Walter F. Boron, MD, PhD
Distinguished University Professor
Myers/Scarpa Professor and Chairman,
Department of Physiology and Biophysics
Professor of Medicine
Professor of Biochemistry
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 School of Medicine, Cleveland, Ohio
2013 – present: Professor, Secondary Appointment, Department of Medicine, Case Western Reserve University School of Medicine, Cleveland, Ohio
2015 – present: Adjunct Professor, Dept. of Physiology, Wayne State University School of Medicine, Detroit, Michigan
2015: Honorary Professor, University of Medicine and Pharmacy of Tîrgu Mureş, Romania
2016 – 2019: Guest Professor, Huazhong University of Science & Technology (HUST), Wuhan, China
2017 – present: Professor, Secondary Appointment, Department of Biochemistry, Case Western Reserve University School of Medicine, Cleveland, Ohio

Administrative Positions:

1987 – 1989: **Director** of Medical Studies, Dept. of Cellular & Molecular Physiology, Yale University School of Medicine, New Haven, Connecticut

1989 – 1998: **Chair**, Dept. of Cellular & Molecular Physiology, Yale University School of Medicine, New Haven, Connecticut.
2007 – present: **David N. & Inez Myers/Antonio Scarpa, MD, PhD Chair**, Department of Physiology & Biophysics, Case Western Reserve University, School of Medicine, Cleveland, Ohio
2016 – present: **Executive Director of PhD Programs** (representing the Council of Chairs of Basic Science Departments), Case Western Reserve University, School of Medicine, Cleveland, Ohio
2017 – 2018: **Interim Chair** Department of Biochemistry, Case Western Reserve University, School of Medicine, 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 (eligible to receive once), Yale Univ. 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
American Physiological Society 125th Anniversary Symposium, 2012: Paper by Boron & De Weer (*J Gen Physiol*, 1976) selected by Cell Physiology Section as the publication by an APS member that "had significantly advanced the discipline of physiology" in the previous 125 years.
Awarded *Doctor Medicinae Honoris Causa*, Aarhus University, 2014
Elected to National Academy of Medicine, 2014
Elected Fellow, American Physiological Society, 2015
Appointed *Distinguished University Professor*, Case Western Reserve University, 2020.
Distinguished Service Award, Association of Chairs of Departments of Physiology, 2020 *[presentation postponed due to COVID-19]*

Memberships:

American Heart Association
American Physiological Society: **Program Representative**, **Renal Section**, 1984 – 1987; **Chairman**, **Renal Section**, 1990 – 1993; **Council**, 1995 – 1998; **President-elect/President/Past-President**, 1998 – 2001
American Society of Nephrology
Association of Chairs of Departments of Physiology: **Councilor**, 2018 – 2020
Biophysical Society
International Society of Nephrology
International Union of Physiological Societies (IUPS): **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. International Scientific Programming Committee for 2013 Congress, **Co-chair**. International Scientific Programming Committee for 2017 Congress, **Co-chair**. Nominations Committee, 2017 – present, **Chair**. Publications Task Force, 2018 – present, **Chair**.
National Academy of Medicine: **Vice Chair,** National Academy of Medicine, Section 3: Neurobiology, Physiological and Pharmacological Sciences, 2018 – 2020. Chair, Section 3: 2020 – 2022.
Physiological Society (London)
Society of General Physiologists: **Treasurer**, 1988 – 1991
Society for Neuroscience

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
Reference Module in Biomedical Sciences (an online reference source), Elsevier Publishing, Kidlington, Oxford, United Kingdom: 2014 – 2019: **Co-Subject Editor** (with EL Boulpaep), Human Physiology
Medical Physiology. A Cellular and Molecular Approach. (A textbook for medical students) **Co-editor** (with EL Boulpaep). Philadelphia: Saunders/Elsevier, editions published in 2003 (1st edition), 2005 (1st edition, updated edition), 2009 (2nd edition), 2012 (2nd edition, updated edition), 2016 (3rd edition) … 4th edition is in active preparation.
Medical Physiology. Concise Edition. **Co-editor** (with EL Boulpaep). Philadelphia: Saunders/Elsevier [in production]
Physiological Mini Reviews (Official organ of the Argentinian Physiological Society): **Associate Editor**, May 2019 – Present
Physiome (online modeling journal of the International Union of Physiological Sciences): **Editorial Board**

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

International Society on Oxygen Transport to Tissue (ISOTT), Cleveland, OH, 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
Donghu Forum of Life Sciences International Forum, Huazhong University of Science & Technology (HUST), Wuhan, Hubei, China. September 29, 2016
Special Lecturer (series of 3 lectures), 15th Inter-Medical School Physiology Quiz (IMSPQ) 2017, University of Malaya, Kuala Lumpur, Malaysia. August 16–18, 2017
Closing Lecture of Education Meeting, Argentine Society of Physiology (SAFIS), Mar del Plata, Argentina, November 14, 2018
SAFIS Lecture (Keynote), Argentine Society of Physiology (SAFIS), Mar del Plata, Argentina, November 16, 2018
AuPS Plenary Lecture, Australian Physiological Society, Sydney, November 25 – 28, 2018
Berliner Lecture, Departments of Physiology and Medicine, Yale University, March 21, 2019
Honorary Lecture, Philippine Society of Physiologists, Manila, Philippines *[scheduled for June 19, 2020 but postponed due to COVID-19]*
Keynote Lecture, Joint meeting of the Physiological Society (UK), Scandinavian Physiological Society, German Physiological Society, and Federation of European Societies of Physiology *[scheduled for September 11 – 13, 2020 but postponed due to COVID-19]*
Keynote Lecture, Detroit Cardiovascular Training Program, October 23, 2020 *[delivered remotely because of COVID-19]*
Clarenburg Lecture, Kansas State University, to be scheduled for spring of 2021.

Entrepreneurship:

Co-founder, Aeromics Inc. Discovered first blocker of an aquaporin (AQP) water channel to reach clinical trials. AER-271 completed a successful phase 1 in 2019. AER-271, via its parent compound AER-270 blocks AQP4 at the blood-brain barrier to minimize cerebral edema in stroke.

Co-founder, Remsenwood Associates LLC, which creates dedicated companies to develop specific drugs. The first such company is JanusQ, which is developing drugs to treat neurodegenerative diseases.

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. doi: 10.1038/368332a0

Davis BA, EM Hogan & WF Boron. Shrinkage-induced activation of Na^+-H^+ exchange in barnacle muscle fibers. *Am J 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.

Editorial on Zhao et al: Thomas RC. Bicarbonate briefly CO_2-free. *Nature* 374: 597–598. doi:10.1038/374597a0.

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.

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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.

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