

Curriculum Vitæ

January, 2014

Eduardo Ríos. Born May 8, 1947, in Tacuarembó, Uruguay.
 Married in 1970 to Matilde Musulén. Three daughters (Lara, Marina and Carmela).
 US citizen since 1993 (dual Uruguayan citizenship).

Degrees:

"Bachiller en Ciencias", Tacuarembó, Uruguay, 12/28/63
 "Licenciado" in Physics, School of Sciences, Montevideo, 6/28/75

Higher Education:

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| School of Medicine, Montevideo | (3/1/64 - 8/1/67). |
| School of Engineering, Montevideo | (3/1/68 - 12/28/70). |
| School of Sciences, Institute of Physics, Montevideo | (3/1/71 - 6/28/75). |
| School of Medicine, University of Rochester, New York | (3/1/78 - 6/28/83). |

Theses:

"The electronics of voltage clamping" (in Spanish). School of Sciences, Montevideo. 1973.
 "Physicochemical Models of Ionic Movements in Excitation-Contraction Coupling" (in Spanish). School of Sciences, Montevideo, 1975.

Honors and Academic Services:

National Award in History (Uruguay). 1961.
 National Award in French Literature (Uruguay). 1961.
 Research Award of the University of Montevideo, years 1967-1970.
 UNESCO Fellowship, 1976.
 Member, Physiology Study Section, NIH, 1989-1993.
 Member, Cardiovascular Science Study Section, NIH, 2001-2004.
 Vice-Chair, Gordon Conference on Muscle, 1994.
 Chair, Gordon Conference on Muscle, 1997.
 Research Council. American Heart Association of Metropolitan Chicago. 1992-1996.
 Council Member, Biophysical Society, 2003-2005.
 Council Member, Society of General Physiologists, 1995-1997.
 Founder and Member of first Council, Society of Latin American Biophysicists.
 M.E.R.I.T. Award of the National Institute of Arthritis and Musculoskeletal and Skin Diseases, 1996-2006.
 Council Member, National Institute of Arthritis and Musculoskeletal and Skin Diseases, 1998-2001.
 GPRA Evaluator of NIH functions. 2000.
 Plenary Lecture, the European Muscle Society, Bochum, 1994
 Keynote Speaker, the Midwest Physiological Society Meeting, Madison, WI, 2001.
 Plenary Lecture, the Society of Latin American Biophysicists, Rio, 2004.
 Plenary Lecture, The European Muscle Society, Heidelberg, 2008.
 Chair, the Symposium on Calsequestrin, Triadin and More. Satellite to the Annual Meeting of the Biophysical Society Boston, 2009.

Keynote: Joint meeting of European Societies in celebration of the 100th anniversary of the University of Debrecen. Debrecen, Hungary, 2012.
 Keynote: Society of Latin American Biophysicists, Philadelphia, 2013.
 Chair, Symposium on Calcium Signaling. Joint Meeting of the Ibero American Society of Biophysics and Society of Latin American Biophysicists, Viña del Mar, Chile, 2013.
 Robert W. Ramsey Lecture, Virginia Commonwealth University, March 26, 2015.

Editorial Work

Associate Editor; Journal of General Physiology. 2014 to date.
 Associate Editor: Annals of the School of Medicine, Montevideo. 2013 to date
 Reviewing Editor; Journal of Physiology. 2006 to 2012

Editorial Boards:

The Journal of General Physiology. 1992 to 2014.
 The American Journal of Physiology (Cell). 1994 to 2005.
 Physiological Reviews. 2000 to 2005.
 The Japanese Journal of Physiology. 2000 to 2005.
 Physiological Reviews. 2000 to 2006.
 The Journal of Physiology, London. 2004 to 2012.
 The Journal of Physiological Sciences. 2005 to date.
 Frontiers. 2009 to date.

Referral and reviewing:

Journals: The Journal of General Physiology, The Biophysical Journal, Nature, Science, The Journal of Muscle Research and Cell Motility, Proceedings of the National Academy of Sciences (USA), Molecular Pharmacology, Pflügers Archiv, The Journal of Physiology, The American Journal of Physiology, The Japanese Journal of Physiology, Physiological Reviews, News in Physiological Sciences, The Journal of Cell Biology, the Journal of Biological Chemistry, the EMBO Journal, FEBS Letters, Sístole, the Journal of Membrane Biology, The Journal of Theoretical Biology, The Journal of Physiological Sciences. PLOS One. FASEB Journal. Physiology. Cell Calcium. Frontiers. Nature Medicine. Nature Methods. ACS Chemical Biology. Journal of Molecular and Cellular Cardiology.

Granting Agencies: Member of the *Physiology and Cardiovascular A Study* Sections of N.I.H. Referrals for the National Science Foundation, American Heart Association, Muscular Dystrophy Association, U.N.E.S.C.O. the Uruguayan Program of Development of the Basic Sciences (PEDECIBA) and National Councils of Science and Technology (CONICYT) of Chile, Argentina and Uruguay. The Canadian Research Council, the Australian Research Council, the Austrian Council of Scientific Research, Consiglio Nazionale Della Ricerca (Italy) and AFM-Telethon, France.

Positions:

Post-Doctoral:

Director, Section of Cellular Signaling, Rush University School of Medicine, Chicago (9/1/03 – present).

Professor, Dept. of Molecular Biophysics and Physiology, Rush University School of Medicine, Chicago (7/1/91 - present).

Associate Professor, Dept. of Physiology, Rush University School of Medicine, Chicago (7/1/87 - 6/30/91).

Assistant Professor, Dept. of Physiology, Rush University School of Medicine, Chicago (7/1/83 - 7/1/87).

Professor, PEDECIBA (National Program of Development of Basic Sciences). Dept. Biophysics School of Medicine, Montevideo, Uruguay. (4/1/1985 –present.)

Assistant Professor, Dept. of Physiology, School of Medicine, University of Rochester, Rochester, NY (7/1/82 - 7/1/83).

Assistant Professor, Dept. of Biophysics & Biochemistry, School of Dentistry, Montevideo (9/1/75 - 12/30/82).

Research Associate, Dept. of Physiology, School of Medicine, University of Rochester, Rochester, NY (12/13/78 - 6/18/79, and 6/3/80 - 6/30/82).

Research Associate, Dept. of Biophysics, "Clemente Estable" Institute for Biological Sciences, Montevideo (8/1/75 - present; honorary, tenured).

Pre-Doctoral:

Research Fellow, Dept. of Biophysics, School of Medicine, Montevideo, Uruguay (3/1/67 - 3/1/70).

Instructor, Department of Physics, School of Engineering, Montevideo, Uruguay (3/1/71 - 3/1/72).

Instructor of Biophysics, Dept. of Biophysics, School of Medicine, Montevideo, Uruguay (3/15/73 - 2/1/76).

University Services:

Member of the University Cloister in Montevideo, Uruguay. This is an elective body that performs the legislative tasks in the university government, 1966 - 1970.

Task force on Population and Family Planning, Montevideo, 1970.

Task force on University Reform, Montevideo, 1971.

Standing Committee on Affirmative Action, Rush University, 1984-1986.

Eduardo Ríos

Task force on Quality of Education, Rush University, 1986-1988.

Committee on International Liaison. National Program of Development of Basic Sciences, Montevideo, Uruguay, May 1988 - present.

Task force on Research, Rush University, 1991-92.

Council Member, American Heart Association of Metropolitan Chicago, 1992 to 97.

Committee on Committees. Rush University. 1995- present.

Institutional Animal Use and Care Committee. Rush University 1996-1998.

Academic Affiliations:

The Biophysical Society.

The Physiological Society.

Sociedad Uruguaya de Ciencias Fisiológicas.

The Society of General Physiologists.

The American Physiological Society.

Latin American Society of Biophysicists.

American Association for the Advancement of Science.

Research Support (post-doctoral):

July 1983 to July 1986. Grant from the National Institutes of Health. Project title: "Ca movements in Excitation-Contraction Coupling".

July 1986 to July 1991. Competitive renewal of the above grant.

July 1991 to June 1996. Competitive renewal of the above grant.

Jan 1988 to Dec 1991. Grant from the Muscular Dystrophy Association. Title: "I_r, a novel ionic current probably related to EC coupling".

July 1988 to June 1991. Grant from the American Heart Association. Title "Intramembrane charge movements and EC coupling in the heart".

July 1990 to June 1993. Grant from the Muscular Dystrophy Association. Title: "The DHP receptor as Ca channel and voltage sensor of EC coupling. Co-PI (with J. Ma).

Sponsor of three MDA fellowships (to J. Ma, R. Shirokov and A. González), three AHA Metro Chicago fellowships (to J. Ma, R. Shirokov and A. González) and one National Research Service Award (to Robert Fitts).

Current or Recent Support (Ríos, PI):

Eduardo Ríos

“Roles of calsequestrin in the control of calcium signals in health and disease”. R01 Grant from the National Institute of General Medical Diseases. P.I. Eduardo Rios. Current funding period: October 2014 to September 2018.

“Skeletal Muscle. Ca regulation inside the Sarcoplasmic Reticulum”. R01 Grant from the National Institute of Arthritis, and Musculoskeletal and Skin Diseases. P.I. Eduardo Rios. Current funding period: May 2009 to April 2015.

“Ca signaling in Progression of ALS in Skeletal Muscle”. R01 Grant from the National Institute of Arthritis, and Musculoskeletal and Skin Diseases. P.I. Jingsong Zhou. Current funding period: March 2010 to February 2015.

“Calcium Movements in Excitation-Contraction Coupling”. R01 Grant from the National Institute of Arthritis, and Musculoskeletal and Skin Diseases. P.I. Eduardo Rios. Extended at no cost to June 2014.

“A dual-scanner confocal microscope”. Shared Instrumentation Grant from the National Center for Research Resources, NIH. P.I. Eduardo Rios. Award: \$500,000. Funding period: March 2008 through Feb 2009. This award is specifically for the acquisition of a LIVE DUO dual scanner (Carl Zeiss).

“A dual-scanner confocal microscope”. Rush University Capital Equipment Hasterlik Grant. P.I. Eduardo Rios. Award: \$250,000. This is a matching award to the Nat'l Center grant listed above.

"Calcium Movements in Excitation-Contraction Coupling". Grant from the National Institute of Arthritis, and Musculoskeletal and Skin Diseases. Funding period: July 1996 to June 2006. Implemented as a 10-year MERIT (Method to Extend Research In Time) award.

Trainees:

1. Gustavo Brum. Postdoctoral, 1984 - 1986. M.D. School of Medicine, Montevideo. Now the Chair at the Departamento de Biofisica, University of Montevideo.
2. Robert Fitts. Sabbatical trainee under NRSA, Public Health Service, 1986. Now the Chair, Department of Biology, Marquette University, Milwaukee.
3. Michael Fill. Postdoctoral, part of 1986. Ph.D. University of Illinois at Champaign, Urbana. Now a Professor at Rush University, Chicago.
4. Laszlo Csernoch. Postdoctoral, 1988. Ph.D. University Medical School of Debrecen. Now the Chair in the Department of Physiology, Debrecen, Hungary.
5. Gonzalo Pizarro. Postdoctoral, 1986 - 1988. M.D. School of Medicine, Montevideo. Now an Associate Professor in the Department of Biophysics, School

Eduardo Ríos

of Medicine, Montevideo.

6. Ismael Uribe. Postdoctoral, 1987 - 1988. M.D., Ph.D. Inst. Politécnico Nacional. Now an Assistant Professor at Universidad de Chihuahua, Mexico.
7. Adom González. Postdoctoral, 1989 - 1993. Ph.D. IVIC, Caracas, Venezuela. Then a Research Associate at Colorado State University, Fort Collins. Now an Assistant Professor at Universidad Central de Venezuela.
8. Zoltán Papp. Visiting Scientist, 1989. M.D. University of Debrecen, Hungary. Now a Professor in the Department of Physiology, Debrecen.
9. Jianjie Ma. Postdoctoral, 1989 - 1992. Ph.D. Baylor College of Medicine. Department of Physiology and Molecular Biophysics. Now a University Professor at UMDNJ, Piscataway, NJ.
10. Ivan Stavrovsky. Postdoctoral, 1990. M.S. in Engineering, School of Engineering, Bratislava, Chekoslovakia. Now a Systems Analist for Siemens AG, Bratislava and Vienna.
12. Roman Skirokov. Postdoctoral, 1990 - 1992. Ph.D. in Physics. School of Sciences, Kiev, USSR. Now an Assistant Professor at UMDNJ, Newark, NJ.
13. Miloslav Karhánek. Postdoctoral, 1991. M.S. in Engineering, School of Engineering, Bratislava, Chekoslovakia. Now a Research Associate at Stanford University, CA.
14. Natalia Shirokova. Postdoctoral, 1991-present. - Ph.D. in Biophysics, School of Sciences, Kiev, Ukraine. Now an Assistant Professor at UMDNJ, Newark, NJ.
15. Alexander Tsugorka. Postdoctoral, 1994-present. Ph.D. in Biophysics, School of Sciences, Kiev, Ukraine.
16. Jingsong Zhou. Graduate Student. Graduated in August, 1997. Now an Assistant Professor at Rush University.
17. Gonzalo Ferreira. Postdoctoral, 1995-present. M.D. Ph.D. University of Montevideo. Now an Assistant Professor at University of Montevideo
18. Wolfgang Kirsch. Postdoctoral, 1997-2000. M.Sc. in Physics, Ruprecht-Karls University of Heidelberg, Germany. Ph.D. in Biophysics.
19. Juliana Rengifo. Graduate, 1999-2000. B. Sc. , M. Sc. Universidad del Valle, Cali, Colombia.
20. Rolando Segura. Graduate, 2000-2003. B. Sc. , M. Sc. Universidad de la Habana. Cuba.

Eduardo Ríos

21. Bradley Launikonis. Postdoctoral, 2001-2006. M. Sc., Ph. D., Australian National University. Now a Lecturer, at University of Queensland, Brisbane, Australia.
21. Xiaoqun Qin. Visiting Professor, 2001. Professor, Physiology Department of Xiangya Medical School in Hunan Medical University, P.R. China
22. Demetrio Santiago. Graduate, 2003-2010. B.Sc., M. Sc. Universidad de Madrid. (Jointly mentored with T. Shannon).
23. Leandro de Olivera Royer. Graduate, 2004-present. B.Sc. M.Sc. Universidade de Sao Paulo.
24. Sandrine Pouvreau. Postdoctoral. 2006. Ph.D. Université de Lyon. Since February 2008: Chargé de Recherche, Conseil National de la Recherche Scientifique, Villeurbanne, France.
25. Monika Sztretye. Postdoctoral. 2007. Ph.D. Medical University of Debrecen, Hungary.
26. Carlo Manno. Postdoctoral. 2009. Ph.D. Instituto Venezolano de Investigaciones Cientificas.
27. Carolina Figueroa. Postdoctoral. 2009. Ph.D. Instituto Venezolano de Investigaciones Cientificas.
28. Yan Li. Graduate Student, 2009 to 2010.
29. Juan Ferreira. Graduate Student, School of Medicine Montevideo and Rush University. Co-mentored with Gustavo Brum. 2011-present.

Publications:

Refereed Papers

- 1) Castro, J., E. Ríos and C. García. Characterization of the "Inotropic Effect" produced on a systole by the preceding ones (in Spanish). *Sístole*, Montevideo 26: 36-47, 1975.
- 2) Ríos, E., J. Castro and C. García. The inotropic memory of amphibian myocardium. I. Identification of two simultaneous mechanisms and statement of a model. *Arch. Int. Physiol. Biochim.* 83: 27-43, 1975.
- 3) García, C., E. Ríos, A. Sánchez, E. Alvarez and E. Barrios. The inotropic memory of amphibian myocardium. II. Quantitative verification of a model. *Arch. Int. Physiol. Biochim.* 85: 435-453, 1977.
- 4) Kovács, L. E. Ríos and M.F. Schneider. Calcium transients and intramembrane

charge movement in skeletal muscle fibres. *Nature* 279: 391-396, 1979.

- 5) Schneider, M.F., E. Ríos, and L. Kovács. Calcium transients and intramembrane charge movement in skeletal muscle. In: *The Regulation of Muscle Contraction: Excitation-Contraction Coupling*, A.D. Grinnell and M.A.B. Brazier, eds. New York: Academic Press, 1980.
- 6) Ríos, E. and M.F. Schneider. Stoichiometry of the reactions of calcium with the metallochromic indicator dyes Antipyrylazo III and Arsenazo III. *Biophys. J.*, 36: 601-621, 1981.
- 7) Kovács, L., E. Ríos and M.F. Schneider. Measurement and modification of free calcium transients in frog skeletal muscle fibres by a metallochromic indicator dye. *J. Physiol. (London)* 343: 161-196, 1983.
- 8) Melzer, W., E. Ríos and M.F. Schneider. Time course of calcium release and removal in skeletal muscle fibers. *Biophys. J.*, 45: 637-641, 1984.
- 9) Schneider, M.F., E. Ríos and W. Melzer. Use of a metallochromic indicator to study intracellular calcium movements in skeletal muscle. *Cell Calcium* 6: 109-118, 1985.
- 10) Melzer, W., E. Ríos and Schneider, M.F. The removal of myoplasmic free calcium
- 11) following calcium release in frog skeletal muscle. *J. Physiol. (London)* 373:481-512, 1986.
- 12) Ríos, E. and Brum, G. Involvement of dihydropyridine receptors in excitation-contraction coupling in skeletal muscle. *Nature*, 325: 717-720, 1987.
- 13) Brum, G. and Ríos, E. Intramembrane charge movement in frog skeletal muscle fibres. *Properties of Charge 2. J. Physiol. (London)*, 387: 489-517, 1987.
- 14) Melzer, W., Ríos, E. and Schneider, M.F. A general procedure for determining calcium release from the sarcoplasmic reticulum in skeletal muscle fibres. *Biophys. J.*, 51: 849-864, 1987.
- 15) Brum, G., Stéfani, E. and Ríos, E. Simultaneous measurements of Ca currents and intracellular Ca concentrations in single skeletal muscle fibres of the frog. *Can. J. Physiol. Pharmacol.*, 65: 681-685, 1987.
- 16) Schneider, M.F., Ríos, E. and Melzer, W. Determining the rate of calcium release from the sarcoplasmic reticulum in muscle fibers. *Biophys. J.*, 51: 1005-1007, 1987.
- 17) Brum, G., Ríos, E. and Stéfani, E. (with an appendix by Brum, G., Ríos E. and Schneider, M.F.). Effects of extracellular calcium on the calcium movements of

Eduardo Ríos

- excitation-contraction coupling in skeletal muscle fibres. *J. Physiol.* 398: 475-505, 1988.
- 18) Brum, G., Fitts, R., Pizarro, G. and Ríos, E. Mobile charges of the skeletal muscle membrane require calcium to function as voltage sensors of excitation-contraction coupling. *J. Physiol.* 398: 441-473, 1988.
 - 19) Pizarro, G., Fitts, R., Uribe, I. and Ríos, E. The voltage sensor of excitation-contraction coupling in skeletal muscle. Ion-dependence and selectivity. *J. Gen. Physiol.* 94: 405-428, 1989.
 - 20) Bean, B.P. and Ríos, E. Non-linear charge movement in the membranes of mammalian cardiac ventricular cells. *J. Gen. Physiol.* 94: 65-93, 1989.
 - 21) Csernoch, L., G. Pizarro, I. Uribe, M. Rodríguez and E. Ríos. Interfering with Ca release suppresses the delayed component of intramembrane charge movement in skeletal muscle. *J. Gen. Physiol.* 97: 845-884, 1991.
 - 22) García, J., E. Ríos and E. Stéfani. Effects of the calcium buffer EGTA on the delayed charge of skeletal muscle. *J. Gen. Physiol.* 97: 885-896, 1991.
 - 23) Pizarro, G., L. Csernoch, I. Uribe, M. Rodríguez and E. Ríos. The relationship between Q and Ca release from the sarcoplasmic reticulum in skeletal muscle. *J. Gen. Physiol.* 97: 913-947, 1991.
 - 24) Physiol. 97: 913-947, 1991.
 - 25) Ma, J., Mundiña-Weilenmann, C., Hosey, M. and Ríos, E. Dihydropyridine-sensitive skeletal muscle Ca channels in polarized bilayers. I. Kinetics and voltage dependence of gating. *Biophys. J.* 60: 890-901, 1991.
 - 26) Mundiña-Weilenmann, C., Ma, J., Ríos, E. and Hosey, M. Dihydropyridine-sensitive skeletal muscle Ca channels in polarized bilayers. II. Effects of phosphorylation by cAMP-dependent protein kinase. *Biophys. J.* 60: 902-909, 1991.
 - 27) Ma, J., Gutiérrez, L., Hosey, M. and Ríos, E. Dihydropyridine-sensitive skeletal muscle Ca channels in polarized bilayers. III. Effects of phosphorylation by protein kinase C. *Biophys. J.* 63: 639-647, 1992.
 - 28) Pizarro, G., Csernoch, L. and Ríos, E. Differential effects of tetracaine on two kinetic components of calcium release in frog skeletal muscle fibres. *J. Physiol.* 457: 525-538, 1992.
 - 29) Shirokov, R., Levis, R., Shirokova, N. and Ríos, E. Two classes of gating current from L-type channels in guinea pig ventricular myocytes. *J. Gen. Physiol.* 99: 863-895, 1992.

Eduardo Ríos

- 30) González, A. and Ríos, E. Perchlorate enhances transmission in skeletal muscle excitation-contraction coupling. *J. Gen. Physiol.* 102: 373-421, 1993.
- 31) Ma, J., Anderson, K., Shirokov, R., Levis, R., González, A., Karhanek, M., Hosey, M.M., Meissner, G. and Ríos, E. Effects of perchlorate on the molecules of excitation-contraction coupling of skeletal and cardiac muscle. *J. Gen. Physiol.* 102: 423-448, 1993.
- 32) Rios, E., Karhanek, M., Ma, J. and González, A. An allosteric model of the molecular interactions of excitation-contraction coupling in skeletal muscle. *J. Gen. Physiol.* 102: 449-481, 1993.
- 33) Shirokov, R., Levis, R., Shirokova, N. and Ríos, E. Ca^{2+} -dependent inactivation of cardiac L-type Ca^{2+} channels does not affect their voltage sensor. *J. Gen. Physiol.* 102: 1005-1030, 1993.
- 34) Shirokova, N., Pizarro, G. and Ríos, E. A damped oscillation in the intramembranous charge movement and calcium release flux of frog skeletal muscle fibers. *J. Gen. Physiol.* 104: 449-477, 1994.
- 35) Shirokova, N., González, A., Ma, J., Shirokov, R. and Ríos, E. Properties and roles of an intramembranous charge mobilized at high voltages in skeletal muscle. *J. Physiol.* 486: 385-400, 1995.
- 36) Tsugorka, A., Ríos, E., and Blatter, L.A. Imaging elementary events of calcium release in skeletal muscle cells. *Science* 269:1723-1726, 1995.
- 37) Chien, A.J., Zhao, X., Shirokov, R.E., Puri, T.S., Chang, C.F., Sun, D., Ríos, E., and Hosey, M. Roles of a Membrane-localized Subunit in the Formation and Targeting of Functional L-type Ca^{2+} Channel. *J. Biol. Chem.* 270:30036-30044, 1995.
- 38) Shirokova, N., García, J., Pizarro, G. and Ríos, E. Ca^{2+} release from the sarcoplasmic reticulum compared in amphibian and mammalian skeletal muscle. *J. Gen. Physiol.* 107:1-18, 1996.
- 39) Shirokova, N. and Ríos, E. Caffeine enhances intramembranous charge movement in frog skeletal muscle by increasing cytoplasmic Ca^{2+} concentration. *J. Physiol.* 493:341-356, 1996.
- 40) Shirokova, N. and Ríos, E. Activation of Ca^{2+} release by caffeine and voltage in frog skeletal muscle. *J. Physiol.* 493:317-339, 1996.
- 41) J. Chien, K.M. Carr, R.E. Shirokov, E. Rios and M.M. Hosey Identification of Palmitoylation Sites within the L-type Calcium Channel 2a Subunit and Effects on Channel Function. *J. Biol. Chem.* 271 26465-26468, 1996 .
- 42) Meissner, G., Ríos, E., Tripathy, A., and Pasek, D.A. Regulation of skeletal

Eduardo Ríos

muscle Ca^{2+} release channel (ryanodine receptor) by Ca^{2+} and monovalent cations and anions. *J. Biol. Chem.*, 272:1628-1638, 1997.

- 43) Ríos, E. and Stern, M. Calcium in Close Quarters: Microdomain feedback in excitation-contraction coupling and other cell biological phenomena. *Ann. Rev. Biophys. Biomolec. Struct.*,26:47-82, 1997.
- 44) Blatter, L.A., Hüser, J and Ríos, E. Sarcoplasmic reticulum Ca^{2+} release flux underlying Ca^{2+} sparks in cardiac muscle. *PNAS* 94: 4176-4181, 1997.
- 45) Pizarro, G., Shirokova, N., Tsugorka, A. and Ríos, E. "Quantal" calcium release operated by membrane voltage in frog skeletal muscle. *J. Physiol.* 501: 289-303, 1997.
- 46) Ferreira, G., Yi, J., Ríos, E., and Shirokov, R. Ion-dependent inactivation of barium current through L-type calcium channels. *J. Gen. Physiol.* 109:449-462, 1997.
- 47) Shirokova N and Ríos, E. Small event Ca^{2+} release: a probable precursor of Ca^{2+} sparks in frog skeletal muscle. *J. Physiol.* 502: 3-11, 1997.
- 48) Stern, M.D., G. Pizarro and E. Ríos. A local control model of excitation-contraction coupling in skeletal muscle. *J. Gen. Physiol.* 110: 415-440, 1997.
- 49) Shirokov, R., Ferreira, G., Yi, J. and Ríos, E. Inactivation of gating currents of L-type calcium channels. Specific role of the α_2 subunit. *J. Gen. Physiol.* 111:807-823, 1998.
- 50) Zhou, J., Cribbs, L., Yi, J., Shirokov, R., Perez-Reyes, E. and Ríos, E. Molecular cloning and functional expression of a skeletal muscle dihydropyridine receptor form *Rana catesbeiana*. *J. Biol. Chem.* 273:25503-25509, 1998.
- 51) Shirokova, N., J. García and E. Ríos. Local calcium release in mammalian skeletal muscle. *J. Physiol.* 812:377-384, 1998.
- 52) Cheng, H., L.S. Song, N. Shirokova, A Gonzalez, e.G. Lakatta , E. Ríos and M.D. Stern. Amplitude distribution of calcium sparks in confocal images. Theory and studies with an automatic detection method. *Biophys. J.* 76: 606-617, 1999.
- 53) Mejía-Alvarez, R., C. Kettlun, E. Ríos, M.D. Stern and M. Fill. Unitary Ca^{2+} Current through Cardiac Ryanodine Receptor Channels under Quasi-Physiological Ionic Conditions. *J. Gen. Physiol.* 113: 177-186, 1999.
- 54) Stern, M.D., L. Song, H. Cheng, J. Sham, HT Yang, K.R. Boehler and E. Ríos. Local control models of cardiac excitation-contraction coupling: a possible role for allosteric interactions between ryanodine receptors. *J. Gen. Physiol.* In press, 1999.

- 55) Stern, M.D., L. Song, H. Cheng, J. Sham, HT Yang, K.R. Boehler and E. Ríos. Local control models of cardiac excitation-contraction coupling: a possible role for allosteric interactions between ryanodine receptors. *J. Gen. Physiol.* 113: 469-490, 1999.
- 56) Shirokova, N., A. Gonzalez, W.G. Kirsch, E. Ríos, G. Pizarro, M.D. Stern and H. Cheng. Calcium Sparks: release packets of uncertain origin and fundamental role. *J. Gen. Physiol.* 113: 377-384, 1999.
- 57) Rios, E., M.D. Stern, A. Gonzalez, G. Pizarro, and N. Shirokova. Calcium release flux underlying Ca²⁺ sparks of frog skeletal muscle. *J. Gen. Physiol.* 114:31-48.1999.
- 58) Shirokova, N., R. Shirokov, D. Rossi, A. Gonzalez, W.G. Kirsch, J. Garcia, V. Sorrentino and E. Ríos. Spatially segregated control of Ca²⁺ release in developing skeletal muscle. *J. Physiol.* 521: 483-495. 1999.
- 59) Gonzalez, A., W.G. Kirsch, N. Shirokova, G. Pizarro, M.D. Stern and E. Rios. The spark and its ember: separately gated components of Ca release in skeletal muscle. *J. Gen. Physiol.* 115:139-158. 2000.
- 60) González, A., W.G. Kirsch, N. Shirokova, G. Pizarro, G. Brum, I.N. Pessah, M.D. Stern, H. Cheng and E. Ríos. Involvement of multiple intracellular release channels in calcium sparks of skeletal muscle. *PNAS USA*, 97:4380-4385. 2000.
- 61) G. Brum, A. Gonzalez, J. Rengifo, N. Shirokova and E. Ríos Fast imaging in three dimensions resolves extensive sources of Ca sparks in frog skeletal muscle. *J. Physiol.* 2000.
- 62) E. Ríos, N. Shirokova, W.G. Kirsch, G. Pizarro, M.D. Stern, H.Cheng, and A. González. A preferred amplitude of Calcium Sparks in skeletal muscle. *Biophys. J.* 80: 169-183, 2001.
- 63) SQ Wang, LS Song, L Xu, G Meissner, EG Lakatta, MD Stern, E Ríos, H Cheng. 2002. Thermodynamically irreversible gating of ryanodine receptors in situ, revealed by stereotyped release in Ca²⁺ sparks. *Biophys. J.* 83: 242-251.
- 64) J. Rengifo, R. Rosales, A. González, H. Cheng, M.D. Stern, and E. Ríos . 2002. Ca release as irreversible Markov Process. *Biophys J.* 83:2511-2521.
- 65) G Ferreira, E. Ríos and N. Reyes. 2003. Two components of voltage-dependent inactivation in Cav 1.2 channels revealed by its gating currents. *Biophys. J.* 84:3662-78.
- 66) J. Zhou, G. Brum, A. González, B.S. Launikonis, M.D. Stern, E. Ríos. 2003. Ca²⁺ sparks and embers of mammalian muscle. Properties of the sources. *J.*

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Eduardo Ríos

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Book

Ríos, E. Transport and Excitability, Functions of Cell Membranes. (In Spanish). Department of Publications, University of Montevideo, 1981. This is the introductory textbook on membrane physiology currently used in the schools of Medicine, Dentistry, Sciences, Agriculture and Veterinary Medicine.

Multimedia

Rios E. The Cell Boundary Theorem. Henry Stewart Lectures on Calcium Signaling. http://hstalks.com/main/view_talk.php?t=2210&r=13&c=252

Rios E. Did Alan Hodgkin dream of calcium sparks?
jgp-soundsphys.rupress.org/2015/05/25/eduardo-rios/

May 25, 2015 - A conversation with Eduardo Ríos on post-Hodgkin thought, the voltage

Eduardo Ríos

sensor in EC coupling, calcium sparks, and the university system in Uruguay. Produced by Elizabeth Adler, Executive Editor, Journal of General Physiology.

Other

I write a column titled "Chronicles from the Far North", of approximately monthly frequency, in "Batoví", an Uruguayan weekly. In it, I share with my former fellow citizens the experience of migration, and societal and cultural contrast.

Selected Lectures at International Symposia:

Excitation Contraction Coupling. Instituto Mexicano de Cardiología, Mexico, 1978.

Antipyrylazo III measures and modifies Ca transients in skeletal muscle fibers. Guanajuato, Mexico, 1981. Satellite Symposium of the 7th International Biophysics Congress.

Time course of Ca release from the sarcoplasmic reticulum. Gordon Conference on Muscle; Tilton, New Hampshire, 1983.

Kinetics of Ca release: an experimental measurement of the transmission time at the triadic gap. Gordon Conference on Muscle; Tilton, New Hampshire, 1985.

Effects of calcium on calcium release and intramembrane charge movements in skeletal muscle. Gordon Conference on Muscle; Tilton, New Hampshire, 1985.

Calcium, calcium blockers and excitation-contraction coupling. Symposium on Muscle. Ruhr University, Department of Physiology, Bochum, West Germany, 1986.

Modulation of intramembrane charge movement and Ca release from the Sarcoplasmic Reticulum. Symposium on Muscle. FASEB, 71st Annual Meeting, Washington, DC, 1987.

Voltage sensitivity of ion channels. Latin American Federation of Physiological Sciences. Facultad de Ciencias, Montevideo, Uruguay, May 7, 1988.

The voltage sensor of EC coupling. A comparison with Ca channels. Bayer 100th anniversary symposium: The Ca channel, structure, function and implications. Stresa, Italy, May 13, 1988.

A third role of calcium in skeletal muscle excitation-contraction coupling. Workshop: Signal Transduction in Biological Systems". Valparaiso, Chile, May 30, 1988.

Gordon Conference: Skeletal Muscle EC coupling. Plymouth, N.H., 1988. Leader of the Session: Intramembrane Charge Movement, Ca and Membrane Proteins.

Intramembrane Charge Movements in Rat Cardiac Myocytes. Annual Meeting of the International Society for Heart Research. Williamsburg, Virginia, June 27, 1988.

Eduardo Ríos

The voltage sensor of excitation-contraction coupling. A comparison with Ca channels. In "Molecular Aspects of Excitation-Contraction Coupling." Workshop of the Biophysical Society. Cincinnati, February 13, 1989.

From TT to SR and Back. Transmission in skeletal muscle excitation-contraction coupling. 1st Ibero American Congress of Biophysics. Sevilla, Spain, September 1989.

Positive feedback in excitation-contraction coupling. Department of Physiology, University Medical School. Debrecen, Hungary. September 29, 1989.

Positive feedback in excitation-contraction coupling. Centre of Physiological Sciences. Slovak Academy of Sciences. Bratislava, Chekoslovakia. October 2, 1989.

Excitation-contraction coupling in skeletal muscle. Marquette Life Sciences Symposium. Marquette University, Milwaukee. March 1990.

Intramembrane charge movements in Excitation-Contraction coupling. Session leader, Gordon Conference on Muscle, Tilton, N.H. 1991.

The dihydropyridine receptors of skeletal and cardiac muscle, a comparison of functional aspects. American Physiological Society Symposium "From channels to cross bridges." Mt. Desert Island, Maine, 1991.

Calcium homeostasis in skeletal muscle. International School of Biophysics. Erice, Italy, 1991.

Excitation-contraction coupling in skeletal and cardiac muscle. International School of Biophysics. Erice, Italy, 1991.

Cellular mechanisms of excitation-contraction coupling. Symposium on Muscle Fatigue, The American Physiological Society, Augusta, GA, 1992.

Excitation-contraction coupling in skeletal muscle. Elements of a molecular picture. Biomembrane subgroup, Annual Meeting of the Biophysical Society, Houston, TX, 1997.

An allosteric model of excitation-contraction coupling. Symposium on Muscle. Meeting of the International Union of Physiological Sciences. Glasgow, 1993.

An allosteric model of excitation-contraction coupling. Symposium on Signal Transduction. Meeting of the International Union of Pure and Applied Biophysics. Budapest, 1993

Current concepts on Excitation-contraction coupling in skeletal muscle. Annual Meeting of the Biophysical Society, Contractility Subgroup. New Orleans, LA, 1994.

Signal transduction in skeletal and cardiac muscle. Latin American Association of Physiological Sciences. Montevideo, Uruguay, 1994.

Eduardo Ríos

Measurement of intracellular calcium. International course on signal transduction. Debrecen, Hungary, 1994.

Excitation-Contraction Coupling. Invited Lecture at the European Muscle Club. Ruhr University, Bochum, Germany, 1994.

Imaging Elementary Events of Ca^{2+} Release. Annual Symposium of the Society of General Physiologists. Woods Hole, MA, 1995.

Microdomain control of Ca release. FASEB symposium on "Local Ca Signaling". Washington, D.C., 1996.

Ca^{2+} signaling in muscle. Keynote address to the TriBeta Research Meeting, Univ. Wisconsin at Stevens Point, 1997.

Ca^{2+} sparks and the control of Ca^{2+} release in skeletal muscle. 1st K-JIST International Symposium on Life Science: "Excitation-Contraction Coupling". Seoul, South Korea, 1998.

Sparks, quarks and E-C coupling. The University of Tokyo. 1998.

True distribution of spark sizes in skeletal muscle. Annual Symposium of the Society of General Physiologists. Woods Hole, Massachusetts, 1998.

Ca sparks and couplons: functional emergents of Ca release in muscle. The Latin American Federation of Physiological Societies. Cancún, Mexico, 2000.

Ca sparks and couplons: functional emergents of Ca release in muscle. The Ibero American congress of biophysics. Alicante, Spain, 2000.

The significance of Ca sparks in E-C Coupling. Symposium of the Biophysical Society, Boston, 2001.

Sparks, so what? Keynote Address, the Midwest Physiological Society. Madison, Wisconsin, 2001.

From molecular events to cellular function in excitation-contraction coupling. The European Muscle Society, Pavia, Italy, 2001.

Ca^{2+} sparks of mammalian muscle. Initial studies. The International Union of Pure and Applied Biophysics. Satellite Symposium. Montevideo, 2002.

Control of dual isoforms of Ca^{2+} release channels in muscle. International Symposium on Intracellular Ca Channels. Marbella Resort, Chile, 2003.

Ca control inside the SR. Plenary Lecture. The Ibero-American congress of Biophysics. Rio de Janeiro, Brasil, 2003.

Eduardo Ríos

Concerted and sequential activation of Ca release channels. The Gordon Conference on Muscle. New Hampshire, 2003.

Ca control inside the Sarcoplasmic Reticulum. Symposium on Calcium Signaling. Biophysical Society meeting. Long Beach, California, 2005.

Ca control inside the Sarcoplasmic Reticulum. Plenary Lecture, European Muscle Congress, Hortobagy, Hungary, 2005.

The elusive role of store depletion in the control of intracellular calcium release. European Muscle Conference, Heidelberg, 2006.

Expression in muscle of living mice clarifies the functional roles of crucial proteins. Gordon Research Conference on Calcium Signaling, Tilton, NH, 2007.

Termination of Ca release. Gordon Research Conference on Muscle. Waterville Valley, NH, 2009.

Deconstructing Calsequestrin. Symposium on Calsequestrin, Triadin and More. Boston, NH, 2009.

Control of Calcium Release in Skeletal Muscle. The Role of Calcium Content in the Cellular Store. New Horizons in Calcium Signaling. International Meeting of the Biophysical Society, Beijing, China, 2010.

Probing Excitation-Contraction Coupling with artificial Ca sparks. In "New Optical Methods in Cell Physiology", 63 Symposium of the Society of General Physiologists. Woods Hole, Massachusetts, September 10, 2010.

Direct measurement of Ca buffering properties of the sarcoplasmic reticulum. Gordon Conference on Muscle. Les Diablerets, Switzerland, June 8, 2012.

Puskás Ferenc and the control of fast calcium signals in muscle. Plenary lecture in the one-hundredth anniversary of the University of Debrecen (Joint meeting of the Hungarian biological societies). Debrecen, Hungary, June 12, 2012.

Termination of Ca release in skeletal and cardiac muscle. V IberoAmerican Congress of Biophysics. Valparaíso, Chile, 2013.