. Total direct budget = \$158,802. Approved, not funded.

NATO Research Grant: Temperature adaptation in fish with particular reference to its genetic control and the distribution of different species. 1980-1981. (co-Principal Investigator with G. Goldspink) Total budget = 135,000 Belgian francs. **Funded**.

NSF Research Grant (Regulatory Biology Program): Structure/function adaptations to environmental temperature in fish muscle. 1981-1984. Total budget = \$145,900. (NSF Grant PCM 8104112). **Funded**.

NATO Research Grant: Renewal of RG 136.80. Temperature adaptation of fish with particular reference to its genetic control and the distribution of different species. 1981-1982. (co-Principal Investigator with G. Goldspink and I.A. Johnston). Total budget = 190,000 Belgian francs. **Funded**.

American Heart Association, Maine Affiliate, Inc.: Effects of hypothermia on myocardial fatty

acid metabolism. 1984-1985. Total budget = \$22,823. **Funded.**

NSF Research Grant (Polar Biology and Medicine Program): Characterization of energy metabolism in Antarctic fish. 1986-1989. Total budget = \$201,671. (DPP-851637). **Funded.**

NSF Research Grant (Regulatory Biology Program): Role of lipid fuels in muscular activity of thermally-acclimated fish. 1986-1987. Total budget = \$30,000. (DCB 8518442). **Funded.**

NSF Research Grant (Physiological Processes): Energetic and respiratory role of lipids in thermally-acclimated fish. 1988-1991. Total budget = \$213,000. (DCB 88-11209). **Funded.**

NSF Research Grant (Polar Biology and Medicine Program): Metabolic and ultrastructural adaptations to chronically cold body temperature in Antarctic Fishes. 1990-1993. Total budget = \$246,000. DPP 88-19469 **Funded.**

NSF/Maine Science and Technology Foundation Grant (NSF/EPSCoR): Adaptation and evolution of marine organisms: Molecular biological approaches. 1992-1995. Total budget = \$3,177,061. **Funded.**

NSF Research Grant (Polar Biology and Medicine Program): Adaptations to counter diffusional constraints in muscles of channichthyid icefishes. 1993-1996. Total budget = \$435,481. (DPP 92-20775). **Funded.**

NSF Research Grant (Polar Biology and Medicine Program): Evolution of an oxygen-binding hemoprotein in a unique environment: Myoglobin in the hemoglobinless Antarctic icefishes. 1996-2000. Total budget = \$586,963. (OPP 94-21657). **Funded.**

NSF Research Grant (Polar Biology and Medicine Program). Proteins of oxygen-binding and energy metabolism in muscles of Antarctic fishes: Evolutionary adjustments to life at cold temperature. 2000-2002. Total budget = \$320,000. (OPP 99-09055). **Funded.**

Maine Science and Technology Foundation: Enhanced telecommunications hardware to support connectivity of *U. Maine's* School of Marine Sciences to the State's marine research community. 2000-2001. Total budget = \$90,000. **Funded.**

NSF Research Grant (Polar Biology and Medicine Program). Cold body temperature as an evolutionary shaping force in the physiology of Antarctic fishes. 2001-2005. Total budget = \$555,000. **Funded.**

NSF Research Grant (Antarctic Biology and Medicine Program). Differential expression of oxygen-binding proteins in Antarctic fishes affects nitric oxide-mediated pathways of angiogenesis and mitochondrial biogenesis. 2005-2008. Total requested budget = \$464,699. (ANT 04-37887). **Funded.**

BRUCE DAVID SIDELL

NSF Research Grant (Antarctic Sciences Division; Organisms and Ecosystems Program). Linkages among mitochondrial form, function and thermal tolerance of Antarctic notothenioid fishes. 2008-2011. Total requested budget (Sidell/U. Maine component) = \$203,218. (ANT 07-39637). **Funded.**