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ACADEMIC:

Associate Prof. (2007-present) Dept. Biology, Queen's University, Kingston, Ontario, Canada
Assistant Prof. (2000-07) Dept of Biology, Queen's University, Kingston, Ontario, Canada
Adjunct Prof. (2003-present) School of Environmental Science, Queen' University, Canada
Adjunct Prof. (2002-07) Life Science College, Zhejiang University, China.
Adjunct Prof. (2007-present) College of Biological Science, Chongqing Normal University, Chongqing, P.R. China
Post-Doctoral Fellow (1999-00) NSERC PDF, Kinesiology, University of Waterloo, Ontario, Canada
Post-Doctoral Fellow (1996-1999) US NIEH PDF, RASMA, University of Miami, Florida, USA
Post-Doctoral Fellow (1996) PDF, University of Wyoming, Laramie, Wyoming, USA

Education:

Ph.D. Animal Physiology and Toxicology, McMaster University, Hamilton, Ontario, Canada, 1996.
M.Sc. Aquatic Toxicology and Biogeochemistry, Trent University, Peterborough, Ontario, Canada, 1990.
B.Sc. (Hon.) Biology, Beijing Normal University, Beijing, P.R. China, 1984.

PERSONAL INFORMATION:

Place of Birth (Date): Beijing, P.R. China (1962, 8, 7)
Citizenship: Canadian.

AFFILIATIONS: Member of American Physiological Society, The Society for Experimental Biologists (U.K.), and Canadian Society for Zoologists.

RESEARCH EXPERIENCE & INTERESTS:

2003-2004 **National Institute of Amazonian Research, Manaus, Brazil (Prof. Dal Val)**
Adaptation of tropical fish to hypoxic, osmotic and acid-base challenges.

1997-present **Qinghai Lake, Qinghai-Tibet Plateau, China** (Chinese NSF 30128016),
Initiated and organized three joint international expeditions to study the physiological and biochemical adaptation of endangered fish species in a high alkalinity, low temperatures and low oxygen saline lake.

2001-present **Dept. of Biology, Queen's Univ. Kingston, Ontario, Canada** (NSERC Research Grant

- 238390-01).
Metabolic adaptation of MCT in fish under hypoxic conditions.
Walleye domestication: an inland strategy using recirculation system.
Nitrogen metabolism, toxicity and its potential role in metabolic regulation.
- 1999-2001 **Dept. of Kinesiology, Univ. of Waterloo, Waterloo, Ontario, Canada** (NSERC PDF, Drs. Arend Bonen and Patricia Schulte).
To characterise the regulation of monocarboxylate transporters (MCT) in the sarcolemma membrane using the giant vesicle technique, developed mRNA probes and characterised cDNA sequences of MCT, to assess transcriptive and translational control of MCT under hypoxic and anaerobic conditions in fish and mammals.
- 1998-2000 **Dept. of Neurology, Med. School and RSMAS, Univ. of Miami, Florida, U.S.A.**
Collaborated with Dr. M.A. Pérez-Pinzón to study the effect of anoxia and ammonia on the mitochondria complex I and cytochrome C in CNS of rat and fish (NIEHS grant).
- 1997-2000 Collaborated with Dr. M. Wilkie, Biology, Mount Allison U., Canada, to investigate the biochemical pathways of nitrogenous metabolism and ammonia toxicity in various life stages of lamprey of the Great Lakes and Atlantic Ocean.
- 1996-1998 **RSMAS, Div. of Marine Biology and Fisheries, Univ. of Miami, Miami, Florida, U.S.A.** (NIEHS PDF, Dr. Patrick J. Walsh).
Carried out a comparative study supported by US NSF and NIEHS grants to examine the toxicity, metabolism, and transport mechanisms of nitrogenous products in various marine teleost fish; characterized the urea transporter gene UT-2, and genetic regulation of carbamoyl phosphate synthetase III and glutamine synthetase in toadfish; developed a new method to assess nitrogen distribution in fish using mass spectrometry. The results contributed to a new understanding of the superior ammonia tolerance in certain marine fish which may lead to potential medical and aquaculture applications.
- 1998 **Mount Desert Island Biological Laboratory, Maine.**
Surveyed nitrogenous waste excretion in several marine teleost fish species.
- 1996 **Fish Physiology & Toxicology Lab, Dept. of Zoology & Physiology, Univ. of Wyoming, Laramie, Wyoming, U.S.A.** (PDF, Dr. Harold L. Bergman).
Studied the effect of diel dissolved oxygen on several native fish species in South Platte river, Colorado, the result of which may lead to the establishment of a US EPA site specific standard to regulate the wastewater discharge, saving the city of Denver \$170 million. Assessed the hatching, survival, growth, aerobic and anaerobic capacities, and swimming performance of the fish after the diel exposure to low dissolved oxygen. Collaborated with other faculty members and graduate students to study the physiological mechanisms influencing the cutthroat trout and brook trout habitat distribution at various altitudes in the Rocky Mountain region.
- 1990-1995 **Dept. of Biology, McMaster University, Hamilton, Ont. Canada** (Ph.D. candidate, Dr. Chris Wood).
Conducted a series of NSERC supported research projects on acid-base regulation, lactate and ammonia transport, and gas exchange in rainbow trout. Developed an unique isolated perfused tail-trunk preparation to serve as an *in situ* physiological model to investigate metabolic, acid-base and ion regulation in trout muscle. Played a major role in developing and improving a series of muscle sampling, processing and enzymatic analysis methods for fish muscle. Supervised three summer project students and two technicians during the course of this research.

- 1994-1995 **Dept. of Biology, McMaster University.**
Collaborated with Dr. R. Henry, Dept. of Zoology, Auburn University to investigate the role of carbonic anhydrase in acid-base regulation, gas exchange and metabolic regulation in fish muscle.
- 1992 **Chatsworth Trout Hatchery, Ontario Ministry of Natural Resources, Canada.**
Participated in a joint project between McMaster Fish Physiology Laboratories and the Ontario Ministry of Natural Resources to investigate swimming performance of trout raised under different rearing velocities.
- 1987-1989 **Watershed Ecosystem Program, Trent University, Peterborough, Ont. Canada (M.Sc. candidate, Supervisor Dr. R.D. Evans).**
Conducted research on the effect of water Ca^{2+} on Cd^{2+} uptake in freshwater mussels: an NSERC supported project on bioavailability and toxicity of heavy metals in freshwater ecosystems. Supervised two NSERC summer students to conduct laboratory research as well as fieldwork on this project.

TEACHING EXPERIENCE:

- 2008- Biol 307/407, Aquatic Biodiversity and Environment Assessment, Queen's University/Fudan University/China Southwestern University
- 2005- Biol 325, Frontier in Cell and Molecular Physiology, Queen's U.
- 2005-2007 Biol 307/407, Joint Field Course with Zhejiang University and China Southwestern University, Human Development and Aquatic Ecosystem in China, Queen's U.
- 2004 Biol 957/850, Advanced Topics in Comparative Physiology, Dept. of Biology, Queen's U.
- 2002-2006 Biol 338, Comparative Physiology, Dept. of Biology, Queen's U.
- 2002 Biol 533, Aquaculture, Technology and Environment, Dept. of Biology, Queen's U.
- 2001-present Biol 322, Environmental Animal Physiology, Dept. of Biology, Queen's University.
- 1990-94 **Dept. of Biology, McMaster University**
Demonstrated animal physiology (3rd year) and general biology (1st year) laboratory as a teaching assistant.
- 1987-89 **Dept. of Biology, Trent University**
Demonstrated 3rd year field biology techniques and 2nd year botany as a teaching assistant.
- 1987-89 **Trent University**
Coached varsity men's volleyball team.
- 1983 **Second Affiliated High School of Beijing Normal Univ.**
Grade 13 Biology teacher (intern).

HONOUR, AWARDS & GRANTS:

- 2007 Queen's Technology Sponsorship Fund for teaching equipment (\$19,500)
- 2006-2009 Great Lake Fishery Commission (\$100,000, 3-yr)
- 2006-2009 NSERC Discovery Grant (\$29,800/yr, 3-yr)
- 2005 (2 PIs) Queen's University Infrastructure Fund for Teaching (\$34,000)
- 2005 (4 PIs) NSERC Equipment Grant (\$64,000)
- 2004 Canadian Bureau of International Education Innovative Teaching Award (\$23,000)
- 2003-2004 Visiting Scientist Award, Ministry of Education of China (\$5000)
- 2003 K.C. Wong Education Foundation, Hong Kong, invited speaker (\$3,000)
- 2002 Canadian Innovation Foundation/Ontario Innovation Trust New Opportunity Grant (\$160,000).

- 2002-2004 Aquaculture Collaborative Research Program, Department Fisheries and Ocean, Canada (\$125,000/year, three years)
- 2002 Queen's ARC Award (\$7,500)
- 2002-2004 National Science Foundation of China, Outstanding Young Scientist Award (CNFS 30128016, RMB¥400,000)
- 2001-2005 NSERC Research Grant (238390-01) \$37,000/yr for 5 years.
- 2001- Queen's ARC Grant \$10,000.
- 2001 Queen's Initiation Grant \$95,000.
- 1999-2000 National Science and Engineer Research Council Post-Doctoral Fellowship, Canada (\$70,000).
- 1999-2000 NIEHS Marine and Freshwater Biomedical Centre (U. of Miami) Pilot Grant (\$10,000).
- 1998 Travelling Fellowship of the Society of Experimental Biologists, UK (\$1,500).
- 1998 Visiting Scientist Fellowship of the Education Commission of China.
- 1998 National Natural Science Foundation of China (NNSFC) Visiting Scientist Fellowship.
- 1996-1998 NIEHS Post-Doctoral Fellowship, NIEHS Marine and Freshwater Biomedical Centre, Rosentiel School of Marine and Atmospheric Science, Univ. of Miami.
- 1997 NNSFC Visiting Scientist Fellowship.
- 1996 University President's Post-Doctoral Fellowship, Univ. of Wyoming.
- 1995 Dept. of Biology, Best Student's Poster Award, McMaster Univ.
- 1991-1994 Received four McMaster U., two CSZ and one SEB student Travel Awards.
- 1990-1994 Biology Departmental Scholarship, McMaster Univ.
- 1990-1991 Ontario International Differential Fee Waiver (OIDFW), McMaster Univ.
- 1987-1990 Canadian International Development Agency Scholarship and OIDFW, Trent Univ.
- 1984-1986 Academia Sinica Graduate Scholarship. Grad. School of Academia Sinica, Beijing, China.

PUBLICATIONS:

36. Gonzalez R. J., C.J. Brauner, Y.X. Wang, J.G. Richards, M.L. Patrick, W. Xu, & A.L. Val (2008) physiological correlates of ontological changes in branchial morphology in the obligate Air-breathing fish *Arapaima gigas*. *Physiol Biochem Zool.* (in review)
35. O'Bryan, Dana M; Zhenyu Xie; **Y.X. Wang**; Jizeng Du; Colin J. Brauner; Jeffrey G. Richards; Chris M. Wood; Xeuqun Chen; Brent W. Murray (2008) Phylogeography and conservation genetics of Lake Qinghai scaleless carp (*Gymnocypris przewalskii*) *Mol. Ecology* (in revision)
34. Victoria Matey, Jeffrey G. Richards, **Y.X. Wang**, Chris M Wood, Joe Rogers, Rhiannon Davies, Brent W. Murray, X-Q Chen, Jizeng Du & Colin J. Brauner (2008) The effect of hypoxia on gill morphology and ionoregulatory status in the Lake Qinghai scaleless carp, *Gymnocypris przewalskii* *J. exp. Biol.* (in revision)
33. Wood C.M., J-Z. Du, J. Rogers, C. J. Brauner, J.G. Richards, J.W. Semple*, B. W. Murray, X-Q Chen, & **Y.X. Wang** (2007) Przewalski's Naked Carp (*Gymnocypris przewalskii*): An Endangered Species Taking a Metabolic Holiday in Lake Qinghai, China, *Physiol Biochem. Zool.* 80(1):59-77
32. Madison, B.N.*and **Y.X. Wang** (2006) Haematological consequences of acute sub-lethal nitrite exposure in walleye (*stizostedion vitreum*) *Aqua Toxicol.* 79:16-23
31. Wilkie M.P., J. F. Claude, A. Cockshutt, J. A. Holmes, **Y.X. Wang**, J. H. Youson and P. J. Walsh (2006) Shifting Pattern of Nitrogen Excretion and Amino Acid Catabolism Capacity During the Life Cycle of the Sea Lamprey (*Petromyzon marinus*). *Physiol. Biochem. Zool.* 79(5):885-898
30. Richards J.G., C.J. Brauner, R.J. Gonzalez, M.L. Patrick, P.M. Schulte, A.R. Choppari-Gomes, A.L.

- Val, V.M. Almeida-Val, and **Y.X. Wang**. (2007) Metabolic and ionoregulatory responses of the Amazonian cichlid, *Astronatus ocellatus*, to severe hypoxia. *J.Comp. Physiol.* 177(3): 361-374
29. Madison, B.N., R.S. Dhillon, B.L. Tufts and **Y.X. Wang** (2008) Moderate ammonia stimulates growth in walleye (*stizostedion vitreum*). *Aquaculture (in review)*
28. Xie Zhen-Yu, Du Ji-Zeng, Chen Xue-Qun, **Y.X. Wang**, and B.W. Murray (2005) The Significance of Mitochondria Control Region (D-Loop) in Intraspecific Genetic Differentiation of Fish, *Hereditas (Beijing)*.
27. Chen, X-Q., J-Z. Du, **Y. X. Wang** (2004) Regulation of hypoxia-induced release of corticotropin-releasing factor in the rat hypothalamus by norepinephrine. *Regulatory Peptides* 119: 221-228.
26. Brauner, C.J., T. Wang, R. Gonzalez, **Y.X. Wang**, R.G. Richards, N.J. Bernier, W. Xu, M. Patrick and A.L. Val. (2004) Limited extracellular but complete intracellular acid-base regulation during environmental hypercapnia in the armoured catfish, *Liposarcus pardalis*. *J. Exp. Biol.* 207: 3381-3391.
25. Wilkie M.P., S. Turnbull, J. Bird, **Y.X. Wang**, J.F. Claude and J.H. Youson (2004) Lamprey parasitism of sharks and teleosts: high capacity urea excretion in an extant vertebrate relic. *Comp. Biochem. Physiol. A.* 138(4):485-492
24. **Wang, Y.X.**, R.J. Gonzalez, M.L. Patrick, M. Grosell, C.G. Zhang, J.Z. Du, P.J. Walsh, C.M. Wood Unusual physiology of Lake Qinghai scaleless carp, *Gymnocypris przewalskii* (2003) *Comp. Biochem. Physiol. A.* 134: 409-421.
23. Furimsky, M., S.J. Cooke, C.D. Suski, **Y.X. Wang** and B.L. Tufts (2003). Respiratory and circulatory effects of hypoxia in largemouth bass (*Micropterus salmoides*) and small mouth bass (*Micropterus dolomieu*): an application to “live-release” fishing tournament. *Trans. Am. Fish. Soc.* 132: 1065-1075.
22. **Wang, Y.X.**, D. Miskovic, M. Tonouchi, and A. Bonen (2003) Thyroid hormone (T3) regulates monocarboxylate transporter isoforms (MCT1 and MCT4) and mRNA expression in rat skeletal and cardiac muscle. *Am. J. Physiol.* 285:E622-E628.
21. Veauvy, C., **Y.X. Wang**, Perez-Pinzon G.P., P.J. Walsh (2001) Comparison of ammonia effect on brain metabolism in rat and toadfish. *Am. J. Physiol.* 283: R598-R603.
20. Walsh, P.J., **Y.X. Wang**, C.E. Campbell, G. DeBoeck and Chris M. Wood (2001). Patterns of nitrogenous waste excretion and gill urea transporter mRNA expression in various species of marine fish. *Mar. Biol.* 139:839-844.
19. Hatta, H., M. Tounuchi, D. Miskovic, **Y.X. Wang**, J. Heikkila and A. Bonen (2001). Tissue specific and isoform specific change in MCT1 and MCT4 in heart and soleus muscle during a 1 year period. *Am. J. Physiol. Endocrinol. Metab.* 281:E749-E756.
18. Wood, C.M., D.M. McDonald, J. Warne, R. Balment, **Y.X. Wang**, and P.J. Walsh (2001). Do circulating plasma AVT and/or control pulsatile urea excretion in the gulf toadfish (*Opsanus beta*)? *Comp. Biochem. Physiol. A.* 129:859-872
17. Laurent, P., C.M. Wood, **Y.X. Wang**, S.F. Perry, K.M. Gilmour, P. Pärt and P.J. Walsh (2001) Intracellular vesicular trafficking in the gill epithelium of urea excreting fish. *Cell & Tissue Res.* 303:197-210.

16. McDonald, M.D., C.M. Wood, **Y.X. Wang** and P.J. Walsh (2000) Differential branchial and renal handling of urea, acetamide and thiourea in the gulf toadfish, *Opsanus beta*: evidence for two transporters. *J. exp. Biol.* 203:1027-1037.
15. **Wang, Y.X.** and P.J. Walsh (2000) High ammonia tolerance in fishes of the family Batrachoididae (toadfish and midshipmen). *Aqua. Toxicol.* 50:205-219.
14. Walsh, P.J., M.Hertz, M. Medina, G.G. Goss, V. Vincek, **Y.X. Wang**, C. E. Campell, G.J. Cooper, C.M. Wood and C.P. Smith (2000) Molecular characterisation of a urea transporter in the gills of the gulf toadfish, *Opsanus beta*. *J. exp. Biol.* 203:2357-2364.
13. Kong,H., N.Kahatapitiya, K. Kingsley, W.L. Salo, P.M. Anderson, **Y.X. Wang** and P. J. Walsh (2000) Induction of carbamoyl phosphate synthetase III and glutamine synthetase mRNA during confinement stress in gulf toadfish (*Opsanus beta*). *J. exp. Biol.* 203:311-317.
12. Wilkie, M.P., **Y.X. Wang**, P.J. Walsh and J.H. Youson (1999) Nitrogen waste excretion by the larvae of a phylogenetically ancient vertebrates: the sea lamprey (*Petromyzon marinus*). *Can. J. Zool.* 77:707-715.
11. Walsh, P.J. and **Y.X. Wang** (1998) Re-examination of nitrogenous waste excretion in several marine teleost fishes. *Bull. Mt. Desert Island Biological Lab.*
10. **Wang, Y.X.**, R.P. Henry, P.W. Wright, G.J.F. Heigenhauser and C.M. Wood (1998) Respiratory and metabolic roles of carbonic anhydrase in post-exercise trout skeletal muscle. *Am. J. Physiol.* 275:R1766-R1779.
9. **Wang, Y.X.** and Bergman H.L. (1997) Report on South Platte River Segment 15 Studies: Laboratory studies to determine the response of fish species to diel fluctuations in dissolved oxygen (prepared for Metro Denver Wastewater Reclamation District).
8. C.M. Wood and **Y.X. Wang** (1999) Lactate, H⁺ and ammonia transport and distribution in rainbow trout white muscle after exhaustive exercise. In: *S.E.B Seminar Series: Regulation of Tissue pH in Plants and Animals: a reappraisal of current techniques* pp.99-124 (Ed. E.W. Taylor, S. Egginton, and J.A. Raven), London, Cambridge Univ. Press.
7. Henry, R.P., **Y.X. Wang** and C.M. Wood (1997) Carbonic anhydrase facilitates CO₂ and NH₃ transport across the sarcolemma of trout white muscle. *Am. J. Physiol.* 272: R1754-R1761.
6. **Wang, Y.X.**, P.W. Wright, G.J.F. Heigenhauser and C.M. Wood (1997) Lactate transport by perfused rainbow trout white muscle: kinetic characteristics and sensitivity to inhibitors. *Am. J. Physiol.* 272: R1577-R1587.
5. **Wang, Y.X.**, G.J.F. Heigenhauser and C.M. Wood (1996) Ammonia movement and distribution after exercise across white muscle cell membranes in rainbow trout. *Am. J. Physiol.* 271: R738-R750.
4. **Wang, Y.X.**, G.J.F. Heigenhauser and C.M. Wood (1996) Lactate, metabolic H⁺ transport and distribution after exercise across white muscle cell membranes in rainbow trout. *Am. J. Physiol.* 271: R1239-R1250.
3. **Wang, Y.X.**, G. Heigenhauser and C.M. Wood (1994) Integrated responses to exhaustive exercise and recovery *in vivo* in rainbow trout white muscle: acid-base, phosphagen, carbohydrate, lipid, and electrolyte metabolism. *J. Exp. Biol.* 195:227-258

2. Wang, Y.X., M.P. Wilkie, G. Heigenhauser and C.M. Wood (1994) The analysis of metabolites in rainbow trout white muscle: a comparison of different sampling and processing methods. *J. Fish Biol.* 45:855-873.

1. Wang, Y.X. and Evans, R.D. (1993) Influence of calcium concentrations on cadmium uptake by freshwater mussels *Elliptio complanata*. *Can. J. Fish. Aquat. Sci.* 50 (12): 2591-2596.

PUBLICATIONS IN PREPARATION:

Dhillon RS, **YX Wang**, and B. L. Tufts (2005) Expression of myosin mRNA during juvenile walleye (*Sander vitreus*) feed training.

Dhillon RS, AJ Esbaugh, **YX Wang**, and BL Tufts (2005) Myosin mRNA as a Marker for Rapid Assessment of Muscle Growth in Juvenile Walleye (*Sander vitreus*).

Wang, Y.X., D. Miskovic, M. Tounuchi*, and A. Bonen. Thyroid hormone (T3) regulates monocarboxylate transporter isoforms (MCT2) and mRNA expression in rat skeletal and cardiac muscle.

Wang, Y.X., D.C. Novinger* and H.L. Bergman. Assessment of aerobic and anaerobic swimming performance of largemouth bass after exposure to diel dissolved O₂ fluctuation.

Andrade J.A.*, P.M. Schulte, A.A. Bonen, G.G. Goss and **Y.X. Wang** (2006) Expression and kinetic characteristics of teleost monocarboxylate transporter protein in frog oocytes.

Guo, X.N.* and **Y.X. Wang** (2006) Intensive training effect on monocarboxylate transporter mRNA expression in rainbow trout during exhaustive exercise and recovery

Gonzalez R.J, **Wang Y.X.**, Brauner C.J., Patrick M.L., Richards J.G., Almeida-VAL V.M. and Val A.L. Osmoregulation in an Amazonian air-breathing fish *Arapaima gigas* in extreme soft Rio Negro water.

Brauner, C. J., J.G. Richards, V Matey, C.M. Wood, J. Rogers, J.W. Semple*, B. Murray, X-Q Chen J-Z. Du, & **Y.X. Wang**. When good holidays go bad; Salinity tolerance of Lake Qinghai scale-less carp (*Gymnocypris przewalskii*)

Wang Y.X., Brauner, C. J., V Matey, C.M. Wood, J. Rogers, J.W. Semple*, B. Murray, X-Q Chen J-Z. Du, and Richards J.R. Icing on snow carp: maternity leave into freshwater is complicated by hypoxia

Cao Y.B.*, Xue-Qun Chen, Ji-Zeng Du, and **Y.X. Wang**, Expression of IGF I and IGF II mRNA in liver of Lake Qinghai naked carp migrating from freshwater river to saline water lake.

Wang S.*, Xue-Qun Chen, Ji-Zeng Du, and **Y.X. Wang** Expression of GLUT and LDH mRNA in liver and brain of Lake Qinghai naked carp migrating from freshwater river to saline water.

ABSTRACTS:

Between 1990 and 2007, 55 abstracts were published for oral presentation and poster in the proceedings of FASEB, SEB, CSZ, ASZ, and other regional, national and international meetings.

