Walter F. Boron, MD, PhD
Myers/Scarpa Professor and Chairman,
Department of Physiology and Biophysics
Case Western Reserve University
10900 Euclid Avenue
Cleveland, OH 44106-4970
Tel: 216-368-3400
Email: walter.boron@case.edu

Education:

A.B. *Summa cum laude*, 1971, Saint Louis University, Chemistry
M.D., 1977, Washington University (St. Louis)
Ph.D., 1977, Washington University, Physiology and Biophysics

Academic Positions:

1977 – 1978: Postdoctoral Fellow, Dept. of Physiology and Biophysics, Washington University School of Medicine, St. Louis, Missouri.
1978 – 1980: Postdoctoral Fellow, Dept. of Physiology, Yale University School of Medicine, New Haven, Connecticut.
1980 – 1984: Assistant Professor, Dept. of Physiology, Yale University School of Medicine, New Haven, Connecticut.
1984 – 1987: Associate Professor, Dept. of Physiology, Yale University School of Medicine, New Haven, Connecticut.
1987 – 2007: Professor, Dept. of Cellular & Molecular Physiology, Yale University School of Medicine, New Haven, Connecticut.
2007 – present: Professor, Dept. of Physiology & Biophysics, Case Western Reserve University, Cleveland, Ohio.
2015 – present: Adjunct Professor, Dept. of Physiology, Wayne State University, Detroit, Michigan.

Administrative Positions:

1987 – 1989: **Director** of Medical Studies, Dept. of Cellular & Molecular Physiology, Yale University School of Medicine, New Haven, Connecticut.
1989 – 1998: **Chairman**, Dept. of Cellular & Molecular Physiology, Yale University School of Medicine, New Haven, Connecticut.
2003 – 2007: **Principal Investigator** of Program Project Grant DK17433.
2007 – present: **David N. & Inez Myers/Antonio Scarpa, MD, PhD Chairman**, Dept. of Physiology & Biophysics, Case Western Reserve University, Cleveland, Ohio.

Honors and Awards:

Marcus Award (undergraduate research in chemistry), 1971.
Phi Beta Kappa, Alpha Sigma Nu, Pi Mu Epsilon, Beta Beta Beta.

Grass Foundation MBL Fellow, 1975.
Sigma Xi
NIH Research Service Award (postdoctoral fellowship), 1977 – 1980.
Searle Scholar, 1981 – 1984.
NIH Research Career Development Award, 1983 – 1988.
Young Investigator Award, American Society of Nephrology & American Heart Association, 1986.
Charles W. Bohmfalk Teaching Award, Yale University School of Medicine, 1993.
Robert F. Pitts Lecture and Award, Renal Commission of the International Union of Physiological Sciences, 1993.
Carl W. Gottschalk Lecture and Award, Renal Section of the American Physiological Society, 1998.
Elected Fellow, American Academy for the Advancement of Science, 1998.
NIH "MERIT" Award (NIDDK), 2002 – 2011.
Homer Smith Award, American Society of Nephrology, 2005.
Sharpey-Schafer Award, The Physiological Society (London), 2008.
PROSE (Professional and Scholarly Excellence) Award for the journal *Physiology* in category "Journal, Best Design in Print," Association of American Publishers, 2009.
Palade Gold Medal (shared with William Catterall and Richard Tsien), Wayne State University, 2010.
Ray G. Daggs Award, American Physiological Society, 2011.
British Medical Association Certificate of Honor (shared with EL Boulpaep & Elsevier) for *Medical Physiology Updated 2nd Edition* in category "Basic and Clinical Sciences" of BMA Medical Book Awards, 2012.
Doctor Medicinae Honoris Causa, Aarhus University, 2014.
Elected to *Institute of Medicine* of the *National Academies* (now *National Academy of Medicine*), 2014.
Honorary Professor, University of Medicine and Pharmacy of Tîrgu Mureș, Romania, 2015.
Elected Fellow, American Physiological Society, 2015.

Memberships:

American Physiological Society: **Program Representative**, **Renal Section**, 1984 – 1987; **Chairman**, **Renal Section**, 1990 – 1993; **Council**, 1995 – 1998; **President-elect/President/Past-President**, 1998 – 2001.
Physiological Society (London)
American Society of Nephrology
International Society of Nephrology
Biophysical Society
Society of General Physiologists: **Treasurer**, 1988 – 1991.
Society for Neuroscience
International Union of Physiological Societies: **Member**, National Organizing Committee for 2005 Congress; **Chair**, US Scientific Programming Committee & concurrent **Chair**, International Scientific Programming Committee, for 2005 Congress. **Secretary-General**, 1/1/2010 – 12/31/2017.

Editorial Positions:

American Journal of Physiology: *Renal, Fluid and Electrolyte Physiology*: **Editorial Board**, 1984 – 1988.
Annual Review of Physiology: **Special Section Editor**, volume 48, 1986.

Journal of Physiology (London): **an Editor**, 1985 – 1992.
Physiological Reviews: **Associate Editor**, Jan. 1, 1985 – Dec. 31, 1990; **Editor-in-Chief**, Jan. 1, 1994 – Dec. 31, 1999.
Physiology. **Editor-in-Chief**, July 1, 2003 – June 30, 2012.
Medical Physiology. A Cellular and Molecular Approach. (A textbook for medical students) **Co-editor** (with EL Boulpaep). Philadelphia: Saunders/Elsevier, various editions published in 2003, 2005, 2009, 2012, with the 3rd edition in production.
Reference Module in Physiology. (An online reference source). Co-editor (with EL Boulpaep). Oxford, UK: Elsevier. In production.

Meetings Organized:

Na^+-H^+ Exchange, Intracellular pH, and Cell Function. Yale Univ., Dept. of Physiology: Tenth Conference on Membrane Transport Processes. Dec. 11 – 13, 1984: **Co-organizer** (with PS Aronson).
pH. Multi-symposium "Theme" for spring 1986 FASEB meeting, St. Louis. **Organizer**.
Intracellular pH. American Physiological Society Conference. July 1996. Snowmass, Colorado: **Co-organizer** (with R Gillies).
Frontiers of Cellular and Molecular Physiology. Yale Univ., Dept. of Physiology Conference, Jan. 22 – 23, 1998: **Co-organizer**.
From Genomes to Functions. 2005 Meeting of the International Union of Physiological Sciences (IUPS), San Diego, CA: **Member**, National Organizing Committee; **Chair**, US Scientific Programming Committee; **Chair**, International Scientific Programming Committee.
Gas Channels Workshop. Sponsored by the Office of Naval Research, Cleveland, September, 2012. **Organizer**.
2013 Congress of the International Union of Physiological Sciences (IUPS), Birmingham, UK: **Co-Chair**, International Scientific Programming Committee.
2017 Congress of the International Union of Physiological Sciences (IUPS), Rio de Janeiro, Brazil: **Co-Chair**, International Scientific Programming Committee.

Special Lectureships:

Visiting Lecturer, Cardiovascular Research Institute, University of California at San Francisco, April 7 – 8, 1986
Beckman Lecturer, Department of Physiology, University of Cork, Ireland, April 1997
Plenary Lecturer, Gordon Conference on Membrane Transporters, July 1998.
Major Lecturer, Annual Meeting of the German Physiological Society, Bonn, Germany, 1999
Keynote Lecturer, Second Annual Membrane Biology Conference, University of Missouri, Columbia, November 1999
After-Dinner Lecturer, Cell & Molecular Physiology Section of the American Physiological Society, New Orleans, April 22, 2002
Dunaway-Burnham Visiting Scientist, Dartmouth University School of Medicine, Hanover, NH, January 20 – 22, 2003
Dr. John J. Spitzer Distinguished Lecturer, Louisiana State University Health Sciences Center, New Orleans, LA, October 4, 2004
Suk-Ki Hong Memorial Lectures, SUNY Buffalo, May 24, 2006
Keynote Speaker, Medical Student Research Forum, New York Medical College, February 5, 2007

Frontiers of Science Lecture, Wayne State University, Detroit, MI, 2008
Gottschalk Lecture, University of North Carolina, Chapel Hill, NC, 2009
F.C. MacIntosh Lectureship, McGill University, Montreal, Canada, 2009
Visiting Scientist, Perinatal Biology Seminar, Loma Linda University, Loma Linda, California, 2010
Plenary Lecture. Joint Meeting of the Scandinavian and German Physiological Societies, University of Copenhagen, Denmark, 2010
Guest (keynote) Speaker, 3rd Annual Graduate Student Research Day, Department of Physiology and Biophysics, Dalhousie University, Nova Scotia, Canada. 2010
Keynote Address, Center for Membrane Protein Research, Texas Tech University Health Science Center. 2010
Plenary Lecture, 23rd Congress of the Chinese Association for Physiological Sciences (CAPS), Xi'An, China. 2010
Plenary Lecture, 2nd Symposium of the International Society of Proton Dynamics in Cancer, Nice, France. 2011
Plenary Lecture, International Workshop on Membrane Transport of Small Solutes, Strobl, Austria. 2012
Keynote Lecture, Brain Energy Metabolism and Blood Flow Gordon Research Conference, Waterville, Maine. 2012
Plenary Lecture, International Physiology Conference, Suzhou, China. 2012
JC Skou Lecture, Annual PhD Day at Faculty of Health, Aarhus University, Denmark. January, 2014
Worthheim Lectureship, Graduate PhD Program in Biomedical Sciences, Florida International University, Miami, Florida. March 2014
Plenary Lecture, III International Symposium (Neuroplasticity; Nervous Substrate for Health and Disease. New Approaches for Research), Tbilisi, Georgia. October 2–4, 2014
Mayerson-DiLuzio Award Lecture, Tulane University, New Orleans, LA. March 9, 2015
Distinguished Lecture, Office of Naval Research, Arlington, VA. April 20, 2015
Plenary Lecture, Molecular & Cell Biology Congress, Nanjing, China. April 25, 2015
Keynote Speaker, Frontiers in Nano Cell Biology, University of Medicine and Pharmacy, Tîrgu Mureș, Romania. May 5, 2015
Keynote Lecture, 41st Turkish Physiology Congress, Çanakkale (Gallipoli), Turkey. September 10, 2015
Walter H. Seegers endowed Lecture, Department of Physiology, Wayne State University, Detroit, MI. October 8, 2015
Keynote Speaker, 2nd Annual Hypercapnia Symposium, Northwestern University, Chicago, IL. May 3, 2016.

Publications:

Original Research

Peterson PE & WF Boron. 1,3-halogen shifts occurring via four-membered ring halonium ion intermediates in the solvolyses of 3-halo-1-butyl trifluromethanesulfonates. *J Am Chem Soc* 93:4076–4077, 1971.

Boron WF & P De Weer. Intracellular pH transients in squid giant axons caused by CO_2, NH_3, and metabolic inhibitors. *J Gen Physiol* 67:91–112, 1976. PMCID: PMC2214912.

Boron WF & P De Weer. Active proton transport stimulated by CO_2/HCO_3^-, blocked by cyanide. *Nature* 259:240–241, 1976. doi: 10.1038/259240a0.

Boron WF & A Roos. Comparison of microelectrode, DMO, and methylamine methods for measuring intracellular pH. *Am J Physiol* 231:799–809, 1976. PMID: 9832.

Russell JM & WF Boron. Role of chloride transport in regulation of intracellular pH. *Nature* 264:73–74, 1976. doi:10.1038/264073a0.

Boron WF. Intracellular pH transients in giant barnacle muscle fibers. *Am J Physiol* 233:C61–C73, 1977. PMID: 20782.

Boron WF, JM Russell, MS Brodwick, DW Keifer & A Roos. Influence of cyclic AMP on intracellular pH regulation and chloride fluxes in barnacle muscle fibers. *Nature* 276:511–513, 1978. doi:10.1038/276511a0.

Roos A & WF Boron. Intracellular pH transients in rat diaphragm muscle measured with DMO. *Am J Physiol* 235:C49–C54, 1978. PMID: 27989.

Boron WF, WC McCormick & A Roos. pH regulation in barnacle muscle fibers: dependence on intracellular and extracellular pH. *Am J Physiol* 237:C185–C193, 1979. PMID: 38672.

Boron WF, WC McCormick & A Roos. pH regulation in barnacle muscle fibers: dependence on extracellular sodium and bicarbonate. *Am J Physiol* 240:C80–C89, 1981. PMID: 6257119.

Boron WF & EL Boulpaep. Intracellular pH regulation in the renal proximal tubule of the salamander: Na-H exchange. *J Gen Physiol* 81:29–52, 1983. PMCID: PMC2215563.

Boron WF & EL Boulpaep. Intracellular pH regulation in the renal proximal tubule of the salamander: basolateral HCO_3^- transport. *J Gen Physiol* 81:53–94, 1983. PMCID: PMC2215562.

Boron WF & JM Russell. Stoichiometry and ion dependencies of the intracellular-pH-regulating mechanism in squid giant axons. *J Gen Physiol* 81:373–399, 1983. PMCID: PMC2215574.

Russell JM, WF Boron & MS Brodwick. Intracellular pH and Na fluxes in barnacle muscle with evidence for reversal of the ionic mechanism of intracellular pH regulation. *J Gen Physiol* 82:47-78, 1983. PMCID: PMC2228689.

Boron WF. Intracellular-pH-regulating mechanism of the squid axon: relation between the external Na^+ and HCO_3^- dependences. *J Gen Physiol* 85:325–345, 1985. PMCID: PMC2215796.

Knakal RC, WC Summers, EJ Cragoe Jr & WF Boron. Expression of a mammalian Na-H exchanger in muscle fibers of the giant barnacle. *Nature* 315:756–758, 1985. PMID: 2409448.

Chaillet JR & WF Boron. Intracellular calibration of a pH-sensitive dye in isolated, perfused salamander proximal tubules. *J Gen Physiol* 86:765–794, 1985. PMCID: PMC2228795.

Chaillet JR, AG Lopes & WF Boron. Basolateral Na-H exchange in the rabbit cortical collecting tubule. *J Gen Physiol* 86:795–812, 1985. PMCID: PMC2228792.

Chaillet JR, K Amsler & WF Boron. Optical measurement of intracellular pH in single LLC-PK_1 cells: demonstration of Cl-HCO_3 exchange. *Proc Natl Acad Sci, USA* 83:522–526, 1986. PMCID: PMC322892.

Lopes AG, AW Siebens, G Giebisch & WF Boron. Electrogenic Na/HCO_3 cotransport across the basolateral membrane of the isolated perfused *Necturus* proximal tubule. *Am J Physiol* 253:F340–F350, 1987. PMID: 3618795.

Siebens AW & WF Boron. Effect of electroneutral luminal and basolateral lactate transport on intracellular pH in salamander proximal tubules. *J Gen Physiol* 90:799–831, 1987. PMCID: PMC2228884.

Boron WF, E Hogan & JM Russell. pH-sensitive activation of the intracellular-pH regulation system in squid axons by ATPγS. *Nature* 332:262–265, 1988. doi:10.1038/332262a0.

Ganz MB, G Boyarsky, WF Boron & RB Sterzel. Effects of angiotensin II and vasopressin on intracellular pH of glomerular mesangial cells. *Am J Physiol* 254:F787–F794, 1988. PMID: 3381882.

Nakhoul NL, AG Lopes, JR Chaillet & WF Boron. Intracellular pH regulation in the S3 segment of the rabbit proximal tubule in HCO_3^--free solutions. *J Gen Physiol* 92:369–393, 1988. PMID: 3225554.

Nakhoul NL & WF Boron. Acetate transport in the S3 segment of the rabbit proximal tubule and its effect on intracellular pH. *J Gen Physiol* 92:395–412, 1988. PMCID: PMC2228900.

Boyarsky G, MB Ganz, RB Sterzel & WF Boron. pH regulation in single glomerular mesangial cells. I. Acid extrusion in the absence and presence of HCO_3^-. *Am J Physiol* 24:C844–C856, 1988. PMID: 2849306.

Boyarsky G, MB Ganz, RB Sterzel & WF Boron. pH regulation in single glomerular mesangial cells. II. Na^+-dependent and -independent Cl-HCO_3 exchangers. *Am J Physiol* 24:C859–C896, 1988.

Boron WF & RC Knakal. Intracellular pH-regulating mechanism of the squid axon: interaction between DNDS and extracellular Na^+ and HCO_3^-. *J Gen Physiol* 93:123–150, 1989. PMCID: PMC2216203.

Siebens AW & WF Boron. Depolarization-induced alkalinization in proximal tubules. I. Characteristics and dependence on Na^+. *Am. J. Physiol* 256:F342–F353, 1989. PMID: 2916666.

Siebens AW & WF Boron. Depolarization-induced alkalinization in proximal tubules. II. Effects of lactate and SITS. *Am J Physiol* 256:F354–F365, 1989. PMID: 2916667.

Ganz MB, G Boyarsky, RB Sterzel & WF Boron. Arginine vasopressin enhances pH_i regulation in the presence of HCO_3^- by stimulating three acid-base transport systems. *Nature* 337:648–651, 1989. doi:10.1038/337648a0.

Geibel JP, G Giebisch & WF Boron. Effects of acetate on luminal acidification processes in the S3 segment of the rabbit proximal tubule. *Am J Physiol* 257:F586–F594, 1989. PMID: 2801961.

Geibel JP, G Giebisch & WF Boron. Basolateral sodium-coupled acid-base transport mechanisms of the rabbit proximal tubule. *Am J Physiol* 257:F790–F797, 1989. PMID: 2556038.

Boyarsky G, MB Ganz, EJ Cragoe & WF Boron. Intracellular pH dependence of Na-H exchange and acid loading in quiescent and arginine vasopressin-activated mesangial cells. *Proc Natl Acad Sci, USA* 87:5921–5924, 1990. PMCID: PMC54441.

Geibel J, G Giebisch & WF Boron. Angiotensin II stimulates both Na-H exchange and Na/HCO_3 cotransport in the rabbit proximal tubule. *Proc Natl Acad Sci, USA* 87:7917–7920, 1990. PMCID: PMC54862.

Nakhoul NL, L Chen & WF Boron. Intracellular pH regulation in the rabbit S3 proximal tubule. Basolateral Cl-HCO_3 exchange and Na/HCO_3 cotransport. *Am J Physiol* 258:F371–F381, 1990. PMID: 2155541.

Ganz MB, MC Perfetto & WF Boron. Effects of mitogens and other agents on mesangial cell proliferation, pH and Ca^{2+}. *Am J Physiol* 259:F269–F278, 1990. PMID: 2117398.

Boyarsky G, N Rosenthal, E Barrett & WF Boron. Effect of diabetes on Na-H exchange by single isolated hepatocytes. *Am J Physiol* 260:C167–C175, 1991.

Davis BA, E Hogan & WF Boron. Role of G proteins in stimulation of Na-H exchange by cell shrinkage. *Am J Physiol* 262:C533–C536, 1992. PMID: 1311505.

Davis BA, E Hogan & WF Boron. Activation of Na-H exchange by intracellular lithium in barnacle muscle fibers. *Am J Physiol: Cell* 263:C246–C256, 1992. PMID: 1322042.

Boron WF & RC Knakal. Intracellular pH-regulating mechanism of the squid axon. Dependence on extracellular pH. *J Gen Physiol* 99:817–837, 1992.

Tardieux I, P Webster, J Ravesloot, WF Boron, JA Lunn, JE Heuser & NW Andrews. Lysosome recruitment and fusion are early events required for trypanosome invasion of mammalian cells. *Cell* 71:1117–1130, 1992. doi:10.1016/S0092-8674(05)80061-3.

Boyarsky G, W-R Schlue, MBE Davis, B Ransom & WF Boron. Intracellular pH regulation in single cultured astrocytes from rat forebrain. *Glia* 8:241–248, 1993.

Nakhoul NL, LK Chen & WF Boron. Effect of basolateral CO_2/HCO_3 on intracellular pH regulation in the rabbit S3 proximal tubule. *J Gen Physiol*. 102:1171–1205, 1993. PMID: 8133244 PMCID: PMC2229188.

Gupta A, CJ Schwiening & WF Boron. Effects of CGRP, forskolin, PMA and ionomycin on pH_i dependence of Na-H exchange in UMR-106 cells. *Am J Physiol* 266:C1083–C1092, 1994. PMID: 8178955.

Schwiening CJ & WF Boron. Regulation of intracellular pH in pyramidal neurones from the rat hippocampus by Na^+-dependent Cl^--HCO_3^- exchange. *J Physiol* 475:59–67, 1994. PMCID: PMC1160355.

Kaplan DL & WF Boron. Long-term expression of c-H-*ras* stimulates Na-H and Na^+-dependent Cl-HCO_3 exchange in NIH-3T3 fibroblasts. *J Biol Chem* 269:4116–4124, 1994. PMID: 8307971.

Ganz MB & WF Boron. Long-term effects of growth factors on pH and acid-base transport in rat glomerular mesangial cells. *Am J Physiol* 266:F576–F585, 1994. PMID: 8184890.

Waisbren SJ, JP Geibel, WF Boron & IM Modlin. Luminal perfusion of isolated gastric glands. *Am J Physiol* 266:C1013–C1027, 1994. PMID: 8178950.

Waisbren SJ, JP Geibel, IM Modlin & WF Boron. Unusual permeability properties of gastric gland cells. *Nature* 368:332–335, 1994. PMID: 8127367.

Davis BA, EM Hogan & WF Boron. Shrinkage-induced activation of Na^+-H^+ exchange in barnacle muscle fibers. *Am DJ Physiol* 266:C1744–C1753, 1994. PMID: 8023904.

Fei YJ, Y Kanai, S Nussberger, V Ganapathy, FH Leibach, MF Romero, SK Singh & WF Boron, MA Hediger. Expression cloning of a mammalian proton-coupled oligopeptide transporter. *Nature* 368:563–566, 1994. PMID: 8139693.

Chen LK & WF Boron. Acid extrusion in the S3 segment of the rabbit proximal tubule: I. Effect of bilateral CO_2/HCO_3^-. *Am J Physiol* 268:F179–F192, 1995. PMID: 7864155.

Chen LK & WF Boron. Acid extrusion in the S3 segment of the rabbit proximal tubule: II. Effect of basolateral CO_2/HCO_3^-. *Am J Physiol* 268:F193–F203, 1995. PMID: 7864156.

Ravesloot JH, T Eisen, R Baron & WF Boron. Role of Na-H exchangers and vacuolar H^+ pumps in intracellular pH regulation in neonatal rat osteoclasts. *J Gen Physiol* 105:177–208, 1995. PMCID: PMC2216940.

Zhao J, EM Hogan, MO Bevensee & WF Boron. Out-of-equilibrium CO_2/HCO_3^- solutions and their use in characterizing a new K/HCO_3 cotransporter. *Nature* 374:636–639, 1995. doi:10.1038/374636a0.

Bevensee MO, CJ Schwiening & WF Boron. Use of BCECF and propidium iodide to assess membrane integrity of acutely isolated CA1 neurons from rat hippocampus. *J Neurosci Meth* 58:61–75, 1995. doi:10.1016/0165-0270(94)00159-E.

Apkon M & WF Boron. Extracellular and intracellular alkalinization and the constriction of rat cerebral arterioles. *J Physiol* 484:743–753, 1995. PMCID: PMC1157957.

Kanai Y, S Nussberger, MF Romero, WF Boron, SC Hebert & MA Hediger. Electrogenic properties of the epithelial and neuronal high affinity glutamate transporter. *J Biol Chem* 270:16561–16568, 1995. doi: 10.1074/jbc.270.28.16561.

Hogan EM, MA Cohen & WF Boron. K^+- and HCO_3^--dependent acid-base transport in squid giant axons I: Base efflux. *J Gen Physiol* 106:821–844, 1995. PMID: 8648294.

Hogan EM, MA Cohen & WF Boron. K^+- and HCO_3^--dependent acid-base transport in squid giant axons II: Base influx. *J Gen Physiol* 106:845–862, 1995. PMID: 8648295.

Singh SK, HJ Binder, WF Boron, JP Geibel. Fluid absorption in isolated perfused colonic crypts. *J Clin Invest* 96:2373–2379, 1995. PMID: 7593625.

Singh SK, HJ Binder, JP Geibel & WF Boron. An apical permeability barrier to NH_3/NH_4 in isolated, perfused colonic crypts. *Proc Natl Acad Sci, USA* 92:11573–11577, 1995. PMID: 8524806.

Bevensee MO, TR Cummins, GG Haddad, WF Boron & G Boyarsky. pH regulation in single CA1 neurons acutely isolated from the hippocampi of immature and mature rats. *J Physiol* 494:315–328, 1996. PMID: 8841993.

Grishin AV, MO Bevensee, NN Modyanov, V Rajendran, WF Boron & MJ Caplan. Functional expression of the cDNA encoded by the human ATP1AL1 Gene. *Am J Physiol* 271:F539–F551, 1996. PMID: 8853415.

Steel A, S Nussberger, MF Romero, WF Boron, CA Boyd & M. Hediger. Stoichiometry and pH dependence of the rabbit proton-dependent oligopeptide transporter PepT1. *J Physiol* 493: 563–569, 1997. PMID: 9051570.

Romero MF, MA Hediger, EL Boulpaep & WF Boron. Expression cloning of the renal electrogenic Na/HCO_3 cotransporter. *Nature* 387:409–413, 1997. PMID: 9163427.

Nussberger S, A Steel, D Trotti, MF Romero, WF Boron & MA Hediger. Symmetry of H^+ binding to the intra- and extracellular side of the H^+-coupled oligopeptide cotransporter PepT1: *J Biol Chem* 272:7777–7785, 1997. doi: 10.1074/jbc.272.12.7777.

Apkon M, RA Weed & WF Boron. Motor responses of cultured rat cerebral vascular smooth muscle cells to intra- and extracellular pH changes. *Am J Physiol* 273:H434–H445, 1997. PMID: 9249519.

Gunshin H, B Mackenzie, UV Berger, Y Gunshin, MF Romero, WF Boron, S Nussberger, JL Gollan, MA Hediger. Cloning and characterization of a proton-coupled mammalian metal ion transporter. *Nature* 388: 482–488, 1997. PMID: 9242408.

Zahler R, ZT Zhang, M Manor & WF Boron. Sodium kinetics of Na, K-ATPase α isoforms in intact transfected HeLa cells. *J Gen Physiol* 110: 201–213, 1997. PMCID: PMC2233788.

Bevensee MO, RA Weed & WF Boron. Intracellular pH regulation in cultured astrocytes from rat hippocampus. I. Role of HCO_3^-. *J Gen Physiol* 110:453–465, 1997. PMCID: PMC2229379.

Bevensee MO, M Apkon & WF Boron. Intracellular pH regulation in cultured astrocytes from rat hippocampus. II. Electrogenic Na/HCO_3 cotransport. *J Gen Physiol* 110:467–483, 1997. doi: 10.1085/jgp.110.4.467.

Hogan EM, BA Davis & WF Boron. Intracellular Cl^- dependence of Na-H Exchange in barnacle muscle fibers under normotonic and hypertonic conditions. *J Gen Physiol* 110:629–639, 1997. doi: 10.1085/jgp.110.5.629. PMID: 9348333 PMCID: PMC2229391.

Nakhoul NL, BA Davis, MF Romero & WF Boron. Effect of expressing the water channel aquaporin-1 on the CO_2 permeability of *Xenopus* oocytes. *Am J Physiol* 274:C543–C548, 1998. PMID: 9486145.

Romero MF, P Fong, UV Berger, MA Hediger & WF Boron. Cloning and functional expression of rNBC, an electrogenic Na^+-HCO_3^- cotransporter from rat kidney. *Am J Physiol* 274:F425–F432, 1998. PMID: 9486238.

Cooper GJ & WF Boron. Effect of pCMBS on the CO_2 permeability of *Xenopus* oocytes expressing Aquaporin 1 or its C189S mutant. *Am J Physiol* 275: C1481–C1486, 1998. PMID: 9843709.

Schmitt BM, D Biemesderfer, MF Romero, EL Boulpaep & WF Boron. Immunolocalization of the electrogenic Na^+-HCO_3^- cotransporter (NBC) in mammalian and amphibian kidney. *Am J Physiol* 276:F27–F38, 1999. PMID: 9887077.

Bevensee MO, E Bashi, W-R Schlue, G Boyarsky & WF Boron. Shrinkage-induced activation of Na^+/H^+ exchange in rat renal mesangial cells. *Am J Physiol* 276:C674–C683, 1999. PMID: 10069995.

Choi I, MF Romero, N Khandoudi, A Bril & WF Boron. Cloning and characterization of a human electrogenic Na^+-HCO_3^- cotransporter isoform (hhNBC)**.** *Am J Physiol* 276:C576–C584, 1999. PMID: 10069984.

Marino CR, V Jeanes, WF Boron & BM Schmitt. Expression and distribution of the Na^+-HCO_3^- cotransporter in human pancreas. *Am J Physiol* 277:G487–G494, 1999. PMID: 10444464.

Jensen LJ, BM Schmitt, UV Berger, NN Nsumu, WF Boron, MA Hediger, D Brown & S Breton. Localization of sodium bicarbonate co-transporter (NBC) protein and mRNA in rat epididymis. *Biol Reprod* 60:573–579, 1999. doi: 10.1095/biolreprod60.3.573.

Bevensee MO, E Bashi & WF Boron. Effect of trace levels of nigericin on intracellular pH and acid-base transport in rat renal mesangial cells. *J Membr Biol* 169:131–139, 1999. PMID: 10341035.

Heyer M, S Müller-Berger, MF Romero, WF Boron & E Frömter. Stoichiometry of the rat kidney Na^+-HCO_3 cotransporter expressed in *Xenopus laevis* oocytes. *Pflügers Arch* 438:322–329, 1999. PMID: 10398862.

Roussa E, MF Romero, BM Schmitt, WF Boron, SL Alper & F Thévenod. Immunolocalization of anion exchanger AE2 and Na^+-HCO_3^- cotransporter in rat parotid and submandibular glands. *Am J Physiol* 277: G1288–G1296, 1999. PMID: 10600827.

Bevensee, MO, BM Schmitt, J. Lopes, I Choi, MF Romero & WF Boron. An electrogenic Na^+-HCO_3^- cotransporter (NBC) with a novel COOH-terminus, cloned from rat brain. *Am J Physiol* 278:C1200–C1211, 2000. PMID: 10837348.

Grichtchenko II, MF Romero & WF Boron. Extracellular HCO_3^- dependence of electrogenic Na/HCO_3 cotransporters cloned from salamander and rat kidney. *J Gen Physiol* 115:533–546, 2000. PMCID: PMC2217225.

Choi I, C Aalkjær, EL Boulpaep & WF Boron. An electroneutral sodium/bicarbonate cotransporter NBCn1 and associated sodium channel. *Nature* 405:571–575, 2000. doi:10.1038/35014615.

Schmitt BM, UV Berger, RM Douglas, MO Bevensee, MA Hediger, GG Haddad & WF Boron. Na/HCO_3 cotransporters in rat brain: expression in glia, neurons and choroid plexus. *J Neurosci* 20:6839–6848, 2000. doi:20/18/6839.

Vorum H, TH Kwon, C Fulton, B Simonsen, I Choi, W Boron, Maunsbach AB, S Nielsen & C Aalkjær. Immunolocalization of electroneutral $Na\text{-}HCO_3^-$ cotransporter in rat kidney. *Am J Physiol–Renal Physiol* 279:F901–F909, 2000. doi:0363-6127/00.

Maunsbach AB, H Vorum, TH Kwon, S Nielsen, B Simonsen, I Choi, BM Schmitt, WF Boron & C Aalkjær. Immunoelectron microscopic localization of the electrogenic Na/HCO_3 cotransporter in rat and *Ambystoma* kidney. *J Am Soc Nephrol* 11:2179–2189, 2000. doi:1046-6673/1112-2179.

Douglas RM, BM Schmitt, Y Xia, MO Bevensee, D Biemesderfer, WF Boron & GG Haddad. Sodium-hydrogen exchangers and sodium-bicarbonate co-transporters: ontogeny of protein expression in the rat brain. *Neuroscience* 102:217–228, 2001. doi:10.1016/S0306-4522(00)00473-5.

Grichtchenko II, I Choi, P Bray-Ward, JM Russell, I Choi & WF Boron. Cloning, characterization and chromosomal mapping of a human electroneutral Na^+-driven $Cl\text{-}HCO_3$ exchanger. *J Biol Chem* 276:8358–8363, 2001. doi:10.1074/jbc.C000716200.

Davis BA, EM Hogan, GJ Cooper, E Bashi, J Zhao & WF Boron. Inhibition of K/HCO_3 cotransport in squid axons by quaternary ammonium ions. *J Membr Biol* 183:25–32, 2001. doi:10.1007/s00232-001-0050-0.

Khandoudi N, J Albadine, P Robert, S Krief, I Berrebi-Bertrand, X Martin, MO Bevensee, WF Boron & A Bril. Inhibition of the cardiac electrogenic sodium bicarbonate cotransporter reduces ischaemic injury. *Cardiovasc Res* 52:387–396, 2001. doi:10.1016/S0008-6363(01)00430-8.

Virkki LV, GJ Cooper & WF Boron. Cloning and functional expression of MIP (AQP0) homolog from killifish (*Fundulus heteroclitus*) lens. *Am J Physiol*: *Regulatory, Integrative and Comparative* 281:R1994–R2003, 2001. doi:0363-6119/01.

Virkki LV, D Wilson, RD Vaughan-Jones & WF Boron. Functional characterization of NBC4 as an electrogenic $Na^+\text{-}HCO_3^-$ cotransporter (NBCe2). *Am J Physiol Cell Physiol* 282:C1278–C1289, 2002. doi:10.1152/ajpcell.00589.2001.

Jiang Z, II Grichtchenko, WF Boron & PS Aronson. Specificity of anion exchange mediated by mouse Slc26a6. *J Biol Chem* 277:33963–33967, 2002. doi:10.1074/jbc.M202660200.

Virkki LV, C Franke, P Somieski & WF Boron. Cloning and functional characterization of a novel AQP from *Xenopus laevis* oocytes. *J Biol Chem* 277:40610–40616, 2002. doi:10.1074/jbc.M206157200.

Choi I, L Hu, JD Rojas, B Schmitt & WF Boron. Role of glycosylation in the renal electrogenic Na^+-HCO_3^- cotransporter (NBCe1). *Am J Physiol Renal Physiology* 284:F1199–F1206, 2003. doi:10.1152/ajprenal.00131.2002.

Zhao J, Y Zhou & WF Boron. Effect of the isolated removal of either basolateral CO_2 or basolateral HCO_3^- on HCO_3^- reabsorption by the rabbit S2 proximal tubule. *Am J Physiol Renal Physiol* 285:F359–F369, 2003. doi:10.1152/ajprenal.00013.2003.

Virkki LV, I Choi, BA Davis & WF Boron. Cloning of a Na^+-driven Cl-HCO_3 exchanger from squid giant fiber lobe. *Am J Physiol Cell Physiol* 285:C771–C780, 2003. doi:10.1152/ajpcell.00439.2002.

Bouyer P, Y Zhou & WF Boron. An increase in intracellular calcium concentration that is induced by basolateral CO_2 in rabbit renal proximal tubule. *Am J Physiol Renal Physiol* 285:F674–F687, 2003. doi:10.1152/ajprenal.00107.2003.

Xue J, RM Douglas, D Zhou, JY Lim, WF Boron & GG Haddad. Expression of Na^+/H^+ and HCO_3^--dependent transporters in NHE1 null mutant mouse brain. *Neuroscience* 122:37–46, 2003. doi:10.1016/S0306-4522(03)00598-0.

Bouyer P, SR Bradley, J Zhao, W Wang, GB Richerson & WF Boron. Effect of extracellular acid-base disturbances on the intracellular pH of neurons cultured from rat medullary raphe or hippocampus. *J Physiol* 559:85–101, 2004. doi:10.1113/jphysiol.2004.067793. PMCID: PMC1665070.

Zhou Y, J Zhao, P Bouyer & WF Boron. Evidence from renal proximal tubules that HCO_3^- and solute reabsorption are acutely regulated not by pH but by basolateral HCO_3^- and CO_2. *Proc Natl Acad Sci USA* 102:3875–3880, 2005. doi:10.1073/pnas.0500423102. PMCID: PMC553318.

Bouzinova E, J Praetorius, LV Virkki, S Nielsen, WF Boron & C Aalkjaer. The Na^+ dependent HCO_3^- uptake into the rat choroid plexus epithelium is partially DIDS-sensitive. *Am J Physiol Cell Physiol* 289:C1448–C1456, 2005. doi:10.1152/ajpcell.00313.2005.

Zhou Y, P Bouyer & WF Boron. Effect of angiotensin II on the CO_2 dependence of HCO_3^- reabsorption by the rabbit S2 renal proximal tubule. *Am J Physiol Renal Physiol* 290:F666–F673, 2006. doi:10.1152/ajprenal.00287.2005.

Zhou Y, P Bouyer & WF Boron. Role of a tyrosine kinase on the CO_2-induced stimulation of HCO_3^- reabsorption by rabbit S2 renal proximal tubule. *Am J Physiol: Renal Physiol* 291: F358–367, 2006. doi:10.1152/ajprenal.00520.2005.

Gill HS & WF Boron. Expression and purification of the cytoplasmic N-terminal domain of the Na/HCO_3 cotransporter NBCe1: Structural insights from a generalized approach. *Protein Expr Purif* 49:228–234, 2006. doi:10.1016/j.pep.2006.04.001.

Gill HS & WF Boron. Preliminary X-ray diffraction analysis of the cytoplasmic N-terminal domain of the Na/HCO_3 cotransporter NBCe1-A *Acta Crystallograph Sect F: Struct Biol and Cryst Commun* 62:534–537, 2006. doi:10.1107/S1744309106015181. PMCID: PMC2243095.

Lu J, CM Daly, MD Parker, HS Gill & WF Boron. Carbonic anhydrase II does not enhance the activity of the electrogenic Na/HCO_3 cotransporter NBCe1-A. *J Biol Chem* 281: 19241–19250, 2006. doi:10.1074/jbc.M602181200.

Toye AM, MD Parker, CM Daly, J Lu; LV Virkki, M Pelletier & WF Boron. The Human NBCe1-A mutant R881C, associated with proximal renal tubular acidosis, retains function but is mistargeted in polarized renal epithelia. *Am J Physiol Cell Physiol* 291: 788–801, 2006. doi:10.1152/ajpcell.00094.2006.

Endeward V, R Musa-Aziz, GJ Cooper, LM Chen, MF Pelletier, LV Virkki, CT Supuran, LS King, WF Boron & G Gros. Evidence that Aquaporin 1 is the major pathway for CO_2 transport in the human erythrocyte membrane. *FASEB J* 20:1974–1981, 2006. doi:10.1096/fj.04-3300com.

Choi I, H Soo Yang & WF Boron. The electrogenicity of the rat sodium-bicarbonate cotransporter NBCe1 requires interactions among transmembrane segments of the transporter. *J Physiol* 578:131–142, 2007. doi:10.1113/jphysiol.2006.114959. PMCID: PMC2075136.

Bouyer P, H Sakai, T Itokawa, CM Fulton, WF Boron & KL Insogna. Colony-stimulating factor-1 increases osteoclast intracellular pH and promotes survival via the electroneutral Na/HCO_3 cotransporter NBCn1. *Endocrinology* 148:831–840, 2007. doi:10.1210/en.2006-0547.

Piermarini P, EY Kim & WF Boron. Evidence against a direct interaction between intracellular carbonic anhydrase II and pure C-terminal domains of SLC4 bicarbonate transporters. *J Biol Chem* 282:1409–1421, 2007. doi:10.1074/jbc.M608261200.

Wang Y, J Cohen, WF Boron, K Schulten & E Tajkhorshid. Exploring gas permeability of cellular membranes and membrane channels with molecular dynamics. *J Structural Biol* 157:534–544, 2007. doi:10.1016/j.jsb.2006.11.008.

Lu J & WF Boron. Reversible and irreversible interactions of DIDS with the human electrogenic Na/HCO_3 cotransporter NBCe1-A: Role of lysines in the KKMIK motif of TM5. *Am J Physiol Cell Physiol* 292:1787–1798, 2007. doi:10.1152/ajpcell.00267.2006.

Piermarini P, I Choi & WF Boron. Cloning and characterization of an electrogenic Na/HCO_3 cotransporter from the squid giant fiber lobe. *Am J Physiol Cell Physiol* 292:2032–2045, 2007. doi:10.1152/ajpcell.00544.2006.

Parker MD, MT Young, CM Daly, RW Meech, WF Boron & MJ Tanner. A conductive pathway generated from fragments of the human red cell anion exchanger, AE1. *J Physiol* 581:33–50, 2007. doi:10.1113/jphysiol.2007.128389v1. PMCID: PMC2075216.

Zhou Y, P Bouyer & WF Boron. Role of the AT_{1A} receptor in the CO_2-induced stimulation of HCO_3^- reabsorption by renal proximal tubules. *Am J Physiol Renal Physiol* 293:F110–120, 2007. doi:10.1152/ajprenal.00516.2006.

Kanaan A, RM Douglas, SL Alper, WF Boron & GG Haddad. Effect of chronic elevated carbon dioxide on the expression of acid-base transporters in the neonatal and adult mouse. *Am J Physiol Regul Integr Comp Physiol* 293:1294–1302, 2007. doi.org/10.1152/ajpregu.00261.2007.

Chen LM, I Choi, GG Haddad & WF Boron. Chronic continuous hypoxia decreases the expression of SLC4A7 (NBCn1) and SLC4A10 (NCBE) in mouse brain. *Am J Physiol: Regul Integr Comp Physiol* 293:2412–420, 2007. doi.org/10.1152/ajpregu.00497.2007.

Zhou Y & WF Boron. Role of endogenously secreted angiotensin II in the CO_2-induced stimulation of HCO_3 reabsorption by renal proximal tubules. *Am J Physiol Renal Physiol* 294:245–252, 2008. doi.org/10.1152/ajprenal.00168.2007.

Chen LM, ML Kelly, JD Rojas, MD Parker, HS Gill, BA Davis & WF Boron. Use of a new polyclonal antibody to study the distribution and glycosylation of the sodium-coupled bicarbonate transporter NCBE in rodent brain. *Neuroscience* 151:374–385, 2008. doi.org/10.1016/j.neuroscience.2007.10.015. PMCID: PMC2905792.

Bevensee MO & WF Boron. Effects of acute hypoxia on intracellular-pH regulation in astrocytes cultured from rat hippocampus. *Brain Res* 1193:143–152, 2008. doi:10.1016/j.brainres.2007. PMCID: PMC2483307.

Chen LM, ML Kelly, MD Parker, P Bouyer, HS Gill, JM Felie, BA Davis & WF Boron. Expression and localization of Na-driven Cl-HCO_3^- exchanger (SLC4A8) NDCBE in rodent CNS. *Neuroscience* 153:162–174, 2008. doi:10.1016/j.neuroscience.2008.02.018. PMCID: PMC2905791.

Parker MD, R Musa-Aziz, JD Rojas, I Choi, CM Daly & WF Boron. Characterization of human SLC4A10 as an electroneutral Na/HCO_3 cotransporter (NBCn2) with Cl^- self-exchange activity. *J Biol Chem* 283:12777–12788, 2008. doi:10.1074/jbc.M707829200. PMCID: PMC2442331.

Davis BA, EM Hogan, JM Russell & WF Boron. ATP dependence of Na^+-driven Cl-HCO_3 exchange in squid axons. *J Membr Biol* 222:107–113, 2008. doi:10.1007/s00232-008-9100-1. PMCID: PMC2905805.

Majumdar D, AB Maunsbach, JJ Shacka, JB Williams, UV Berger, KP Schultz, LE Harkins, WF Boron, KA Roth & MO Bevensee. Localization of electrogenic Na/bicarbonate cotransporters NBCe1 variants in rat brain. *Neuroscience* 155:313–832, 2008. doi:10.1016/j.neuroscience.2008.05.037. PMCID: PMC2711903.

Parker MD, P Bouyer, CM Daly & WF Boron. Cloning and characterization of novel human *SLC4A8* gene products encoding Na^+-driven Cl-HCO_3 exchanger variants NDCBE-A, -C and -D. *Physiol Genomics* 34:265–276, 2008. doi:10.1152/physiolgenomics.90259.2008. PMCID: PMC2519961.

Chen LM, GG Haddad & WF Boron. Effects of chronic continuous hypoxia on the expression of SLC4A8 (NDCBE) in neonatal versus adult mouse brain. *Brain Res* 1238:85–92, 2008. doi:10.1016/j.brainres.2008.08.033. PMCID: PMC3222586.

Musa-Aziz R, LM Chen, MF Pelletier & WF Boron. Relative CO_2/NH_3 selectivities of AQP1, AQP4, AQP5, AmtB, and RhAG. *Proc Natl Acad Sci* 106:5406–5411, 2009. doi:1.1073/pnas.0813231106. PMCID: PMC2664022

Musa-Aziz R, L Jiang, LM Chen, KL Behar & WF Boron. Concentration-dependent effects on intracellular and surface pH of exposing *Xenopus* oocytes to solutions containing NH_3/NH_4^+. *J Membr Biol* 228:15–31, 2009. doi:10.1007/s00232-009-9155-7. PMCID: PMC2929962.

Sussman CR, J Zhao, C Plata, J Lu, C Daly, N Angle, J DiPiero, IA Drummond, JO Liang WF Boron, MF Romero & M-H Chang. Cloning, localization and function expression of the electrogenic Na^+ bicarbonate cotransporter (NBCe1) from zebrafish. *Am J Physiol Cell Physiol* 297:865–875, 2009. doi:10.1152.ajpcell.00679.2008. PMCID: PMC2770747.

Yu H, B Riederer, N Stieger, WF Boron, GE Shull, MP Manns, UE Seidler & O Bachmann. Secretagogue stimulation enhances NBCe1 (electrogenic Na^+/ HCO_3^- cotransporter surface expression in murine colonic crypts. *Am J Physiol Gastrointest Liver Physiol* 297:C865–C875, 2009. doi:10.1152/ajpgi.00157.2009. PMCID: PMC3774290.

Liu Y, K Xu, LM Chen, X Sun, MD Parker, ML Kelly, JC LaManna & WF Boron. Distribution of NBCn2 (SLC4A10) splice variants in mouse brain. *Neuroscience* 169:951–964, 2010. doi:10.1016/j.neuroscience.2010.06.005. PMCID: PMC2914179.

Chen LM, J Zhao, R Musa-Aziz, MF Pelletier, I Drummond & WF Boron. Cloning and characterization of a zebrafish cDNA homologue of human AQP1: A bifunctional water and gas channel. *Am J Physiol Regul Integr Comp Physiol* 299:R1163–1174, 2010. doi:10.1152/ajpregu.00319.2010. PMCID: PMC2980453.

Chen LM, Y Liu & WF Boron. Role of an extracellular loop in determining the stoichiometry of Na/HCO_3 cotransporters. *J Physiol* 589:877–890, 2011. doi:10.1113/jphysiol.2010.198713. PMCID: PMC3060367.

Liu Y, J-Y Xu, D-K Wang, WF Boron & L-M Chen. Expression of NBCn2 (Slc4a10) splice variants in mouse brain: cloning of novel variant NBCn2-D. *Brain Res* 1390:33–40, 2011. doi:20.1016/j.brainres.2011.03.046. PMCID: PMC3201888.

Lee SK, WF Boron & MD Parker. Relief of autoinhibition of the electrogenic Na/HCO_3 cotransporter NBCe1-B: Role of IRBIT versus amino-terminal truncation. *Am J Physiol Cell Physiol* 302:C518–526, 2012. doi:10.1152/ajpcell.00352.2011. PMCID: PMC3287159.

Parker MD, X Qin, RC Williamson, AM Toye & WF Boron. HCO_3^--independent conductance with a mutant Na/HCO_3 cotransporter (SLC4A4) in a case of proximal renal tubular acidosis with hypokalemic paralysis. *J Physiol* 590:2009–2034, 2012. doi: 10.1113/jphysiol.2011.224733. PMCID: PMC3573318.

Chen LM, X Qin, FJ Moss, Y Liu & WF Boron. Effect of simultaneously replacing of putative TM6 and TM12 of NBCe1-A with those of NBCn1-A on surface abundance in *Xenopus* oocytes. *J Membr Biol* 245:131–140, 2012. doi:10.1007/s00232-012-9421-y. PMCID: PMC4636127.

Somersalo E, R Occhipinti, WF Boron & D Calvetti. A reaction-diffusion model of CO_2 influx into an oocyte. *J Theor Biol* 309:185–203, 2012. doi: 10.1016/j.jtbi.2012.06.016. PMCID: PMC3471386.

Xu K, SR Bhupanapadu Sunkesula, P Huang, CP Tsipis, T Radford, G Babcock, WF Boron & JC LaManna. Early life hypoxic or hypoxic/hypercapnic stress alters acute ventilator sensitivity in adult mice. *Adv Exp Med Biol* 765:351–355, 2013. doi: 10.1007/978-1-4614-4989-8_49.

Lee SK, WF Boron & MD Parker. Substrate specificity of the electrogenic sodium/bicarbonate cotransporter NBCe1-A (SLC4A4, variant A) from humans and rabbits. *Am J Physiol Renal Physiol* 304:F883–F899, 2013. doi: 10.1152/ajprenal.00612.2012. PMCID: PMC3625843.

Danielsen AA, MD Parker, S Lee, WF Boron, C Aalkjaer & Ebbe Boedtkjer. Splice cassette II of NBCn1 (*slc4a7*) interacts with calcineurin A: implications for transporter activity and intracellular pH control during rat artery contractions. *J Biol Chem* 288: 8146–8155, 2013. doi: 10.1074/jbc.M113.455386. PMCID: PMC3605633.

Coley AA, VA Ruffin, F Moss, U Hopfer & WF Boron. Immunocytochemical identification of electroneutral Na^+-coupled HCO_3^- transporters in freshly dissociated mouse medullary raphé neurons. *Neuroscience* 246:451–467, 2013. doi: 10.1016/j.neuroscience.2013.02.064. PMCID: PMC3769942.

Geyer RR, R Musa-Aziz, X Qin & WF Boron. Relative CO_2/NH_3 selectivities of aquaporins 0-9. *Am J Physiol Cell Physiol* 304:C985–C994, 2013. doi: 10.1152/ajpcell.00033.2013.

Geyer RR, R Musa-Aziz, G Enkavi, P Mahinthichaichan, E Tajkhorshid & WF Boron. Movement of NH_3 through the human urea transporter B (UT-B): a new gas channel. *Am J Physiol Renal Physiol* 304:F1447–F1457, 2013. doi: 10.1152/ajprenal.00609.2012. PMCID: PMC3680674.

Gill HS, L Dutcher, WF Boron, S Patel & LM Guay-Woodford. X-ray diffraction studies on merohedrally twinned Δ1-62NtNBCe1-A crystals of the sodium/bicarbonate cotransporter. *Acta Crystallogr Sect F Struct Biol Cryst Commun* 69:796–799, 2013. doi: 10.1107/S1744309113016710. PMCID: PMC3702328.

Qin X & WF Boron. Mutation of a single amino acid converts the human water channel aquaporin 5 into an anion channel. *Am J Physiol Cell Physiol* 305:C663–C672, 2013. doi: 10.1152/ajpcell.00129.2013.

Liu Y, X Qin, DK Wang, YM Guo, HS Gill, N Morris, MD Parker, LM Chen & WF Boron. Effects of optional structural elements, including two alternative amino termini and a new splicing cassette IV, on the function of the sodium-bicarbonate cotransporter NBCn1 (SLC4A7). *J Physiol* 591:4983–5004, 2013. doi: 10.1113/jphysiol.2013.258673. PMCID: PMC3810804.

Geyer RR, MD Parker, AM Toye, WF Boron & R Musa-Aziz. Relative CO_2/NH_3 permeabilities of human RhAG, RhBG, and RhCG. *J Membr Biol* 246:915–926, 2013. doi: 10.1007/s00232-013-9593-0.

Skelton LA & WF Boron & R Musa-Aziz. Effect of acute acid-base disturbances on ErbB1/2 tyrosine phosphorylation in rabbit renal proximal tubules. *Am J Physiol Renal Physiol* 305:F1747–F1764, 2013. doi: 10.1152/ajprenal.00307.2013. PMCID: PMC3882443.

Musa-Aziz R, R Occhipinti & WF Boron. Evidence from simultaneous intracellular- and surface-pH transients that carbonic anhydrase II enhances CO_2 fluxes across *Xenopus* oocyte plasma membranes.

Am J Physiol Cell Physiol 307:C791–C813, 2014. doi:10.1152/ajpcell.00051.2014. PMCID: PMC4216939.

Musa-Aziz R, R Occhipinti & WF Boron. Evidence from simultaneous intracellular- and surface-pH transients that carbonic anhydrase IV enhances CO_2 fluxes across *Xenopus* oocytes plasma membranes. *Am J Physiol Cell Physiol* 307: C814–C840, 2014. doi: 10.1152/ajpcell.00050.2014. PMCID: PMC4216941.

Occhipinti R, R Musa-Aziz & WF Boron. Evidence from mathematical modeling that carbonic anhydrase II and IV enhance CO_2 fluxes across *Xenopus* oocytes plasma membranes. *Am J Physiol Cell Physiol* 307: C841–C858, 2014. doi: 10.1152/ajpcell.00049.2014. PMCID: PMC4216938.

Jalali R, J Guo, B Zandieh-Doulabi B, TJ Bervoets, ML Paine, WF Boron, MD Parker, MJ Bijvelds, JF Medina, PK DenBesten & AL Bronckers. NBCe1 (SLC4A4) a potential pH regulator in enamel organ cells during enamel development in the mouse. *Cell Tissue Res* 358:433–442, 2014. doi: 10.1007/s00441-014-1935-4.

Salameh AI, VA Ruffin & WF Boron. Effects of metabolic acidosis on intracellular pH responses in multiple cell types. *Am J Physiol Regul Integr Comp Physiol* 307:R1413–R1427, 2014. doi:10.1152/ajpregu.00154.2014. PMCID: PMC4269672.

Skelton LA & WF Boron. Effect of acute acid-base disturbances on the phosphorylation of phospholipase C-γ1 and Erk1/2 in the renal proximal tubule. *Physiol Rep* 3:e12280, 2015. doi: 10.14814/phy2.12280. PMCID: PMC4587455.

Hu H, WJ Rappel, R Occhipinti, A Ries, M Böhmer, L You, C Xiao, CB Engineer, WF Boron & JI Schroeder. Distinct cellular locations of carbonic anhydrases mediate CO_2 control of stomatal movements. *Plant Physiol* 169:1168–1178, 2015. doi: 10.1104/pp.15.00646. PMCID: PMC4587455.

Wang, C, H Honghong, X Danyun, X Qin, WF Boron & J Schroeder. Reconstitution of CO_2 regulation of SLAC1 anion channel and identification of the CO_2-permeable PIP2;1 aquaporin as carbonic anhydrase 4 interactor. *Plant Cell*, 28(2):568-82, 2016. doi: 10.1105/tpc.15.00637 PMCID: PMC4790870.

Boedtkjer E, KB Hansen, DMB Boedtkjer, C Aalkjaer & WF Boron. Extracellular HCO_3^- is sensed by mouse cerebral arteries: Regulation of tone by receptor protein tyrosine phosphatase γ. *J Cereb Blood Flow Metab*, 36: 965-980, 2016. doi: 10.1177/0271678X15610787. PMCID: PMC4853837.

Zhou Y, LA Skelton, L Xu, PM Chandler, JM Berthiaume & WF Boron. Role of receptor protein tyrosine phosphatase γ in sensing extracellular CO_2 and HCO_3^-. *J Am Soc Nephrol*, 2016. doi: 10.1681/ASN.2015040439. *(Epub ahead of print).*

Salameh A, Hübner CA, WF Boron. Role of Cl-HCO_3 exchanger AE3 in intracellular-ph homeostasis in cultured murine hippocampal neurons, and in crosstalk to adjacent astrocytes. *J Physiol*, 2016. doi: 10.1113/JP272470. *(Epub ahead of print).*

Reviews and Chapters

Boron WF. Active control of intracellular pH. *Respir Physiol* 33:59–62, 1978.

Boron WF. Intracellular pH regulation. In: *Current Topics in Membranes and Transport*, EL Boulpaep, ed. NY: Academic Press. 13:3–22, 1980.

Roos A & WF Boron. The buffer value of weak acids and bases: origin of the concept, and first mathematical derivation and application to physico-chemical systems. The work of M. Koppel and K. Spiro (1914). *Respir Physiol* 40:1–32, 1980.

Roos A & WF Boron. Intracellular pH. *Physiol Rev* 61:296–434, 1981.

Roos A & WF Boron. Intracellular pH regulation in barnacle muscle. In: *Intracellular pH*. R Nuccitelli & D Deamer, eds. NY: Liss. pp. 205–219, 1982.

Russell JM & WF Boron. Intracellular pH regulation in squid giant axons. *Intracellular pH*. R Nuccitelli & D Deamer, eds. NY: Liss. pp. 221–237, 1982.

Boron WF & EL Boulpaep. Hydrogen and bicarbonate transport by salamander proximal tubule cells. In: *Intracellular pH*. R Nuccitelli & D Deamer, eds. NY: Liss. pp. 253–267, 1982.

Boron WF. Cell pH regulation and acidification mechanisms in the proximal nephron. *Sem Nephrol* 2:336–342, 1982.

Boron WF. Transport of H^+ and of ionic weak acids and bases. *J Membr Biol* 72:1–16, 1983.

Boron WF & H Sackin. Measurement of intracellular ionic composition and activities in renal tubules. *Ann Rev Physiol* 45:483–496, 1983.

Boron WF. Intracellular pH of squid giant axons. In: *The Squid Axon*. PF Baker, ed. NY: Academic Press. pp. 249–269, 1984.

Boron WF. Intracellular pH regulation of renal-epithelial cells. In: *Circulation, Respiration, and Metabolism. Current Comparative Approaches.* R Gilles, ed. Berlin: Springer-Verlag. pp. 424–436, 1985.

Boron WF. Control of intracellular pH. In: *The Kidney. Physiology and Pathophysiology*. DW Seldin & G Giebisch. NY: Raven Press. pp. 1417–1439, 1986.

Boron WF. pH regulation in cells. In: *Physiology of Membrane Disorders*. T Andreoli, J Hoffman, D Fanestil & S Schultz, eds. NY: Plenum. pp. 423–435, 1986.

Boron WF. Intracellular pH regulation in epithelial cells. *Ann Rev Physiol* 48:377–388, 1986.

Boron WF. Approaches for studying intracellular pH regulation in mammalian renal cells. In: *Na^+-H^+ Exchange, Intracellular pH, and Cell Function*. PS Aronson & WF Boron, eds. NY: Academic Press. pp. 15–33, 1986.

Boron WF. Control of Intracellular pH. In: *Contemporary Issues of Nephrology*. JH Stein & BM Brenner, eds. NY: Churchill Livingstone. pp. 45–66, 1987.

Boron WF & NL Nakhoul. Intracellular pH Regulation in the S3 Segment of the Rabbit Proximal Tubule. *Proc Xth Internatl Congr Nephrol* AM Davison, ed. London: Bailliere Tindall. pp. 213–216, 1988.

Boron WF, AW Siebens & NL Nakhoul. Role of monocarboxylate transport in the regulation of intracellular pH of renal proximal-tubule cells. In: *H^+ Transport*. G Bock & J Marsh. Chichester, UK: Wiley. pp. 91–99, 1988.

Nakhoul NL & WF Boron. Physiological role of Na-H exchange in epithelial cells. In: *Na^+/H^+ Exchange*. S Grinstein, ed. Boca Raton, FL: CRC Press. pp. 167–178, 1988

Boron WF. Chemistry of buffer equilibria in blood plasma. In: *The Regulation of Acid-Base Balance* (DW Seldin & G Giebisch, eds) NY: Raven Press. pp. 3–32, 1989.

Boron WF. Cellular buffering and intracellular pH. In: *The Regulation of Acid-Base Balance* (DW Seldin & G Giebisch, eds) NY: Raven Press. pp. 33–56, 1989.

Boron WF & EL Boulpaep. The electrogenic Na/HCO_3 cotransporter. *Kidney Int* 36:392–402, 1989. doi:10.1038/ki.1989.208.

Boron WF, G Boyarsky & M Ganz. Intracellular pH regulation in renal mesangial cells. *NY Acad Sci* 574:321–332, 1989.

Boron WF. Optical approaches for studying intracellular pH in epithelial cells. *Nephrology* 2:1418–1428, 1991.

Chen LK & WF Boron. Intracellular pH regulation in epithelial cells. *Kidney Int* 40 (Suppl 33):S11–S17, 1991.

Boron WF. Control of intracellular pH. In: *The Kidney, Physiology and Pathophysiology, 2nd ed.* DW Seldin & G Giebisch, eds. NY: Raven. pp. 219–263, 1992.

Boron WF, EM Hogan & BA Davis. Involvement of a G protein in the shrinkage-induced activation of Na-H exchange in barnacle muscle fibers. In: *Cellular and Molecular Physiology of Cell Volume Regulation*. K Strange, ed. Boca Raton, FL: CRC Press. pp. 299–310, 1993.

Boron WF, SJ Waisbren, IM Modlin & JP Geibel. Unique permeability barrier of the apical surface of parietal and chief cells in isolated perfused gastric glands. *J Exp Biol* 196:347–360, 1995. PMID: 7823033.

Bevensee MO & WF Boron. Manipulation and regulation of cytosolic pH. In: *Methods in Neuroscience* Measurement and manipulation of intracellular ions. J Kraicer and SJ Dixon, eds. Academic Press, Inc. 27:252–273, 1995.

Boron WF, MA Hediger, EL Boulpaep & MF Romero. The Renal Electrogenic Na^+/HCO_3^- Cotransporter. *J Exp Biol* 200**:**263–268, 1997.

Boron WF, P. Fong, MA Hediger, EL Boulpaep & MF Romero. The electrogenic Na/HCO_3 cotransporter. *Wien Klin Wochenschr* 109/12–13**:** 445–456, 1997.

Bevensee MO & WF Boron. Fluorescence indicators. In: *pH and Brain Function.* K. Kaila and BR Ransom, eds. New York: Wiley & Sons. pp. 129–151, 1998.

Bevensee MO & WF Boron. Thermodynamics and physiology of cellular pH regulation. In: *pH and Brain Function.* K Kaila and BR Ransom, eds. New York: Wiley & Sons. pp. 173–194, 1998. ISBN: 0-471-11838-9.

Bevensee MO & WF Boron. pH regulation in mammalian neurons. In: *pH and Brain Function.* K. Kaila and BR Ransom, eds. New York: Wiley & Sons. pp. 211–231, 1998. ISBN: 0-471-11838-9.

Romero MF & WF Boron. Electrogenic Na^+/HCO_3^- cotransporters: Cloning and physiology. *Annu Rev Physiol* 61:699–723, 1999. PMID: 10099707.

Bevensee MO, SL Alper, PS Aronson & WF Boron. Control of intracellular pH. In: *The Kidney, Physiology and Pathophysiology, 3rd ed.* DW Seldin & G Giebisch, eds. NY: Raven. pp. 391–442, 2000.

Cooper GJ, R Dixit, J Nasrallah & WF Boron. The permeability of MIPs to gases. In: *Molecular Biology and Physiology of Walter and Solute Transport*. S Hohmann & S. Nielsen, eds. NY: Kluwer Academic/Plenum Publishers. pp. 275–282, 2000.

Cooper GJ, Y Zhou, P Bouyer, II Grichtchenko & WF Boron. Transport of volatile solutes through AQP1. *J Physiol* 542:17–29, 2002. doi:10.1113/jphysiol.2002.023218. PMCID: PMC2290406.

Boulpaep EL & WF Boron. Foundations of physiology. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. Philadelphia: Saunders. pp. 50–86, 2003.

Aronson PS, WF Boron & EL Boulpaep. Physiology of membranes. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. Philadelphia: Saunders. pp. 50–86, 2003.

Boron WF. Organization of the respiratory system. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. Philadelphia: Saunders. pp. 593–605, 2003.

Boron WF. Mechanics of respiration. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. Philadelphia: Saunders. pp. 606–632, 2003.

Boron WF. Acid-base physiology. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. Philadelphia: Saunders. pp. 633–653, 2003.

Boron WF. Transport of oxygen and carbon dioxide in the blood. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. Philadelphia: Saunders. pp. 654–668, 2003.

Boron WF. Gas exchange in the lungs. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. Philadelphia: Saunders. pp. 669–685, 2003.

Boron WF. Ventilation and perfusion of the lungs. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. Philadelphia: Saunders. pp. 686–711, 2003.

Richerson GB & WF Boron. Control of ventilation. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. Philadelphia: Saunders. pp. 712–734, 2003.

Romero MF, CM Fulton & WF Boron. The SLC4 family of HCO_3^- transporters. *Pflügers Arch*, 477:495–509, 2004. 10.1007/s00424-003-1180-2

Boron WF. Regulation of intracellular pH. *Adv Physiol Educ* 28:160–170, 2004. doi:10.1152/advan.00045.2004

Boulpaep EL & WF Boron. Foundations of physiology. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. *Updated Edition*. Philadelphia: Saunders. pp. 50–86, 2005.

Aronson PS, WF Boron & EL Boulpaep. Physiology of membranes. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. *Updated Edition*. Philadelphia: Saunders. pp. 50–86, 2005.

Boron WF. Organization of the respiratory system. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. *Updated Edition*. Philadelphia: Saunders. pp. 593–605, 2005.

Boron WF. Mechanics of respiration. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. *Updated Edition*. Philadelphia: Saunders. pp. 606–632, 2005.

Boron WF. Acid-base physiology. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. *Updated Edition*. Philadelphia: Saunders. pp. 633–653, 2005.

Boron WF. Transport of oxygen and carbon dioxide in the blood. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. *Updated Edition*. Philadelphia: Saunders. pp. 654–668, 2005.

Boron WF. Gas exchange in the lungs. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. *Updated Edition*. Philadelphia: Saunders. pp. 669–685, 2005.

Boron WF. Ventilation and perfusion of the lungs. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. *Updated Edition*. Philadelphia: Saunders. pp. 686–711, 2005.

Richerson GB & WF Boron. Control of ventilation. In: *Medical Physiology. A Cellular and Molecular Approach.* WF Boron & EL Boulpaep, eds. *Updated Edition*. Philadelphia: Saunders. pp. 712–734, 2005.

Boron WF. Acid-base transport by the renal proximal tubule (Homer W. Smith Award Lecture). *J Am Soc Nephrol* 17: 2368–2382, 2006. doi:10.1681/ASN.2006060620.

Bevensee MO & WF Boron. Control of intracellular pH. In: *The Kidney*, edited by RJ Alpern and SC Hebert. Burlington, MA: Academic press, pp. 1429–1480, 2007.

Parker MD & WF Boron. Sodium-coupled bicarbonate transporters. In: *The Kidney*, edited by RJ Alpern and SC Hebert. Burlington, MA: Academic Press, pp. 1481–1497, 2007.

Boulpaep EL & WF Boron. Foundations of physiology. In: *Medical Physiology. A Cellular and Molecular Approach, 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 3–6, 2009.

Aronson PS, WF Boron & EL Boulpaep. Transport of solutes and water. In: *Medical Physiology. A Cellular and Molecular Approach, 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 106–46, 2009.

Boron WF. Organization of the respiratory system. In: *Medical Physiology. A Cellular and Molecular Approach, 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 613–629, 2009.

Boron WF. Mechanics of respiration. In: *Medical Physiology. A Cellular and Molecular Approach, 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 630–651, 2009.

Boron WF. Acid-base physiology. In: *Medical Physiology. A Cellular and Molecular Approach, 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 652–671, 2009.

Boron WF. Transport of oxygen and carbon dioxide in the blood. In: *Medical Physiology. A Cellular and Molecular Approach, 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 672–684, 2009.

Boron WF. Gas exchange in the lungs. In: *Medical Physiology. A Cellular and Molecular Approach, 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 685–699, 2009.

Boron WF. Ventilation and perfusion of the lungs. In: *Medical Physiology. A Cellular and Molecular Approach, 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 700–724, 2009.

Richerson GB & WF Boron. Control of ventilation. In: *Medical Physiology. A Cellular and Molecular Approach, 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 725–746, 2009.

Boron WF, LM Chen & MD Parker. Modular structure of sodium-coupled bicarbonate transporters. *J Exp Biol* 212:1697–1706, 2009. doi: 10.1242/jeb.028563. PMCID: PMC2683013.

Boron WF. Evaluating the role of carbonic anhydrases in the transport of HCO_3^--related species. *Biochim Biophys Acta* 1804: 410–421, 2010. doi:10.1016/j.bbapap.2009.10.021.

Musa-Aziz R, WF Boron & MD Parker. Using fluorometry and ion-sensitive microelectrodes to study the functional expression of heterologously-expressed ion channels and transporters in Xenopus oocytes. *Methods* 51: 134–145, 2010. doi:10.1016/j.ymeth.2009.12.012. PMCID: PMC2905798.

Boron WF. Sharpey-Schafer Lecture: Gas Channels. *Exp Physiol* 95:1107–1130, 2010. doi:10.1113/expphysiol.2010.055244. PMCID: PMC3003898.

Skelton LA, WF Boron & Y Zhou. Acid-base transport by the renal proximal tubule. *J Nephrol* 23 Suppl 16:S4–S18, 2010. PMID: 21170887.

Boulpaep EL & WF Boron. Foundations of physiology. In: *Medical Physiology. A Cellular and Molecular Approach, Updated 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 3–6, 2012.

Aronson PS, WF Boron & EL Boulpaep. Transport of solutes and water. In: *Medical Physiology. A Cellular and Molecular Approach, Updated 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 106–146, 2012.

Boron WF. Organization of the respiratory system. In: *Medical Physiology. A Cellular and Molecular Approach, Updated 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 613–629, 2012.

Boron WF. Mechanics of respiration. In: *Medical Physiology. A Cellular and Molecular Approach, Updated 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 630–651, 2012.

Boron WF. Acid-base physiology. In: *Medical Physiology. A Cellular and Molecular Approach, Updated 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 652–671, 2012.

Boron WF. Transport of oxygen and carbon dioxide in the blood. In: *Medical Physiology. A Cellular and Molecular Approach, Updated 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 672–684, 2012.

Boron WF. Gas exchange in the lungs. In: *Medical Physiology. A Cellular and Molecular Approach, Updated 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 685–699, 2012.

Boron WF. Ventilation and perfusion of the lungs. In: *Medical Physiology. A Cellular and Molecular Approach, Updated 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 700–724, 2012.

Richerson GB & WF Boron. Control of ventilation. In: *Medical Physiology. A Cellular and Molecular Approach, Updated 2nd Edition.* WF Boron & EL Boulpaep, eds. Philadelphia: Elsevier, pp. 725–746, 2012.

Bevensee MO & WF Boron. Control of intracellular pH. In: *The Kidney*, edited by RJ Alpern, MJ Caplan & OW Moe. Burlington, MA: Academic press, pp. 1773–1835, 2013.

Parker MD & WF Boron. Bicarbonate Physiology and Pathophysiology. In: *McGraw-Hill Yearbook of Science and Technology, 2013 Edition.* New York, NY: McGraw-Hill, pp. 45–49, 2013.

Romero MF, AP Chen, MD Parker & WF Boron. The SLC4 family of bicarbonate (HCO_3^-) transporters. *Molec Aspects Med*, 34: 159-182, 2013. doi: 10.1016/j.mam.2012.10.008.

Parker MD & WF Boron. The divergence, action, and roles of sodium-coupled bicarbonate transporters. *Physiol Rev* 93: 803–959, 2013. doi: 10.1152/physrev.00023.2012.

Lee SK, WF Boron & MD Parker. Monitoring ion movements using ion-selective liquid-membrane microelectrodes. *Sensors* 13: 984–1003, 2013. doi: 10.3390/s130100984.

Ruffin VA, AI Salameh, WF Boron & MD Parker. Intracellular pH regulation by acid-base transporters in mammalian neurons. *Front Physiol* 5:43: 1–11, 2014. doi: 10.3389/fphys.2014.00043.

Occhipinti RO & WF Boron. Mathematical modeling of acid-base physiology. *Progr Biophys Mol Biol.* 117: 43–58, 2015. doi:10.1016/j.pbiomolbio.2015.01.003. *[recommended by F1000]*

Cooper GJ, R Occhipinti & WF Boron. Cross Talk Proposal: Physiological CO_2 exchange can depend on membrane channels. *J Physiology* 593:5025–5028, 2015. doi:10.1113/JP270059.

Cooper GJ, R Occhipinti & WF Boron. Rebuttal from Gordon J. Cooper, Rossana Occhipinti and Walter F. Boron. *J Physiol* 593:5033, 2015. doi:10.1113/JP271239.

Musa-Aziz M, NL Nakhoul, RR Geyer & WF Boron. Gas channels. *Physiology* (invited review, being written).

Edited Books

Aronson PS and WF Boron (eds.). *Na^+-H^+ Exchange, Intracellular pH, and Cell Function. Current Topics in Membranes and Transport*. New York: Academic Press. 315 pp., 1986.

Boron WF & EL Boulpaep (eds.). *Medical Physiology: A Cellular and Molecular Approach.* Philadelphia: Saunders. 1391 pp., 2003.

Boron WF & EL Boulpaep (eds.). *Medical Physiology: A Cellular and Molecular Approach. Updated Edition*. Philadelphia: Saunders. 1391 pp., 2005.

Boron WF & EL Boulpaep (eds). *Medical Physiology. A Cellular and Molecular Approach, 2nd Edition.* Philadelphia: Elsevier. 1337 pp., 2009.

Boron WF & EL Boulpaep (eds). *Medical Physiology. A Cellular and Molecular Approach, Updated 2nd Edition.* Philadelphia: Elsevier. 1337 pp., 2012.

Boron WF & EL Boulpaep (eds). *Medical Physiology. A Cellular and Molecular Approach, 3rd Edition.* Philadelphia: Elsevier. (*in press*).

Letters

Boron WF, A Roos & P De Weer. NH_4Cl and other weak bases in the activation of sea urchin eggs. *Nature* 274:190, 1978. doi:10.1038/274190a0

Boron WF. The 'basic' connection in cell activation. *Nature* 312:312, 1984. doi:10.1038/312312a0

Parker MD, R Musa-Aziz & WF Boron. The use of extracellular, ion-selective microelectrodes to study the function of heterologously expressed transporters in *Xenopus* oocytes. *Am J Physiol Cell Physiol* 296:C1243, 2009. doi: 10.1152/ajpcell.00044.2009.

Boron WF, V Endeward, G Gros, R Musa-Aziz, P Pohl. Intrinsic CO_2 permeability of cell membranes and potential biological relevance of CO_2 channels. *ChemPhysChem* 12:1017–1019, 2011 (authors in alphabetical order). doi: 10.1002/cphc.201100034.

Voipio J, WF Boron, SW Jones, U Hopfer, JA Payne & K Kaila. Comment on "Local impermeant anions establish the neuronal chloride concentration". Science 345:1130, 2014. doi: 10.1126/science.1252978

Vaughan-Jones RJ & WF Boron. Integration of acid-base and electrolyte disorders. New Engl J Med 372:389, 2015. doi: 10.1056/NEJMc1414731.

Editorials

Boron WF. The New *Physiology*. *Physiology* 19:160, 2004. doi: 10.1152/physiol.00023.2004.

Boron WF. The XXXV International Congress of Physiological Sciences. *Physiology* 20:2, 2005. doi: 10.1152/physiol.00023.2004.

Boron WF, Giebisch G. The physiology of the kidney. *Physiology* 20:80, 2005. doi: 10.1152/physiol.00007.2005.

Boron WF. NIH funding of the independent investigator. *Physiology* 21:300–301, 2006. doi: 10.1152/physiol.00030.2006.

Boron WF. The World Community of Physiology…On our third anniversary. *Physiology* 22:230, 2007. doi: 10.1152/physiol.00022.2007.

Boron WF. Physiology and the Olympics … on our fourth anniversary. *Physiology* 23:1882, 2008. doi: 10.1152/physiol.00014.2008.

Boron WF. Managing the business of science. *Physiology* 24:2–3, 2009. doi: 10.1152/physiol.00044.2008.

Boron WF. *Physiology*…On our fifth anniversary. *Physiology* 24:204–205, 2009. doi: 10.1152/physiol.00019.2009.

Boron WF. *Physiology* … wearing multiple hats. *Physiology* 25:2, 2010. doi: 10.1152/physiol.00003.2010

Boron WF. Sustainability in biomedical research. *Physiology* 25:200-202, 2010 doi: 10.1152/physiol.0032.2010.

Noble D, Boron WF. IUPS outreach strategy. Stage 1: outreach to member societies. *Indian J Physiol Pharmacol* 54(4):295-298, 2010. PMID: 21675026.

Boron WF. Babies in biomedical research. *Physiology* 26:2–3, 2011. doi: 10.1152/physiol.00056.2010.

Boron WF. A vision for Physiology—The journal. *Physiology* 26:208–209, 2011. doi:10.1152/physiol.00025.2011.

Noble D, Kurachi Y, Hunter P. Wang X, Gordon M, and Boron WF. Physiology without borders 2. *Physiology* 27:2, 2012. doi: 10.1152/physiol.00045.2011.

Boron WF. A fond farewell … and Good luck to Gary Sieck. *Physiology* 27:114, 2012. doi: 10.1152/physiol.00020.2012.

Noble D, Chan J, Hansen P, Boron W, Wagner P. IUPS and the future of Physiology. *Physiology* 30:2–3, 2015. doi: 10.1152/physiol.00054.2014.

Noble D, Chan J, Hansen P, Boron W, Wagner P. The landscape of Physiology. *Physiology* 31:2–4, 2016. doi: 10.1152/physiol.00052.2015.

Abstracts

Boron WF & P De Weer. Studies on the intracellular pH of squid giant axons. *Biophys J* 15:42a, 1975.

De Weer P & WF Boron. Intracellular pH transients in squid giant axons. *Proc V Internatl Congr Biophys*, Copenhagen:134**,** 1975.

Boron WF & P De Weer. Inhibition of "proton pumping" by CN and DNP, and stimulation by HCO_3^-/CO_2. *Biophys J* 16:156a, 1976.

Roos A & WF Boron. Comparison of DMO and intracellular electrode methods for measuring intracellular pH. *Fed Proc* 35:606, 1976.

Russell JM & WF Boron. Role of chloride transport in regulation of intracellular pH. *XXVII Proc Int Union Physiol Sci* Paris, France: 13:646, 1977.

Boron WF & A Roos. Intracellular pH regulation in giant barnacle muscle. *Biophys J* 21:102, 1978.

Russell JM & WF Boron. Intracellular pH regulation in squid giant axons. *Biol Bull* 157:392, 1979.

Boron WF & EL Boulpaep. Intracellular pH in isolated, perfused proximal tubules of amphibian kidney. *Fed Proc* 39:713, 1980.

Boron WF & EL Boulpaep. Intracellular pH regulation in salamander renal proximal tubule. *Kidney Int* 19:233, 1981.

Sackin H, WF Boron & EL Boulpaep. Intracellular sodium activity in *Ambystoma* renal proximal tubule. *Kidney Int* 19:255, 1981.

Boron WF. Optical measurement of intracellular pH in isolated perfused renal proximal tubules of the salamander. *Fed Proc* 41:1011, 1982.

Boron WF & P Fong. Effects of carbonic anhydrase inhibitors on basolateral HCO_3^- transport in salamander proximal tubules. *Kidney Int* 23:230, 1983.

Chaillet JR & WF Boron. Intracellular pH regulation in rabbit proximal tubules studied with a pH-sensitive dye. *Kidney Int* 25:273, 1984.

Boron WF. Dependence of pH regulation on external Na^+ and HCO_3^- in squid axons. *Biophys J* 45:161a, 1984.

Chaillet JR & WF Boron. Basolateral Na-H exchange in the rabbit cortical tubule. *Fed Proc* 43:1089, 1984.

Chaillet JR, K Amsler & WF Boron. Optical measurements of intracellular pH in single PK_1 cells: evidence for Cl-HCO_3 exchange. *Kidney Int* 27:275, 1985.

Nakhoul NL & WF Boron. Intracellular pH regulation in rabbit proximal straight tubules: basolateral HCO_3^- transport. *Kidney Int* 27:288, 1985.

Siebens AW. & WF Boron. Intracellular alkalinization induced by depolarization in *Ambystoma* proximal tubules. *Kidney Int* 27:288, 1985.

Boron WF & RC Knakal. Intracellular-pH regulation by the squid axon: competition of DNDS, a reversible stilbene derivative, with external Na^+ and HCO_3^-. *Biophys J* 47:490a, 1985.

Boron WF, RC Knakal & WC Summers. Expression of a mammalian Na-H exchanger in barnacle muscle fibers. *Fed Proc* 44:648, 1985.

Nakhoul NL & WF Boron. Intracellular-pH regulation in rabbit proximal straight tubules: dependence on external sodium. *Fed Proc* 44:1898, 1985.

Siebens AW & WF Boron. Effects of lactate and SITS on depolarization-induced alkalinization in isolated perfused *Ambystoma* proximal tubules. *Fed Proc* 44:1898, 1985.

Lopes AG, AW Siebens, G Giebisch & WF Boron. Electrogenic Na/HCO_3 cotransport in isolated perfused *Necturus* proximal tubules. *Kidney Int* 29:371, 1986.

Nakhoul NL & WF Boron. Effect of Na-dependent acetate transport on pH_i in rabbit proximal straight tubules. *Kidney Int* 29:373, 1986.

Siebens AW & WF Boron. Effect of electroneutral luminal and basolateral lactate transport on cell pH (pH_i) in isolated perfused *Ambystoma* proximal tubules. *Kidney Int* 29:376, 1986.

Boron WF & RC Knakal. Dependence of the squid-axon intracellular-pH regulating mechanism on extracellular pH. *Biophys J* 49:550a, 1986.

Siebens AW & WF Boron. Luminal and basolateral transport mechanisms involved in depolarization-induced alkalinization in *Ambystoma* proximal tubules. *Kidney Int* 31:415, 1987.

Nakhoul NL & WF Boron. pH_i regulation in the S3 proximal tubule: a novel HCO_3^--dependent acid-extruder at the basolateral membrane. *Kidney Int* 31:412, 1987.

Boyarsky G, M Ganz, RB Sterzel & WF Boron. Optical study of pH regulation in single cultured glomerular mesangial cells. *Kidney Int* 31:161, 1987.

Geibel J, WF Boron & G Giebisch. Effects of acetate on HCO_3^- transport in S3 segment of the rabbit proximal tubule. *Kidney Int* 31:400, 1987.

Ganz M, G Boyarsky, WF Boron & B Sterzel. Angiotensin II (AII) and arginine vasopressin (AVP) alter intracellular pH (pH_i) of mesangial cells (MCs) *Proc. Xth Int. Congr. Nephrology* 251, 1987.

Nakhoul NL, N Agarwal, CW Slayman & WF Boron. Intracellular pH in single LLC-PK_1 cells: Comparison of parental cells to mutants overexpressing or deficient in Na-H exchange activity. *Kidney Int* 33:405, 1988.

Boyarsky G, BR Ransom, WG Carlini & WF Boron. Intracellular pH regulation in cultured mammalian astrocytes. *Abstr Soc Neurosci* 14: 1057a, 1988.

Nakhoul NL, L Chen & WF Boron. Basolateral Na-independent Cl-HCO_3 exchange in the S3 segment of the rabbit proximal tubule. *Kidney Int* 35:460, 1989.

Boron WF & NL Nakhoul. Basolateral Na/HCO_3 cotransport in the S3 segment of the rabbit proximal tubule. *Kidney Int* 35:451, 1989.

Geibel J, G Giebisch & WF Boron. Na^+-dependent, basolateral acid- base transport in superficial and juxtamedullary rabbit proximal S1, S2 and S3 segments. *Kidney Int* 35: 454, 1989.

Ganz MB, G Boyarsky, RB Sterzel & WF Boron. AVP stimulation of Na-H, Na-dependent and independent Cl-HCO_3 exchange in rat mesangial cells. *Kidney Int* 35:172, 1989.

Boron WF, G Boyarsky, MB Ganz & W-R Schlue. The effect of DIDS on pH regulation of single rat mesangial cells examined in the absence of HCO_3^-. *J Physiol* 418:125P, 1989.

Boyarsky, G, W-R Schlue, B Ransom, EJ Cragoe Jr & WF Boron. Effect of ethylisopropyl amiloride on intracellular pH regulation in cultured rat astrocytes. *Acta Physiol Scand* 135:30, 1989.

Boyarsky G, BR Ransom, W-R Schlue, M Davis & WF Boron. Anomalous stimulation of pH regulation by ethylisopropyl amiloride in cultured mammalian astrocytes. *Abstr Soc Neurosci* 15:15, 1989.

Davis BA, EM Hogan & WF Boron. Intracellular Cl^- dependence of hypertonically activated Na-H exchange activity in barnacle muscle. *Biophys J* 57:594a, 1990.

Boyarsky G, MB Ganz & WF Boron. Intracellular pH dependence of Na-H exchange and acid loading, and the effect of AVP, in mesangial cells examined in the absence of HCO_3. *Kidney Int* 37:191, 1990.

Eisen TD, MJ Caplan & WF Boron. Intracellular pH regulation in MDCK cells. *Kidney Int* 37:535, 1990.

Geibel J, G Giebisch & WF Boron. Angiotensin II stimulates both Na-H exchange and Na/HCO_3 cotransport in rabbit proximal S1 tubules. *Kidney Int* 37:537, 1990.

Kasner SE, WF Boron & MB Ganz. Measurement of intracellular potassium in rat mesangial cells (MCs) with a newly developed fluorescent potassium indicator. *Kidney Int* 37:563, 1990.

Schlue W-R, G Boyarsky & WF Boron. Intracellular pH regulation in hypertonic solutions by single glomerular mesangial cells. *Proceedings of Interaction of Cell Volume and Cell Function. Tyrol, Austria*, 1990.

Davis BA, EM Hogan & WF Boron. Intracellular Cl^- dependence of hypertonically activated Na-H exchange activity in barnacle muscle. *Biophys J* **57**:594a, 1990.

Boyarsky G, MB Ganz & WF Boron. Sensitivity of Na-H exchange to removal of external solutes in rat mesangial cells. *J Am Soc Nephrol* 1:647, 1990.

Chen LK & WF Boron. Stimulation of a Na-independent intracellular alkalinization by CO_2/HCO_3^- in isolated perfused rabbit S3 proximal tubules. *J Am Soc Nephrol* 1:648, 1990.

Boyarsky G, TR Cummins, GG Haddad & WF Boron. Intracellular pH regulation in single mammalian hippocampal CA1 neurons. *Abstr Soc Neurosci* 16:429, 1990.

Boron WF, G Boyarsky, KL Marek & BR Ransom. Intracellular pH regulation in astrocytes in the absence of HCO_3^-. *Abstr Soc Neurosci* 16:971, 1990.

Davis BA, EM Hogan & WF Boron. Role of G proteins in the stimulation of Na-H exchange by hypertonicity. *FASEB J* 5:A670, 1991.

Boron WF & EM Hogan. Recovery of intracellular pH from acute alkali loads in the squid giant axon. *FASEB J* 5:A670, 1991.

Waisbren SJ, JP Geibel, WF Boron & IM Modlin. Intracellular pH regulation in isolated perfused gastric glands monitored with digital processing of fluorescent images. *Gastroenterology* 100:A181, 1991.

Eisen T, Y Su, R Baron & WF Boron. The regulation of intracellular pH in rat osteoclasts studied in the absence of HCO_3^-. *J Bone Miner Res* 6:S96, 1991.

Hogan EM, BA Davis & WF Boron. Shrinkage-induced activation of Na-H exchange in barnacle muscle fibers: non-responding animals *FASEB J* 6:A1763, 1992.

Kaplan D & WF Boron. Effects of long-term expression of c-H-ras on intracellular pH and acid-extrusion mechanisms in NIH 3T3 fibroblasts. *FASEB J* 6:A1639, 1992.

Gupta A, CJ Schwiening & WF Boron. Effects of CGRP, forskolin, PMA and ionomycin on the pH_i dependence of Na-H exchange in UMR-106 cells. *FASEB J* 6:A1744, 1992.

Geibel JG, I Boydstun & WF Boron. Effects of BCECF on intracellular pH regulation in the S3 segment of the rabbit proximal tubule. *FASEB J* 6:A1548, 1992.

Schwiening CJ & WF Boron. Fractional rate of dye-signal decrease as an aid in assessing membrane permeability. *J Physiol* 447:693-709, 1992.

Waisbren SJ, JG Geibel, WF Boron & IM Modlin. Effects of luminal acidity on intracellular pH in isolated perfused gastric glands monitored with digital processing of fluorescent images. *Gastroenterology*, 1992.

Cohen M, EM Hogan, RA Weed, A Davis & WF Boron. Acid-base transport supported by Li^+, Na^+, K^+, Rb^+, and Cs^+ in squid axons at high intracellular pH. *FASEB J*, 7:A812, 1993.

Hogan EM, MF Romero, BA Davis & WF Boron. Shrinkage-induced activation of Na-H exchange in *Xenopus* oocytes *FASEB J*, 7A442, 1993.

Singh SK & WF Boron. Glycylglycine, but not glycine, acid loads enterocytes. *FASEB J*, 7:A860, 1993.

Bevensee MO, RA Weed & WF Boron. HCO_3^- transport in single hippocampal astrocytes from rat. *FASEB J*, 7:A186, 1993.

Siegel W-K, J-H Ravesloot, R Baron & WF Boron. The anion exchanger of neonatal rat osteoclasts. *FASEB J*, 7:A13, 1993.

Romero MF, Y Kanai, MA Hediger & WF Boron. Acid-base transport is coupled to the electrogenic high-affinity glutamate transporter, EAAC1. *Am Soc Nephrol*, 4:26P, 1993.

Ebata S, WF Boron, G Giebisch & J Geibel. Increasing intracellular Ca^{2+} concentration stimulates Na-H exchange in principal cells of the rabbit cortical collecting duct. *Am Soc Nephrol*, 4:26P, 1993.

Chen LK, NL Nakhoul & WF Boron. Role of HCO_3 segment of the rabbit renal proximal tubule. *XXXII Proc Int Union Physiol Sci*, Glasgow, Scotland: 208:32, 1993.

Apkon M & WF Boron. Extracellular alkalinization and intracellular acidification constrict penetrating ceral arterioles. *FASEB J* 8:A1032, 1994.

Apkon M & WF Boron. Differential effects of intra (pH) Cellular pH on cerebral arteriolar tone. *Pediatric Res* 35:48A, 1994.

Romero MF, S Nussberger, Y Kanai, MA Hediger & WF Boron. H^+ Cotransport is coupled the electrogenic oligopeptide transporter, PEPT1. *FASEB J* 8: A561, 1994.

Singh SK, HJ Binder, WF Boron & JP Geibel. Direct quantitation of bicarbonate movement in the isolated, perfused colonic crypt. *Gastroenterology* 106:A271, 1994.

Singh SK, JP Geibel, WF Boron & HJ Binder. Basal fluid absorption and agonist-stimulated secretion in the isolated, perfused colonic crypt. *Gastroenterology* 106**:**A272, 1994.

Romero MF, S. Nuberger, MA Hediger & WF Boron. H^+ Cotransport via the electrogenic oligopeptide transporter PEPT1 is bidirectional and depends on external pH. *Am Soc Nephrol* 5:76P, 1994.

Zhao J & WF Boron. Generating out-of equilibrium CO_2/HCO_3^- solutions. *Am Soc Nephrol* 5:49P, 1994.

Zhao J, EM Hogan, MO Bevensee & WF Boron. Use of out-of-equilibrium CO_2/HCO_3^- solutions for studying a novel K/HCO_3 cotransporter and buffering power in squid axons. *Am Soc Nephrol* 5:49P, 1994.

Romero MF & WF Boron. Expression of kidney Poly(A)-RNA in *Xenopus* oocytes speeds the CO_{2-} induced intracellular acidification. *FASEB J* 9:A564, 1995.

Apkon M, R. Weed & WF Boron. Intrinsic contractile response of rat cerebral vascular smooth muscle cells (VSMCs) to increased pH. *FASEB J* 9:A266, 1995.

Hogan EM, BA Davis & WF Boron. Activation of Na-H exchange in barnacle muscle fibers by intracellular Cl^- under normotonic and hypertonic conditions. *FASEB J* 9:A356, 1995.

Bevensee MO, WF Boron & M Apkon. Electrogenic Na^+/HCO_3^- cotransport in single hippocampal astrocytes from rat. *FASEB J* 9:A308, 1995.

Singh SK, J Geibel, WF Boron & HJ Binder. An apical permeability barrier to HH_3 in isolated perfused colonic crypts. *Gastroenterology* 108**:**A325, 1995.

Zahler R, Jewell E, Lingrel J, Zhang DH, Bang E & Boron WF. Sodium kinetics of alpha 1 and alpha 3 Na, K-ATPase isoforms measured separately in intact transfected cells. *Clinical Research Meeting*, 1995.

Apkon M & Boron WF. Intrinsic motor responses of rat cerebral vascular smooth muscle cells (VSMCs) to increased and decreased pH. *American Pediatric Society*, 1995.

Apkon M, R Weed & WF Boron. Isolated rat cerebral vascular smooth muscle cells relax in response to hypercapnic acidosis. *Critical Care Medicine,* 1995.

Zhao J & WF Boron. Effect of basolateral CO_2 and/or HCO_3^- on intracellular pH of rabbit S3 proximal tubules. *J Am Soc Nephrol* 6:2123, 1995.

Nakhoul NL, MF Romero, BA Davis & WF Boron. Expression of CHIP28 (Aquaporin 1) in *Xenopus* oocytes accelerates the CO_2-induced decrease of intracellular pH (pH_i). *J Am Soc Nephrol* 6:2117, 1995.

Miyata Y, WF Boron & J Geibel. Basolateral CO_2/HCO_3 causes an increase in intracellular calcium in rabbit S3 proximal tubules. *J Am Soc Nephrol* 6:1043, 1995.

Nakhoul NL, MF Romero, A Waheed, BA Davis, R Mullins, G Hageman, WS Sly & WF Boron. Processing and functional expression of carbonic anhydrase isoforms in *Xenopus Laevis* oocytes. *FASEB* 10, 1996.

Romero MF, MA Hediger, EL Boulpaep & WF Boron. Expression cloning of the renal electrogenic Na/HCO_3 cotransporter (NBC-1) from *Ambystoma tigrinum*. *FASEB* 10, 1996.

Nussberger S, A Steel, MF Romero, CAR Boyd, WF Boron & MA Hediger. Proton coupling and charge movement of the proton-dependent oligopeptide transporter PEPT1. *FASEB* 10**,** 1996.

Singh SK, AC Cimini & WF Boron. Permeability properties of apical vs. basolateral barriers of colonic crypt epithelial cells. *The Physiologist* June, 1996.

Singh SK, WF Boron, GM Cavestro & JL Boyer. Distinct apical and basolateral Na-H exchangers in isolated perfused intrahepatic bile duct fragments. *Abstracts of Invited Lectures Int'l Falk Workshop on The Vanishing Bile Duct Syndrome* 1**:**32, 1996.

Romero MF, MA Hediger, EL Boulpaep & WF Boron. Expression cloning of the renal electrogenic Na/HCO_3 cotransporter (NBC) from *Ambystoma tigrinum*. *The Physiologist* June, 1996.

Zhao J, GB Richerson, W Wang & WF Boron. Effect of extracellular pH and CO_2 on intracellular pH of ventromedial medullary neurons. *The Physiologist* June, 1996.

Grishin AV, NN Modyanov, MO Bevensee, WF Boron & MJ Caplan. Functional expression of the cDNA encoded by ATP1AL1, a putative renal HK-ATPase. *J Am Soc Nephrol* 5**:**267, 1994.

Grishin AV, MO Bevensee, M Rajendran, WF Boron & MJ Caplan. ATP1AL1, a putative renal H,K-ATPase, does not mediate 1:1 K/H exchange: Studies of protein expressed in HEK 293 cells. *J Am Soc Nephrol* **7**: 1280, 1996.

Romero MF, MA Hediger, EL Boulpaep & WF Boron. Physiology of the cloned renal electrogenic Na/HCO_3 cotransporter, NBC. *J Gen Physiol* 108:16–17a, 1996.

Romero MF, MA Hediger, EL Boulpaep & WF Boron. Physiology of the cloned *Ambystoma tigrinum* renal electrogenic Na/HCO_3 cotransporter (aNBC): I. Role of HCO_3^-. *J Am Soc Nephrol* 7:1259, 1996.

Romero MF, MA Hediger & WF Boron. Cloning and Functional Expression of the rat renal electrogenic Na/HCO_3 cotransporter (rNBC). *J Am Soc Nephrol* 7:1259, 1996.

Grichtchenko I, MF Romero & WF Boron. Extracellular bicarbonate dependence of aNBC, the electrogenic Na/HCO_3 cotransporter cloned from tiger salamander (*Ambystoma tigrinum*). *J. Am Soc. Nephrol* 7:1255, 1996.

Singh SK, AC Cimini, WF Boron & HJ Binder. Activity Profile of basolateral NaH exchange in perfused crypts from human ascending colon. *Gastroenterology* 110: A360, 1996.

Singh SK, HJ Binder AC Cimini & WF Boron. Unusually low apical permeability to butyric acid in perfused colonic crypts. *Gastroenterology* 110**:**A361, 1996**.**

Singh SK, AC Cimini & WF Boron. Permeability properties of apical vs basolateral barriers of colonic-crypt epithelial cells. *The Physiologist*.39**:**144(A3.16), 1996.

Zhao J, GB Richerson, W Wang & WF Boron. Effect of respiratory acid-base changes on intracellular pH of ventromedial medullary neurons. *APS Conference I Physiology of Acid-Base Regulation: From Molecules to Humans*, 1996.

Zhao J & WF Boron. Basolateral HCO_3^- triggers apical acid extrusion in rabbit superficial S2 proximal tubules. *J Am Soc Nephrol* 7:1265, 1996.

Romero MF, MA Hediger, EL Boulpaep & WF Boron. Physiology of the cloned *Ambystoma tigrinum* renal electrogenic Na/HCO_3 cotransporter (aNBC): II. Localization and Na^+ dependence. *J Am Soc Nephrol* 7**:**1260, 1996.

Romero MF, MA Hediger, P Fong & WF Boron. Expression of the rat renal electrogenic Na/HCO_3 co-transporter (rNBC). *International Society of Nephrology*, 1997.

Singh SK, AC Cimini, WF Boron & HJ Binder. An Apical K^+ extruder controls intracellular pH in polarized colonic surface epithelial cells. *Gastroenterology* 112**:**A405, 1997.

Singh SK, GM Cavestro, A Mennone, WF Boron & JL Boyer. Distinct apical and basolateral Na-H exchangers in isolated perfused intrahepatic bile duct segments. *Gastroenterology* 112**:**A1384, 1997.

Grichtchenko II, MF Romero & WF Boron. External bicarbonate dependence of the cloned rat electrogenic Na/HCO_3 cotransporter (rNBC). *XXXIII International Congress of Physiological Sciences, St. Petersburg*: P020.07, 1997.

Grishin AV, MO Bevensee, V Rajendran, WF Boron & MJ Caplan. The human ATPIAL1 gene encodes A P -TYPE K-ATPASE, but is it an H,K-ATPase. *XXXIII International Congress of Physiological Sciences, St. Petersburg*: P006.15, 1997.

Hogan EM, BA Davis, M Apkon & WF Boron. Effect of shrinkage on pH_i and V_m in *Xenopus* oocytes expressing AQP1. *J Am Soc Nephrol* 8**:**6A, 1997.

Schmitt BM, D Biemesderfer, E Boulpaep, MF Romero & WF Boron. Immunolocalization of the electrogenic Na^+/HCO_3 cotransporter (NBC) in mammalian and amphibian kidney. *J Am Soc Nephrol* 8**:**10A, 1997.

Cooper GJ & WF Boron. The CO_2 permeability of the AQP1 water channel expressed in *Xenopus* oocytes. *J Am Soc Nephrol* 8**:**16A, 1997.

Zhao J, BA Davis, EM Hogan & WF Boron. Intracellular K^+ dependence of K/HCO_3 cotransport in squid giant axons. *J Am Soc Nephrol* 8**:**15A, 1997.

Schmitt BM, D Biemesderfer, S Breton, D Brown, R Caroppo, JP Geibel, M Ikuma, VM Rajendran, EL Boulpaep, MF Romero & WF Boron. Immunolocalization of the electrogenic Na^+:HCO_3^- cotransporter (NBC) in mammalian epithelia. *Pflügers Arch* 435:R59, 1998.

Bevensee MO, BM Schmitt, MF Romero & WF Boron. Cloning of a putative Na/HCO_3 cotransporter (NBC) from rat brain. *FASEB J* 12:A1031, 1998.

Boron WF & GJ Cooper. Effect of DIDS on the CO_2 permeability of the water channel AQP1. *FASEB J* 12:2174, 1998.

Zhao J, Y Zhou, T Wang & WF Boron. Effect of basolateral HCO_3 or CO_2 on HCO_3 re-absorption by the rabbit superficial S2 proximal tubule. *FASEB J* 12: A420, 1998.

Grichtchenko II, MF Romero & WF Boron. Electrogenic Na/HCO_3 cotransporters from rat and salamander kidney have similar external HCO_3 dependencies. *FASEB J* 12:3708, 1998.

Grishin AV, MO Bevensee, WF Boron & MJ Caplan. ATP1AL1, a member of the non-gastric H,K-ATPase family, functions primarily as an Na,K-ATPase. *FASEB J* 12:5896, 1998.

Muller-Berger S, M Heyer, MF Romero, WF Boron & E Frömter. Stoichiometry of rat Na/HCO_3 cotransporter (rkNBC) overexpressed in *Xenopus* laevis oocytes measured using giant patches. *J Am Soc Nephrol* 9:9A, 1998.

Romero MF & WF Boron. Identification and expression of an electroneutral Na/HCO_3 cotransporter from *Caenorhabditis elegans* (ceNBC). *J Am Soc Nephrol* 9:11A, 1998.

Romero MF, CR Sussman, I Choi, MA Hediger & WF Boron. Cloning of an electrogenic Na/HCO_3 cotransporter (NBC) isoform from human kidney and pancreas. *J Am Soc Nephrol* 9:11A, 1998.

Romero MF, BA Davis, CR Sussman, P Bray-Ward & WF Boron. Identification of multiple genes for human electrogenic Na/HCO_3 cotransporters (NBC) on 4q. *J Am Soc Nephrol* 9:11A, 1998.

Cooper GJ & WF Boron. Effect of zinc on the CO_2 permeability of the water channel AQP1. *J Am Soc Nephrol* 9:17A, 1998.

Schmitt BM, MO Bevensee, R Douglas, UV Berger, MA Hediger, GG Haddad & WF Boron. Expression and localization of Na/HCO_3 cotransporter (NBC) mRNA and protein in adult rat brain. *Abstr Soc Neurosci* 24:1066, 1998.

RM Douglas, Y Xia, BM Schmitt, MO Bevensee, D Biemesderfer, WF Boron & GG Haddad. Developmental and stress-induced profile of two CNS pH regulatory proteins: The Na/H exchanger and the Na/HCO_3 cotransporter. *Abstr Soc Neurosci* 24:1605, 1998.

Choi I, C Aalkjaer, A Bril & WF Boron. Cloning of putative sodium bicarbonate cotransporters (NBC) expressed in human heart and rat pulmonary arteries. *FASEB J* 12:A1031, 1998.

Choi I, C Aalkjaer & WF Boron. Molecular evidence for bicarbonate transporters in the cells of rat arteries. *Pflugers Archiv* 435:R73, 1998.

Khandoudi N., XJ Martin, I Choi, B Schmitt, WF Boron & A Bril. Functional characterization and differential expression in cardiomyopathic heart of a novel human cardiac Na^+/HCO_3^- cotransporter. *Circulation* 98:I-680, 1998

Boron WF & GJ Cooper. Gas Channels. *Pflügers Arch* 437:R41, 1999.

Marino C, V Jeanes, WF Boron & BM Schmitt. Expression and distribution of the sodium-bicarbonate cotransporter in human pancreas. *Gastroenterology* 116:A1147, 1999.

Caroppo R, BM Schmitt, WF Boron & J Geibel. Identification of the Na-HCO_3 cotransporter (NBC) in rat gastric surface epithelial cells. *Gastroenterology*, 1999.

Choi I, C Aalkjaer, MF Romero & WF Boron. Cloning and characterization of an electroneutral Na-driven bicarbonate transporter from rat pulmonary arteries. *FASEB J* 13:349.28, 1999.

Cooper GJ & WF Boron. Effect of expressing MIP26 (AQP0) on the membrane permeability of *Xenopus* oocytes to CO_2 and acetic acid. *FASEB J* 13:A393, 1999.

Cooper GJ & WF Boron. Effect of Zn^{2+} on the CO_2 permeability of cysteine mutants of AQP1. *J FASEB* 13: A393, 1999.

Cooper GJ, LV Virkki & WF Boron. Effect of expressing nodulin 26 on the membrane permeability of *Xenopus* oocytes to NH_3/NH_4 and acetic acid. *FASEB J* 13:LB26, 1999.

Cooper GJ & WF Boron. The CO_2 permeability of the MIP family of channels expressed in *Xenopus* oocytes. *FASEB J* 13:A393, 1999.

Grichtchenko II, EM Hogan & WF Boron. Extracellular HCO_3 directly inhibits HCO_3 efflux in *Xenopus* oocytes expressing the electrogenic rat kidney Na/HCO_3 cotransporter (rkNBC). *FASEB J* 13:A65, 1999.

Zhou Y, J Zhao, P Bouyer & WF Boron. Effect of independently varying basolateral [CO_2] and [HCO_3] on HCO_3 reabsorption by rabbit S2 proximal tubule. *FASEB J* 13:A65, 1999.

Maunsbach AB, H Vorum, T-H Kwon, S Nielsen, B Simonsen., BM Schmitt, WF Boron & C Aalkjær. Immunoelectron microscopical localization of the electrogenic Na/HCO_3 cotransporter (NBC) in rat kidney. *J Am Soc Nephrol* 10:122A, 1999.

Hu L, BM Schmitt & WF Boron. Glycosylation analysis of the Na/HCO_3 cotransporter (NBC). *J Am Soc Nephrol* 10:5A, 1999.

Bouyer P, Y Zhou & WF Boron. Basolateral CO_2 increases intracellular calcium in the rabbit S2 renal proximal tubule. *FASEB J* 14:A355, 2000.

Cooper GJ & WF Boron. Effect of db-cGMP on the CO_2 permeability of oocytes expressing AQP1 or AQP5. *FASEB J.* 14:A343, 2000.

Grichtchenko II, I Choi & WF Boron. Cloning, tissue distribution and functional characterization of a new, electroneutral Na/HCO_3 cotransporter cloned from human brain (hbS11) *FASEB J* 14:LB60, 2000.

Virkki LV, GJ Cooper & WF Boron. Cloning and functional expression of MIPfun, a Major Intrinsic Protein homolog from killifish (*Fundulus heteroclitus*) lens. *FASEB J* 14: A344, 2000.

Zhou Y, P Bouyer, LV Virkki, BA Davis & WF Boron: Effect of apical Zn or DIDS on HCO_3 reabsorption by the rabbit S2 proximal tubule. *FASEB J* 14:A355, 2000.

Choi I, EL Boulpaep & WF Boron. Functional characterization of an electroneutral Na/HCO_3 cotransporter (NBCn1). *FASEB J* 14:A356, 2000.

Aalkjaer C, C Fulton, TH Kwon, S Nielsen, I Choi, WF Boron & H Vorum. An electroneutral Na/HCO_3 cotransporter (enNBC) in rat seminiferous tubules. *FASEB J* 14:A356, 2000.

Virkki LV, GJ Cooper & WF Boron. Cloning and functional expression of MIPfun, a Major Intrinsic Protein homolog from killifish (*Fundulus heteroclitus*) lens. *3rd International Conference on Molecular Biology and Physiology of Water and Solute Transport. Gothenburg, Sweden,* July 1–5, 2000.

Bouyer P, SR Bradley, J Zhao, W Wang, WF Boron & GB Richerson. Neurons of the medullary raphe have a uniform pH_i response to CO_2. *Abstr Soc Neurosci* 26:423, 2000.

Bevensee MO & Boron WF. Hypoxia stimulates acid extrusion and acid loading in cultured hippocampal astrocytes. *Abstr Soc Neurosci* 26:2061, 2000.

Khandoudi N, J Albadine, P Robert, I Bertrand, S Krief, MO Bevensee, WF Boron & A Bril. The electrogenic sodium bicarbonate cotransporter, hhNBC, plays a crucial role in ischemic heart diseases. *Circulation* 102:S330, 2000.

Virkki LV, I Choi, BA Davis, P Somieski, C Franke & WF Boron. Molecular cloning of an electroneutral Na^+ and Cl^--dependent HCO_3^- transporter from squid (*Loligo pealei* and *Loligo opalescens*) giant fiber lobe. *FASEB J* 15:A446, 2001.

Zhou Y, J Zhao, P Bouyer & WF Boron. Regulation of bicarbonate reabsorption by rabbit S2 proximal tubule: Evidence for a CO_2-sensor. *FASEB J* 15:A142, 2001.

Choi I, LV Virkki, BA Davis & WF Boron. Molecular identification of Na/HCO_3 cotransporter-related cDNAs from squid (*Loligo opalescens*) giant fiber lobe. *FASEB J* 15:A446, 2001.

Choi I, C. Kobayashi, M. Jacovich & WF Boron. Structure/function analysis of an electroneutral Na/HCO_3 cotransporter (NBCn1). *FASEB J* 15:A446, 2001.

Bouyer P, Y Zhou & WF Boron. Basolateral CO_2 induces intracellular calcium rise in the rabbit S2 renal proximal tubule. *Proc Clin Nephrol* A5, 2001.

Grichtchenko II, I Choi, JM Russell & WF Boron. Na^+-dependent Cl-HCO_3 exchanger: cloning, tissue distribution and characterization. *Proc Clin Nephrol* A9, 2001.

Grichtchenko II, MF Romero & WF Boron. Functional study of cloned renal Na/HCO_3 cotransporters: kinetics of extracellular HCO_3 dependence and interaction with $SO_3^=$. *Proc Clin Nephrol* A9, 2001.

Grichtchenko II, I Choi, X Zhong, P Bray-Ward, JM Russell & WF Boron. Na^+-driven Cl-HCO_3 exchanger cloned from human brain: molecular and functional characterization, tissue distribution

and chromosomal mapping. *XXXIV Proc Int Union Physiol Sci*, Christchurch, New Zealand, A139, 2001.

Virkki LV, C Franke, Somieski P and Boron WF. Cloning and functional expression of a novel AQP from *Xenopus laevis* oocytes. *XXXIV Proc Int Union Physiol Sci*, Christchurch, New Zealand, A945, 2001.

Bouyer P, S Risso-Bradley , J Zhao, RM Fitzsimonds, W Wang, GB Richerson & WF Boron. Intracellular pH (pH_i) response of medullary raphe neurons during extracellular acid-base perturbations. *Abstr Soc Neurosci* A632.6 2001.

Risso-Bradley S, GB Richerson, JD Rojas, P Bouyer & WF Boron. Distribution of Na/HCO_3 cotransporters in rat brain studied using subtype-specific antibodies. *Abstr Soc Neurosci* A527.11, 2001.

Grichtchenko II, S Risso-Bradley, JD Rojas, GB Richerson & WF Boron. Localization of the Na^+-driven Cl-HCO_3 exchanger protein (NDCBE1) in rat brain. *Abstr Soc Neurosci* A527.12, 2001.

Grichtchenko II & WF Boron. Evidence for $CO_3^=$ transport by NBCe1, based on surface-pH measurements in voltage-clamped *Xenopus* oocytes co-expressing NBCe1 and CAIV: evidence for $CO_3^=$ transport. *FASEB J* 16:A795, 2002.

Grichtchenko II & WF Boron. Surface-pH gradient measurements in *Xenopus* oocytes co-expressing the Na^+-driven Cl-HCO_3 exchanger (NDCBE1) and CA IV: evidence for $CO_3^=$ transport. *FASEB J* 16:A797, 2002.

Grichtchenko II & WF Boron. Evidence for CO2 permeability of AQP1, based on surface-pH measurements in *Xenopus* oocytes co-expressing NBCe1, CAII, CAIV and AQP1. *FASEB J* 16:A808, 2002.

Virkki LV, D Wilson, RD Vaughan-Jones & WF Boron. Characterization of "NBC4" as an electrogenic NBC. *FASEB J* 16:A795, 2002.

Choi I, JD Rojas, C Kobayashi & WF Boron. Functional characterization of "NCBE", an electroneutral Na/HCO_3 cotransporter. *FASEB J* 16:A796, 2002.

Davis BA, JD Rojas, LV Virkki, EM Hogan & WF Boron. Functional analysis of point mutations in human electrogenic Na/HCO_3 cotransporters NBCe1-A and -B. *FASEB J* 16:A796, 2002.

Davis BA, I Choi, JD Rojas, LV Virkki & WF Boron. Binding of carbonic anhydrase II (CAII) to C termini of the Na-coupled HCO_3 transporters NBCe1, NBCn1 and NDCBE1. *FASEB J* 16:A796, 2002.

Parker MD, WF Boron & MJA Tanner. Characterization of human 'AE4' as an electroneutral, sodium-dependent bicarbonate transporter. *FASEB J* 16:A796, 2002.

Zhou Y, P Bouyer & WF Boron, High-dose angiotensin II blocks the ability of CO_2 to stimulate HCO_3 reabsorption by the rabbit S2 proximal tubule. *FASEB J* 16: A181 2002.

Bouyer P, Y Zhou, JD Rojas & WF Boron. Acute CO_2 exposure increases tyrosine phosphorylated protein in the rabbit proximal tubule. *J Am Soc Nephrol* 13:475A, 2002.

Lu J, L Virkki, I Choi, EL Boulpaep & WF Boron. The effect of mutations of K559 and K562, within the KMIK motif of TM5, on the DIDS sensitivity of the electrogenic Na/HCO_3 cotransporter from human kidney (hNBCe1-A). *FASEB J* 17:A1221, 2003.

Zhou Y, P Bouyer & WF Boron, CO_2-evoked increased in HCO_3 reabsorption in the rabbit S2 proximal tubule: Blockade by genistein. *FASEB J* 17: A1221, 2003.

Rojas JD, BA Davis, GD Haddad & WF Boron. The effect of chronic hypoxia on aquaporin expression in mice. *FASEB J* 17:A18, 2003.

Zhou Y, P Bouyer & WF Boron. Role of endogenously secreted angiotensin II in the CO_2-induced stimulation of HCO_3 reabsorption by rabbit S2 proximal tubules. *FASEB J* 18:A1016, 2004.

Zhou Y, P Bouyer & WF Boron. Role of a receptor tyrosine kinase in the CO_2-induced stimulation of HCO_3 reabsorption by rabbit S2 proximal tumor. *FASEB J* 18:A1016, 2004.

Lu J & WF Boron. The reversible and irreversible interactions of DIDS with the electrogenic Na/HCO_3 cotransporter (hNBCe1-A): Importance of K558, K559, and K562 within the KKMIK motif of TM5. *FASEB J* 18:A1017, 2004.

Messier ML, P Bouyer, C Lavoie & WF Boron. Effects of acute and chronic hypoxia on intracellular pH regulation in cultured rat hippocampal neurons. *FASEB J* 18:A1022, 2004.

Piermarini PM, CL Lavoie & WF Boron. Purification of the C-terminal peptide of the electrogenic sodium bicarbonate cotransporter (NBCe1): Biochemical characterization and binding to carbonic anhydrase (CA II). *FASEB J* 18:A79, 2004.

Bouyer P, T Itokawa, H Sakai, WF Boron & K Insogna. A role for the sodium/bicarbonate exchanger, NBCn1 in colony stimulating factor-1 (CSF-1)-dependent alkalinization and cell survival in osteoclasts. *26th Annual Meeting of the American Society for Bone and Mineral Research, Seattle, WA*, 2004.

Chen LM & WF Boron. Expression and effect of chronic hypoxia on NCBE in mouse brain. *FASEB J* 19:A140, 2005.

Lu J, CM Daly, R Musa-Aziz & WF Boron. Carbonic anhydrase II (CA II) does not enhance the activity of the human electrogenic Na/HCO_3 cotransporter (hNBCel-A) in Xenopus oocytes. *FASEB J* 19:A142, 2005.

Lu J & WF Boron. The presteady-state currents induced by DIDS from the electrogenic Na/HCO_3 cotransporter (hNBC3l-A). *FASEB J* 19:A142, 2005.

Parker MD, MJA Tanner, WF Boron & RW Meech. Uncoupling the transport mechanism of the human red cell anion exchanger, hAE1: Single-channel analysis on an electroneutral transporter. *FASEB J* 19:A142, 2005.

Bouyer P, ML Messier & WF Boron. Effect of isolated changes in extracellular bicarbonate concentration or pH on the intracellular pH of cultured rat hippocampal neurons. *FASEB J* 19:A146, 2005.

Zhou Y, P Bouyer & WF Boron. CO_2-evoked HCO_3 reabsorption in the rabbit S2 proximal tubule: Blockade by PKC inhibitor RO-31-8220. *FASEB J* 19:A156, 2005.

Gros G, L Virkki, LS King, JP Cartron, WF Boron & V Endeward. Aquaporin 1 is a CO_2 channel in human red cell membranes. *FASEB J* 19:A1156, 2005.

Praetorius J, EV Bouzinova, WF Boron, C Aalkjaer & S Nielsen. Expression of bicarbonate transporters and aquaporins in the choroid plexus. *FASEB J* 19:A1645, 2005.

Piermarini PM, HS Gill, RM Pelis & WF Boron. Cloning, expression, and purification of a recombinant carbonic anhydrase from a lower vertebrate. *XXXV Proc Int Union Physiol Sci*, San Diego, CA, 2005 (late-breaking abstract).

Kelly ML, P Bouyer & WF Boron. Effects of chronic hypoxia, and the return to normoxia, on the low-vs high-intracellular pH (pH_i) status of cultured rat hippocampal neurons. *Abstr Soc Neurosci* 379.3, 2005.

Musa-Aziz R, I Grichtchenko & WF Boron. Evidence from surface-pH transients that CA IV enhances CO_2 influx into *Xenopus* oocytes. *American Society of Nephrology, 38th Annual Meeting, Philadelphia, PA*, 2005.

Musa-Aziz R, L Chen & WF Boron. Evidence from surface-pH transients that AmtB mediates NH_3 influx into Xenopus oocytes. *American Society of Nephrology, 38th Annual Meeting, Philadelphia, PA*, 2005.

Zhou Y, P Bouyer & WF Boron. Role of the AT_{1A} receptor in the CO_2-induced stimulation of HCO_3 reabsorption by renal proximal tubules. *American Society of Nephrology, 38th Annual Meeting, Philadelphia, PA, 2005*.

Lu J, CM Daly, MD Parker & WF Boron. Carbonic anhydrase II fused to the human electrogenic Na/HCO_3 cotransporter (hNBCe1-A) does not enhance the activity of the transporter in Xenopus oocytes. *FASEB J* 20:A842, 2006.

Chen L, J Rojas, BA Davis, H Gill, MD Parker & WF Boron. Characterization of a polyclonal antibody directed against the amino terminus of the sodium-coupled bicarbonate transporter NCBE. *FASEB J* 20:A842, 2006.

Piermarini PM, I Choi & WF Boron. Cloning of a unique electrogenic bicarbonate transporter from the squid giant fiber lobe. *FASEB J* 20:A842, 2006.

Zhou Y, P Bouyer & WF Boron. Evidence that AQP1 is a functional CO_2 channel in proximal tubules. *FASEB J* 20:A1225, 2006.

Boron WF. Gas-impermeable membranes and gas-permeable channels. *2006 Meeting of the German Physiological Society*.

Gill HS, LS Dutcher, MD Parker & WF Boron. Identification and cloning of alternative N termini of human NBCn1. Proceedings of *The Physiological Society*, University College, London. C20:11p, 2006.

Kelly ML, LM Chen, BA Davis, P Bouyer, H Gill, MD Parker, PM Piermarini & WF Boron. Characterization of a polyclonal antibody directed against the amino terminus of the Na^+-driven Cl-HCO_3 exchanger (NDCBE). *Abstr Soc Neurosci*, 2006.

Skelton LA, P Boyer & WF Boron. CO_2/HCO_3 induces EGFR phosphorylation in the proximal tubule. *J Am Soc Nephrol* 17: 578A, 2006.

Musa-Aziz R, LM Chen & WF Boron. Evidence from surface-pH transients that AmtB and RhAG, expressed in *Xenopus* oocytes, have a substantially lower CO_2/NH_3 permeability ratio than AQP1. *J Am Soc Nephrol*, 17:550A, 2006.

Parker MD, AM Toye & WF Boron. The human NBCel-A mutant A799V, associated with proximal renal tubular acidosis, exhibits both mistargeting in polarized renal epithelial and reduced intrinsic function. *J Am Soc Nephrol* 17:577A, 2006.

Bouyer P, MD Parker & WF Boron. Cloning and functional characterization of new splice variants of the human Na^+-driven Cl/CHO_3 exchanger (NDCBE). *FASEB J* 21:A1282, 2007.

Musa-Aziz R, LM Chen & WF Boron. Differential effects of DIDS on the CO_2 vs NH_3 permeability of AQP1, AmtB, and RhAG. *International Society of Nephrology, Rio de Janeiro, Brazil*, 2007.

Parker MD, LA Skelton, CM Daly & WF Boron. IRBIT functional enhances the electroneutral Na^+-coupled bicarbonate transporter NCBE by sequestering and N-terminal autoinhibitory domain. *FASEB J* 21:A1285, 2007.

Parker MD, LA Skelton, CM Daly & WF Boron. IRBIT binds to and functionally enhances the electroneutral Na^+-coupled bicarbonate transporters NBCn1, NDCBE and NCBE. *FASEB J* 21:A1285, 2007.

Dutcher LS, HS Gill & WF Boron. Identification, cloning, expression, and purification of new splice variants of the cytoplasmic, N terminal of human NBCn1. *Yale Undergraduate Research Symposium*, 2007.

Gill HS, LS Dutcher & WF Boron. Crystal structure of the cytoplasmic N-terminal domain of the Na/HCO_3 cotransporter NBCe1-A at 2.5 Å; resolution illustrates extended, flexible docking regions for regulatory protein binding partners. *Biomedical Transporters, Bern, Switzerland*, P16, p. 52, 2007.

Musa-Aziz R, MD Parker & WF Boron. Evidence from surface [Cl^-] measurements that human SLC4A10 ('NCBE') is a chloride-independent $NaHCO_3$ cotransporter. *J Am Soc Nephrol* 18: 592A, 2007.

Parker MD & WF Boron. Expression and characterization of a prokaryotic SLC4-like anion transporter from *Nitrococcus mobilis*. *J Am Soc Nephrol* 18:592A, 2007.

Musa-Aziz R, LM Chen & WF Boron. The CO_2/NH_3 selectivity of AQP1, AQP4, and AQP5 and how it is affected by DIDS. *J Am Soc Nephrol* 18: 6A, 2007.

Parker MD & WF Boron. Splice cassette II within the N terminus of the electroneutral Na^+-coupled bicarbonate transporter NBCn1 includes a functional calcineurin Aβ binding site. *FASEB J* 22:759.12, 2008.

Zhou Y & WF Boron. Effect of basolateral CO_2 on the luminal ANG II sensitivity of HCO_3 reabsorption by rabbit S2 proximal tubules. *FASEB J* 22:979.5, 2008.

Chen LM & WF Boron. Structural requirements for the electrogenicity of the electrogenic Na-HCO_3 cotransporter NBCe1. *FASEB J* 22:759.13, 2008.

Skelton LA & WF Boron. CO_2/HCO_3 modulates receptor protein tyrosine phosphatase Gamma (RPTPγ) activity. *FASEB J* 22:748.7, 2008.

Liu Y, MD Parker & WF Boron. Cloning and identification of a novel human NBCn1 splice variant. *FASEB J* 22:1b92, 2008.

Chen LM, Y Liu & WF Boron. A structural and functional study on the electrogenicity of human sodium bicarbonate cotransporter NBCe1-A. *Acta Physiologica Sinica* 60 (suppl. 1):404, 2008.

Liu Y, MD Parker, LM Chen & WF Boron. Using novel polyclonal antibodies to study the expression of NBCn2 splice variants in mouse brain. *Acta Physiologica Sinica* 60 (suppl. 1):143, 2008.

Zhou Y & WF Boron. Receptor protein tyrosine phosphatase γ (RPTPγ): Candidate for the dual, extracellular CO_2/HCO_3 sensor in renal proximal tubules. *Acta Physiologica Sinica* 60 (suppl. 1):400, 2008.

Ruffin VA, LM Chen & WF Boron. Intracellular pH regulation in mouse medullary raphe neurons and immunocytochemical evidence for the expression NDCBE (SLC4A8) and NBCn2 (SCL4A10). *Abstr Soc Neurosci* 383.8/RR75, 2008.

Musa-Aziz R, P Pergher & WF Boron. Evidence from surface-pH transients that DIDS and pCMBS reduce the CO_2 permeability of AQP1 expressed in *Xenopus* oocytes. *J Am Soc Nephrol* 19:F0159, 2008.

Skelton LA, R Musa-Aziz & WF Boron. Reconstituting the carbonic anhydrase activity of Receptor Protein Tyrosine Phosphatase γ (RPTPγ), a putative CO_2/HCO_3^- sensor deleted in renal cell carcinoma. *J Am Soc Nephrol* 19:FC189, 2008.

Musa-Aziz R, RR Geyer & WF Boron. Investigating the mechanism of CO_2 transport through human AQP1. Federacão de Sociedades de Biologia Experimental, São Paulo, Brasil, 8/21/2009.

Geyer RR & WF Boron. Investigating the role of membrane proteins in the transport of oxygen in red blood cells. Office of Naval Research, Tampa, FL, 2009.

Boron WF, Y Zhou & R Musa-Aziz. Role of gas channels in the proximal tubule…and beyond. *XXXVI Proc Int Union Physiol Sci*, Kyoto, Japan. *Springer* 59:WD-V9-5, 2009.

Geyer RR, R Musa-Aziz, & Boron WF. Proteomics approach for identifying the DIDS-reaction site of human Aquaporin 1. International Society on Oxygen Transport to Tissue (ISOTT), 37th Annual Meeting, 2009.

Geyer RR, R Musa-Aziz & WF Boron. Proteomics approach for identifying the DIDS-reaction site of human Aquaporin 1. *J Am Soc Nephrol* 20:PO1145, 376A, 2009.

Musa-Aziz R, RR Geyer, S Shaikh, E Tajkhorsid & WF Boron. Investigating the mechanism of CO_2 transport through human AQP1. *J Am Soc Nephrol* 20:FC146, 34A, 2009.

Parker LA, FM D'Angelo & WF Boron. The Src tyrosine kinase Fyn is a substrate of the Receptor Protein Tyrosine Phosphatase gamma (RPTPγ) in a CO_2/HCO_3 sensitive signaling pathway in the renal proximal tubule. *J Am Soc Nephrol* 20:PO067, 126A, 2009.

Zhou Y & WF Boron. Effect of knocking out receptor protein tyrosine phosphatase γ (RPTPγ) in the CO_2-induced stimulation of HCO_3 reabsorption by mouse renal proximal tubules. *FASEB J* 24:1024.7, 2010.

Xu L, Y Zhou, N Courtney, T Radford & WF Boron. Effect of AQP1 knock out on mouse exercise tolerance. *FASEB J* 24:609.4, 2010.

Qin X & WF Boron. Effect of DIDS and pCMBS on the CO_2 permeability of human aquaporin-5 (AQP5). *FASEB J* 24:610.5, 2010.

Boron WF. Gas transport through channels. Office of Naval Research, Seattle, WA, 2010.

Geyer RR & WF Boron. Investigating the role of membrane proteins in the transport of oxygen in red blood cells. Office of Naval Research, Seattle, WA, 2010.

Geyer RR, AM Toye, MD Parker, WF Boron & R Musa-Aziz. NH_3 permeability of human RhAG, RhBG, and RhCG. *J Am Soc Nephrol* 21:256A, 2010.

Skelton LA & WF Boron. The receptor protein tyrosine phosphatase gamma (RPTPγ) is located at the basal but not lateral membrane of proximal tubules. *J Am Soc Nephrol* 21:252A, 2010.

Skelton LA, R Musa-Aziz, X Qin & WF Boron. Mutations that "restore" enzymatic activity to the carbonic anhydrase-like domain (CALD) of receptor protein tyrosine phosphatase gamma (RPTPγ): Importance of shuttle hits and CO_2 binding site. *J Am Soc Nephrol* 21:252A, 2010.

Geyer RR, R Musa-Aziz & WF Boron. Evidence that DIDS crosslinks Aquaporin 1 monomers. *FASEB J* 25:1039.26, 2011.

Geyer RR, MD Parker, N Burton, WF Boron, AM Toye & R Musa-Aziz. Relative CO_2/NH_3 permeabilities of human RhAG, RhBG, and RhCG. *FASEB J* 25:1040.4, 2011.

Lee SK, II Grichtchenko & WF Boron. Distinguishing HCO_3^- from CO_3^{2-} transport by NBCe1-A. *FASEB J* 25:656.9, 2011.

Moss FJ & WF Boron. The role of carbonic anhydrase II on HCO_3^--initiated transport through the SLC4A4 transporter NBCe1. *FASEB J* 25:656.7, 2011.

Musa-Aziz R, RR Geyer & WF Boron. Relative CO_2/NH_3 permeabilities of several members of the mammalian Aquaporin family: bAQP0, hAQP1, hAQP2, rAQP3, rAQP4-M1, rAPQ4-M23, and hAQP8. *FASEB J* 25:1040.5, 2011.

Somersalo E, R Occhipinti, WF Boron & D Calvetti. A reaction-diffusion model of acid-base balance in a *Xenopus* oocyte. *FASEB J* 25:1129.4, 2011.

Occhipinti R, R Musa-Aziz, D Calvetti, E Somersalo & WF Boron. Effects of intracellular and extracellular carbonic anhydrase on the influx of CO_2 in a *Xenopus* oocyte: Insights with a mathematical model. *FASEB J* 25:1039.25, 2011.

Parker MD & WF Boron. Unusual transport modes of the Na^+-coupled HCO_3^- transporters NDCBE (SLC4A8) and NBCn2 (SLC4A10) in the absence of extracellular Cl^-. *FASEB J* 25:656.3, 2011.

Qin X & WF Boron. Exploring the CO_2 permeability of cysteine-less human aquaporin-5 (hAQP5) with single introduced Cys residues. *FASEB J* 25:1039.27, 2011.

Qin X & WF Boron. Exploring central-pore amino-acid residues important for CO_2 permeation through human aquaporin-5 (AQP5). *FASEB J* 25:1039.5, 2011.

Ruffin VA, P Bouyer & WF Boron. Role of Na-coupled HCO_3 transporters in regulation of intracellular pH in rat hippocampal neurons under normoxic and chronic hypoxic conditions. *FASEB J* 25:656.4, 2011.

Tsipis CP, X Sun, P Huang, E Kikano, T Radford, G Babcock, W Boron, J LaManna & K Xu. Transient neonatal hypoxia alters adult ventilatory response, behavioral performance, and cortical capillary density in mice. *FASEB J* 25:1110.9, 2011.

Xu L, Y Zhou & WF Boron. Role of aquaporin 1 (AQP1) as a CO_2 channel in chronic metabolic acidosis. *FASEB J* 25:834.1, 2011.

Boron WF. Gas channels. Undersea & Hyperbaric Medicine Society Scientific Meeting in conjunction with The Office of Naval Research, Fort Worth, TX, June 15–18, 2011.

Geyer RR & WF Boron. Gas transport through channels. Undersea & Hyperbaric Medicine Society Scientific Meeting in conjunction with The Office of Naval Research, Fort Worth, TX, June 15–18, 2011.

Ruffin VA & WF Boron. Regulation of intracellular pH in rat hippocampal normoxic and chronic hypoxic neurons under normoxic, acute hypoxia conditions. *Abstr Soc Neurosci* S-17602, 2011.

Geyer RR, R Musa-Aziz & WF Boron. Movement of NH_3 through human Urea Transporter B (UT-B)—a member of a new family of gas channels. *J Am Soc Nephrol* 22:81A, 2011.

Musa-Azia R, RR Geyer, X Qin & WF Boron. The CO_2/NH_3 selectivities and inhibitor sensitivities of mammalian Aquaporins. *J Am Soc Nephrol* 22:267A, 2011.

Skelton LA & WF Boron. ErbB1-ErbB2 heterodimer activation in rabbit renal proximal tubules exposed to acute respiratory acidosis. *J Am Soc Nephrol* 22:80A, 2011.

Parker MD, AB Wass, F Rahman, C Grant & WF Boron. Functional reassembly of NBCe1-A from co-expressed cytosolic and transmembrane domains. *FASEB J* 26:882.2, 2012.

Coley AA, VA Ruffin, U Hopfer & WF Boron. Immunocytochemical techniques identify Na^+-coupled HCO_3^- transporters (NCBTs) in chemosensitive neurons of the Medullary Raphé. *FASEB J* 26:882.7, 2012.

Moss FJ & WF Boron. The role of carbonic anhydrase II on HCO_3^--initiated transport through the SLC4A4 transporter NBCe1A. *FASEB J* 26:882.4, 2012.

Qin X, H Hu, J Schroeder & WF Boron. Exploring CO_2 permeability of aquaporins. *FASEB J* 26:1103.3, 2012.

Qin X & WF Boron. A single amino acid mutation converts human aquaporin 5 to an anion channel. *FASEB J* 26:1103.7, 2012.

Occhipinti R, R Musa-Aziz & WF Boron. Mathematical modeling of the role of carbonic anhydrase II and IV on the influx of CO_2 in a *Xenopus* oocyte. *FASEB J* 26:882.9, 2012.

Ruffin VA & WF Boron. Neuronal and non-neuronal steady-state pH_i and recovery NH_4^+-induced acid loads. *FASEB J* 26:901.5, 2012.

Yuen N, YJ Chen, WF Boron J Praetorius, SE Anderson & ME O'Donnell. Blood-brain barrier Na/HCO_3 cotransporters: Evidence for a role in ischemia-induced brain Na uptake. *FASEB J* 26:1152.22, 2012.

Geyer RR & WF Boron. Role of membrane proteins in oxygen transport in red blood cells. International Workshop on Membrane Transport of Small Solutes, Strobl, Austria, June 8–10, 2012.

Boron WF. Gas Channels. International Workshop on Membrane Transport of Small Solutes, Strobl, Austria, June 8–10, 2012.

Geyer RR, R Occhipinti, R Musa-Aziz, X Qin & WF Boron. Gas Channels. Undersea & Hyperbaric Medicine Society Scientific Meeting in conjunction with The Office of Naval Research, Philadelphia, PA, August 7–9, 2012.

Geyer RR & WF Boron. Gas transport through channels. Undersea & Hyperbaric Medicine Society Scientific Meeting in conjunction with The Office of Naval Research, Philadelphia, PA, August 7–9, 2012.

Salameh A, VA. Ruffin & WF Boron. Effects of metabolic acidosis on different cell types inside and outside the central nervous system. *Abstr Soc Neurosci*, New Orleans, LA, October 13–17, 2012.

Boron WF, X Qin, R Occhipinti, R Musa-Aziz & RR Geyer. Gas Channels. International Conference of Physiological Sciences, Suzhou, China, November 1–4, 2012.

Boron WF. Gas Channels. Office of Naval Research, Arlington, VA, May 22, 2013.

Moss FJ & WF Boron. Carbonic anhydrase II enhances activity of endogenous Na-H exchangers and not the Na/HCO_3 cotransporter, NBCe1, when expressed in Xenopus oocytes. *XXXVII Proc Int Union Physiol Sci*, Birmingham, UK, July 21–26, 2013. 541P.

Occhipinti R, SK Lee & WF Boron. Mathematical modeling of bicarbonate versus carbonate transport by the electrogenic Na^+/ HCO_3^- cotransporter. *XXXVII Proc Int Union Physiol Sci*, Birmingham, UK, July 21–26, 2013. 543P.

Moss FJ & WF Boron. Carbonic anhydrase II enhances activity of endogenous Na-H exchangers and not the Na/HCO_3 cotransporter, NBCe1, when expressed in Xenopus oocytes. IUPS Satellite Symposium: H^+ Ion Sensing, Signaling and Servo-Control, Oxford, UK, July 27–30, 2013.

Occhipinti R, SK Lee & WF Boron. Mathematical modeling of bicarbonate versus carbonate transport by the electrogenic Na^+/ HCO_3^- cotransporter. IUPS Satellite Symposium: H^+ Ion Sensing, Signaling and Servo-Control, Oxford, UK, July 27–30, 2013.

Salameh AI, VA Ruffin & WF Boron. The anion exchanger isoform 3 plays an important role in the CA1 neurons response to metabolic acidosis. *Abstr Soc Neurosci*, San Diego, CA, November 9–14, 2013.

Moss FJ & WF Boron. Distinguishing between the possible carbon substrates for transport by electrogenic Na/HCO_3 cotransporter NBCe1 (SLC4A4*). Biophysical J* 106: Pos-L4462, 2014.

Moss FJ, SK Lee, MD Parker & WF Boron. Distinguishing HCO_3^- from $CO_3^=$ transport by the electrogenic Na/HCO_3 cotransporter NBCe1 (SLC4A4). *FASEB J* 28:1098.7, 2014.

Geyer RR, R Occhipinti, P Zhao, R Musa-Aziz & WF Boron. Gas transport through channels. Undersea Medicine Review, Durham, NC, July 15–17, 2014.

Musa-Aziz R., MD Parker, FJ Moss & WF Boron. Direction-dependent block of an electroneutral $Na-HCO_3$ cotransporter: insights from simultaneous intracellular and surface pH measurements in the presence of $DIDS^=$. *J. Am. Soc. of Nephrol* 25:382A, 2014.

Geyer RR, P Zhao, MD Parker & WF Boron. A novel assay for quantitating carbonic anhydrase activity and assessing red blood cell hemolysis. *J Am Soc Nephrol* 25: 382A, 2014.

Occhipinti R, J. Kabutormori, WF Boron & R Musa-Aziz. Effect of varying electrode tip diameter on extracellular surface-pH (pH_S) changes caused by CO_2 fluxes across an oocyte plasma membrane. *J Am Soc Nephrol* 25:382A, 2014.

Salameh AI & WF Boron. The anion exchanger 3 is essential for the robust acidification response in CA1 hippocampal neurons during metabolic acidosis. *Abstr Soc Neurosci*, Washington, DC, November 15–19, 2014.

Gonzalez-Reyes LE, FJ Moss, WF Boron & DM Durand. Selective hippocampal viral gene delivery restores normal seizure susceptibility in electroneutral Na/HCO3 cotransporter NBCn1 (slc4a7) null mice. *Abstr Soc Neurosci*, Washington, DC, November 15–19, 2014.

Occhipinti R & WF Boron. NH_3 permeability versus CO_2 permeability: insights from mathematical modeling. *FASEB J* 29: 668.3, 2015.

Salameh AI & WF Boron. Novel pH-dependent astrocyte-neuron crosstalk in hippocampal CA1 region, not observed after the knockout of the anion exchanger 3 (AE3). *FASEB J* 29:668.2, 2015.

Boron WF. Regulation of intracellular pH: Role of sodium-coupled bicarbonate transporters. BIT's 5th Annual World Congress of Molecular & Cell Biology-2015, Nanjing, China, April 25–28, 2015.

Zhang Y, BO Erokwu, Y Liu, GW Farr, WF Boron, CA Flask & X Yu. Assessing water influx and retention in the brain of AQP4 knockout mice by 17O-MRI. International Society for Magnetic Resonance in Medicine, Toronto, Ontario, Canada, May, 2015.

Occhipinti R, P Zhao, J Lu, J, AI Salameh, FJ Moss & WF Boron. Gas channels. Undersea & Hyperbaric Medicine Society Scientific Meeting in conjunction with The Office of Naval Research, Buffalo, NY, August 4–6, 2015.

Zhao P, RR Geyer, AI Salameh, FJ Moss, & WF Boron. Gas channels: O_2 channels in RBCs. Undersea & Hyperbaric Medicine Society Scientific Meeting in conjunction with The Office of Naval Research, Buffalo, NY, August 4–6, 2015.

Calvetti D, M Callahan, R Occhipinti, WF Boron & E Somersalo. Multi-scale inverse problems: Beyond the modeling limit. IMAG, 2015 Multiscale Modeling Consortium Meeting, Bethesda, MD, September 8–10, 2015.

Occhipinti, R, D Calvetti, E Somersalo & WF Boron. Modeling of the microenvironment around a pH electrode tip. IMAG, 2015 Multiscale Modeling Consortium Meeting, Bethesda, MD, September 8–10, 2015.

Boron, WF. Regulation of intracellular pH: Role of Na^+-coupled HCO_3^- transporters. *Acta Physiol.* (215; S704, 3) 41st Turkish Physiology Congress, Çanakkale (Gallipoli), Turkey. September 9–12, 2015.

Lee, SK & WF Boron. Exploring an autoinhibitory domain in the electrogenic Na/HCO_3 transporter NBCe1-B. *FASEB J* 30, 2016.

Lee, SK & WF Boron. Stimulation of the electrogenic Na/HCO_3 transporter NBCe1-B by phosphomimetic mutants of IRBIT. *FASEB* : 30, 2016.

Moss FJ, B Zeise, MD Parker, B Yu, AC Morrison & WF Boron. Extreme blood pressure polymorphisms influence the bicarbonate-independent conductance of NBCn1 but not its Na/HCO_3 cotransport activity. *FASEB J* 30, 2016.

Moss FJ, P Zhao, P Woost, J Jacobberger, & WF Boron. Quantification of red blood cell size and shape in $AQP1^{-/-}$, $RhAG^{-/-}$, and double-knockout mice. *FASEB J* 30, 2016

Occhipinti R, J Lu & WF Boron. Is the electrogenic Na/HCO_3 cotransporter a CO_2 channel? *FASEB J* 30, 2016.

Occhipinti R, D Calvetti, WF Boron & E Somersalo. Mathematical modeling of the microenvironment beneath a surface pH electrode tip. *FASEB J* 30, 2016.

Salameh A & WF Boron. Na-driven Cl/HCO_3 exchanger (NDCBE) activity is essential for establishing new steady-state in intracellular pH under metabolic acidosis in murine hippocampal neurons and astrocytes. *FASEB J* 30, 2016.

Zhao P, RR Geyer, E Sim, AI Salameh, H Meyerson, A Wass, FJ Moss & WF Boron. Oxygen channels in red blood cells. *FASEB J*, 30, 2016.

Other Publications from the Boron Lab

Leviel F, CA Hübner, P Houillier, L Morla, S El Moghrabi, G Brideau, H Hatim, MD Parker, I Kurth, A Kougioumtzes, A Sinning, V Pech, KA Riemondy, RL Miller, E Hummler, GE Shull, PS Aronson, A Doucet, SM Wall, R Chambrey & D Eladari. The Na^+-dependent chloride-bicarbonate exchanger SLC4A8 mediates an electroneutral Na^+ reabsorption process in the renal cortical collecting ducts of mice. *J Clin Invest* 120:1627-1635, 2010. doi: 10.1172/JCI40145. PMCID: PMC2860930.

Gill HS. Evaluating the efficacy of tryptophan fluorescence and absorbance as a selection tool for identifying protein crystals. *Acta Crystallogr Sect F Struct Biol Cryst Commun* 66:367-372, 2010. doi: 10.1107/S1744309110002022. PMCID: PMC 2833058.

(Updated: September 6, 2016)