

**Dr. Jose Rey-Ladino, PhD (Parasitology), PhD  
(Microbiology and Immunology)  
Citizenship : Canadian**

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**Biography**

Dr Jose Rey-Ladino is currently a Professor of Microbiology & Immunology at Al Faisal University, School of Medicine, Riyadh, Saudi Arabia. Dr. Rey-Ladino's teaching and research interests lie broadly in the realm of microbiology, immunology, infectious diseases and vaccine development. He completed a Ph.D in Parasitology at The Veterinary Institute in Saint Petersburg, Russia in 1982. Then he joined the International Centre for Tropical Medicine (Tulane University-Colciencias) in Cali, Colombia, where he developed research on pathogenesis of cutaneous and mucocutaneous leishmaniasis. He was awarded with a Research Fellowship from the World Health Organization and completed a second Ph.D. in Immunology and Microbiology at the University of British Columbia, Canada in 1996. He then received a Canadian CIHR Fellowship to study regulation of T and B lymphocyte adhesion and migration, the BC Cancer Research Center, Vancouver, Canada. He worked as senior scientist at the Center for Disease Control (CDC), Canada, where he developed an immunoproteomics approach to identify *Chlamydia trachomatis* vaccine candidate antigens. Before joining Al Faisal, Dr Rey-Ladino was Associate Professor at Griffith University in Australia. His current activities include, teaching medical and graduate students, curriculum development for medical and graduate students.

**Countries of Work Experience**

Canada, Australia, Colombia, Russia, The Philippines, Saudi Arabia.

**Languages**

English, Spanish and Russian

**Education**

1990-1996	<b><i>Ph.D., Microbiology and Immunology</i></b> UNIVERSITY OF BRITISH COLUMBIA, Vancouver, Canada
1978-1982	<b><i>Ph.D., Biology (Parasitology)</i></b> SAINT-PETERBURG VETERINARY INSTITUTE, Saint Petersburg, Russia
1973-1977	<b><i>Bachelor of Science (BSc) (Biology)</i></b> UNIVERSITY OF LOS ANDES, Bogota, Colombia

<b>Awards &amp; Fellowships</b>	
2005	<i>Distinguished Citizen</i> , Colombian Minister of Foreign Affairs. Vancouver, Canada.
1995	<i>Investigator Award</i> , the American Federation of Clinical Research, San Diego, CA (USA)
1995	<i>Investigator Award</i> , the American Association of Clinical Investigation. San Diego, CA (USA)
1993	<i>Investigator Award</i> , the Canadian Society for Clinical Investigation, Vancouver, Canada (1993).
1989-1996	<i>Research Fellowship</i> , World Health Organization, Geneva, Switzerland
1997-1999	<i>Institute for Health Research (CIHR) Fellowship</i> , Vancouver Canada
1978-1983	<i>Research Fellowship, the Colombian-Russian Agreement</i> on Cultural and Scientific Exchange. Leningrad Veterinary Institute, Saint Petersburg, Russia
<b>Work History</b>	
2011-Present	<i>Professor of Microbiology &amp; Immunology</i> , Al Faisal University,
2011-Present	<i>Adjunct Professor</i> , Inf. Diseases, Griffith University, Australia
2008-2011	<i>Senior Research Fellow</i> , Inf. Diseases, Griffith University, Australia
2002-2008	<i>Senior Research Scientist</i> , University of British Columbia Centre for Disease Control (UBC-CDC), Vancouver, British Columbia, Canada
	University of British Columbia, MSc/PhD Supervisor
1999-2002	<i>Senior Research Associate</i> , BC Cancer Research Centre, Vancouver, British Columbia, Canada
	University of British Columbia, MSc/PhD Supervisor
1996-1999	<i>Post-Doctoral Fellow</i> , BC Cancer Research Centre, Terry Fox Laboratory, Vancouver, British Columbia, Canada
1990- 1996	<i>PhD Candidate</i> , University of British Columbia, Vancouver, British Columbia, Canada
1986-1989	<i>Research Associate</i> , International Centre for Tropical Medicine (CIDEIM), Cali, Colombia
1983-1985	<i>Professor of Microbiology, Immunology &amp; Biology</i> , University of Malaga, Malaga, Colombia

1977-1982

*PhD Candidate*, Leningrad Veterinary Institute, Saint Petersburg, Russia

### Teaching experience- Medical Microbiology, Medical Parasitology and Infectious Diseases

2011-Present	Teaching microbiology and Immunology for undergraduate medical students, Alfaisal University, School of Medicine.  Teaching microbiology for undergraduate Science Students, Alfaisal University, School of Science.  Teaching an Infection and Immunity course for graduate students. Graduate Program in Molecular Biomedicine, College of Medicine, Alfaisal University and KFHRM.
2008-2011	Teaching Microbiology and Infectious Diseases at the Graduate level and coordinating and supervising health projects for graduate students at Griffith University, Public Health
2002-2008	UBC Centre for Disease Control. Training Grad Students and Post-Doctoral Fellows in laboratory Research, Vancouver, Canada.
1999-2002	BC Cancer Research Centre. Training graduate and undergraduate students in laboratory research, The University of British Columbia, Vancouver, Canada.
1983-1985	Professor. Teaching undergraduate courses in Medical Microbiology, Medical Parasitology and Biology. Universidad Industrial de Santander, Malaga, Colombia.

### Current research topics in infectious diseases, vaccine development and adjuvant discovery

- Testing vaccine adjuvants for Th1 type vaccines
- Antigen discovery based on identification of immuno-peptides from cell surface MHC molecules. Validation of immuno-peptides as potential vaccine candidates
- Vaccine trials, animal models.
- Testing T cell antigens.
- Testing molecular mechanisms of leukocyte activation and migration
- The role of dendritic cells in the development of Th1 immunity in intra-cellular infections
- Microbiology and immunobiology of sexually transmitted *Chlamydia*
- Microbiology and immunobiology of cutaneous leishmaniasis infections
- Biology of infectious diseases
- Vaccine development for *Leishmania*

### Administrative Experience

2012-Present	Infection and Immunity program, Master in Biomedical Science, School of Medicine, Al Faisal University.
2011-2012	Assessment and Accreditation Committee, Alfaisal University.
2011-2012	Research Committee, College of Medicine, Al Faisal University.
2011-Present	Associate member of the Self Design Graduate Institute, Vancouver, Canada.
2007-Present	Member, Board of Directors of the Living Language Institute Foundation (LLIF),

Vancouver, Canada.

2007-present	Founder of <i>JRL Immune Research</i> , a laboratory-based organization that test natural products for immune-modulators and vaccine adjuvants.
1988-1990	Founder and Head of the Mutual Economic Fund for Researchers and Employees, CIDEIM. Cali, Colombia.
1988-1989	Manager of the research laboratory, CIDEIM, Cali, Colombia.

### Current Medical Research Grants

- **A novel approach to *Chlamydia trachomatis* vaccine development: targeting vaccines to dendritic cells (DCs) in vivo.** Total to be requested 2,000,000 SARs. Source: Saudi Arabia KACST (**J. Rey-Ladino**, Mohammed Al-Ahdal, Ahmed Al-Qhatani, Abiola Senok, Atef Shibl, Alan Cripps). (To be submitted, March 2013).
- **Identification of *Leishmania major* antigens for vaccine development.** Rey-ladino, Jose, Waleed Alghamadi, Mohammed N. Al-Ahdal, Atef Ahibl, Ahlam Al Shedoukhy and Abiola Senok. Total to be requested 1,000,000 SARs. Source: Saudi Arabia KACST. (To be submitted, April, 2013).
- Population dynamics of methicillin resistant *Staphylococcus aureus* colonization in Saudi Arabia, 2012. Total requested 1,524,000 SARs. Source: Saudi Arabia KACST (Abiola Senok, Mohammed Al-Ahdal, Atef, Shibl, **J. Rey-Ladino** and Ahmed Al-Qhatani. In review.
- **Integrated control for the elimination of schistosomiasis from the Philippines, 2012.** Application No 1010408. Total requested 1, 800, 000 (AUD\$) over five years. Source: NHMRC (A. Ross, R. Olveda, GM. Williams, L. Leonardo, L. Yuesheng, L. Acosta, D. Stewart, D. Gray, R. Bergquist , **J. Rey\_ladino**. Funded
- **Development of *Chlamydia* T cell vaccines based on DCs immunoproteomics,** The UBC CDC Canada, 2007. 750.000 (US\$) over three years. Source: NIH (R. Brunham, LJ. Foster, **J. Rey-Ladino** and K. Karunakaran). Funded
- **Hidden injection drug networks in Southeast Queensland: from social and molecular analysis to secondary prevention,** 2011. Application No 1010409. Total requested 475,000 (AUD\$) over three years. Source: NHMRC (A. Ross, S. Dawe, C. Aitken, D. Stewart, **J. Rey-Ladino**, J. Sun, D. Gray). Not funded.
- **Identification of novel vaccine adjuvants within a collection of natural product, the Eskitis Institute, 2013.** Griffith University and the Eskitis Institute, Australia: (**J. Rey-Ladino**, A. Cripps, A. Ross and R. Quinn). To be submitted to CSL Biotherapies Australia.
- **Identification of novel *Chlamydia* vaccine antigens from the cell surface MHC of human dendritic cells.** Griffith University and the Eskitis Institute, Australia: (**J. Rey-Ladino**, A. Cripps, A. Ross and R. Quinn). Project in preparation.

### Reviewer for scientific journals

- Critical Reviews in Immunology
- Immunology
- Journal of Biomedicine and Biotechnology
- Vaccine

### Curriculum development

- Infection and Immunity Curriculum development for graduate medical students
- Preparation of problem based learning protocols and cases for undergraduate medical students
- Development of a graduate program for Master students in medical sciences
- Preparation of protocols for assessment in medical education
- Creating a Microbiology program for undergraduate students, Science Department.

### Past and present collaborations

- **Prof. Allan Cripps**, Griffith University, Australia. Development of a *Chlamydia* vaccine based on targeting dendritic cells in vivo. Ongoing collaboration.
- **Prof Alexzander Asea**, Department of Microbiology, Biochemistry and Immunology, Morehouse School of Medicine, Atlanta, USA. On-going collaboration.
- **Prof Allen Ross**, Griffith University, Australia. Integrated control for the elimination of schistosomiasis from the Philippines. On-going collaboration.
- **Prof Neil Reiner**, The University of British Columbia, Canada. Discovery of antigens in *Leishmania major*.
- **Prof Fumio Takei**, The BC Cancer Research Centre, Canada. Molecular immunology in T and B cells.
- **Prof Ralf Steinman**, The Rockefeller University. Development of vaccine against *Chlamydia trachomatis* based on targeting dendritic cells, New York, USA.
- **Prof Nancy Gore Saravia**, International Centre for Tropical Medicine, Cali, Colombia.
- **Prof. R. Quinn**, Eskitis institute, Australia. Identification of vaccine adjuvants within the Eskitis collection of natural products.
- **Prof. D. McManus**, QIMR, Australia. Discovery of new vaccine candidate antigens for *Schistosoma Japonicum*.
- **Prof. Megan Levings**, Department of Microbiology and Immunology, University of British Columbia, Canada. The role of regulatory T cells in the development of asthma during infection.

### Peer Reviewed Publications

1. Rey-Ladino, J, Senok, A. Sarkar, A. E. H., and Al Shedoukhy, 2013. The role of heat shock proteins 70 (HSP70) family in infection and in immunity. In: Heat Shock Proteins. Alexzander A. A. Asea, Stuart K. Calderwood, editors (Submitted).
2. **Rey-Ladino, J.**, A.G. Ross and A. Cripps, 2013. Developing a Sexually Transmitted *Chlamydia trachomatis* vaccine. Vaccine journal (in review).
3. **Rey-Ladino, J.** Allen G. Ross, Allan W Cripps, Donald P. McManus and Ronald Quinn, 2011. Natural Products and the search for adjuvants, *Vaccine*, 29(38): 6464-71
4. D.P. McManus, D. J. Gray, Y Li, G. M. Williams, Z. Feng, **J. Rey-Ladino**, D. Stewart, & A.G. Ross (2010). Schistosomiasis in the People's Republic of China: The Era of the Three Gorges Dam. *Clinical Microbiology Reviews*, April; 23 (2): 442-466

5. Jiang, X., Shen, C., **Rey-Ladino, J.**, Yu, H. and Brunham, RC. 2008. Characterization of a dendritic cell line (JAWS II) and bone marrow-derived dendritic cells in *Chlamydia* antigen presentation and induction of protective immunity. *Infection and Immunity*, 78(6): 2392-401.
6. Karunakaran, KP., **Jose Rey-Ladino**, Nikolay Stoyanov, Kyra Berg, Caixia Shen, Xiozhou Jiang, Leonard, J. Foster and Robert C. Brunham, 2008. The immune proteome of *Chlamydia*: discovery and evaluation of novel T cell antigens. *Journal of Immunology*, 180(4): 2459-65.
7. **Rey-Ladino, Jose**, Xiaozhou Jiang, Brent Gabel, Caixia Shen and Robert C. Brunham. 2007. Survival of *Chlamydia muridarum* within dendritic cells. *Infection and Immunity*, 75(8):3707-14.
8. Neill, Leanne, Amy H. Tien, **Jose Rey-Ladino** and Cheryl D. Helgason, 2007. SHIP-deficient mice provide insights into the regulation of dendritic cell development and function. *Experimental Hematology*, 35(4):627-39.
9. Zaharik L., Michelle, Tarun Nayar, Rick White, Caixia Ma, Bruce A. Vallance, Nadine Straka, Joanne Jiang, **Jose Rey-Ladino**, Caixia Shen, and Robert C. Brunham. 2007. Genetic profiling of dendritic cells exposed to live- or UV-irradiated *Chlamydia muridarum* reveals marked differences in CXC chemokine profiles. *Immunology*, 120 (2): 160-72.
10. **Rey-Ladino, Jose**, Xiaozhou Jiang, Caixia Shen and Robert C. Brunham, 2006. Targeting dendritic cells (DCs) for vaccination against Chlamydia infection. In: *Chlamydial infections. Proceedings of the Eleventh International Symposium on Human Chlamydial Infections*. Niagara-on-the-Lake, Ontario, Canada, June, 2006, pp.393-399. M. Chernesky editors. International Chlamydia Symposium, San Francisco, 2006, CA 94110, USA.
11. Zaharik L., Michelle, Tarun Nayar, Rich White, Jonathan Lo, Kasra M. Koochesfahani, **Jose Rey-Ladino**, Caixia Shen, and Robert C. Brunham, 2006. Genetic Profiling of dendritic cells exposed to live- or UV- irradiated Chlamydia muridarum reveals marked differences in CXC chemokine profiles. In: *Chlamydial infections. Proceedings of the Eleventh International Symposium on Human Chlamydial Infections*. Niagara-on-the-Lake, Ontario, Canada, June, 2006. M. Chernesky editors. International Chlamydia Symposium, San Francisco, 2006, CA 94110, USA.
12. Brunham Robert C., and **Jose Rey-Ladino**, 2005. Immunology of *Chlamydia* infection: implications for a *Chlamydia trachomatis* vaccine. *Nature Reviews Immunology*, 5:149-161.
13. **Rey-Ladino, Jose**, Koochesfahani KM, Shen C, Brunham RC, 2005. A live and inactivated *Chlamydia trachomatis* mouse pneumonitis strain induces the maturation of dendritic cells that are phenotypically and immunologically distinct. *Infection and Immunity*, 73:1568-77.
14. Reza MM, **Jose Rey-Ladino (co-principal)**, 2003. Faye DL, Shaw D, and Takei, F. Membrane cholesterol regulates LFA-1 function and lipid rafts heterogeneity. *Blood*, 102:215-22.
15. **Rey-Ladino, Jose**, Huber M, Liu L, Damen EJ, Krystal G, Takei F. 1999. The SH2-containing inositol-5'-phosphatase, SHIP, enhances LFA-1 (CD11a/CD18)-mediated cell adhesion and defines two signaling pathways for LFA-1 activation. *Journal of Immunology*, 162: 5792-99.
16. **Rey-Ladino, Jose**, Pyszniak A, Takei F, 1988. Dominant-negative effect of the lymphocyte function associated antigen-1 CD18 cytoplasmic domain on leukocyte adhesion to ICAM-1 and fibronectin. *Journal of Immunology*, 160: 3494-3501.



17. **Rey-Ladino, Jose**, Joshi P, Singh B, Gupta R, Reiner NE, 1997. Molecular cloning, sequencing and expression of the Heat Shock Protein 60 Gene of *Leishmania major* reveals unique carboxy terminal peptide sequences. *Experimental Parasitology*, 85:249-57.
18. **Rey-Ladino, Jose**, and Reiner NE, 1993. Expression of 65- and 67-Kilodalton heat-regulated proteins and 70-Kilodalton heat shock cognate protein of *Leishmania donovani* in macrophages. *Infection and Immunity*, 61:3265-72.
19. **Rey-Ladino, Jose**, Travi BL, Valencia AZ, Saravia NG, 1990. Infectivity of the subspecies of the *Leishmania braziliensis* complex *in vivo* and *in vitro*. *American journal of Tropical Medicine and Hygiene*, 43:623-31.
20. Travi BL, **Rey-Ladino Jose**, Saravia NG. 1988. Behavior of *Leishmania braziliensis* s.l. in golden hamsters: Evolution of the infection under different experimental conditions. *Journal of Parasitology*, 74:1059-62.
21. **Rey-Ladino, Jose**, 1982. Mechanism of action of the polyene antibiotics levorin and Na-levorin on *Trypanosome lewisi*. *Proceedings of the Leningrad State Press*, Leningrad Institute of Veterinary Sciences. UDK 619: 616.993.161.13-085, Saint Petersburg, Russia.

#### Peer reviewed conferences

22. **Rey-Ladino, Jose**. Natural products (NP) as a source of vaccine adjuvants. Medical Research Conference, QIMR, Griffith University and the Eskitis Institute. November 10-14, 2010. Brisbane, Queensland, Australia.
23. Allen G. Ross, **Rey-Ladino, Jose** and Allan Cripps. Toward integrated control of blood born viruses and sexually transmitted infections. HIV and sexual health research forum, Queensland Health, October, 15, 2009, Brisbane, Australia.
24. **Rey-Ladino, Jose**. Dendritic cells infected with Chlamydia as source of T cell antigens Queensland STI & HIV Research Forum, May 21, 2009, Brisbane. Australia.
25. **Rey-Ladino, Jose**. Use of dendritic cells to identify potential adjuvants for T cell vaccines. Gold Coast Health and Medical Research Conference. The Griffith Institute for Health and Medical Research (GIHMR), 4-5 December 2008. Goald Coast, Australia.
26. **Rey-Ladino, Jose**, Jiang, X, Shen C., and Brunham, RC. In vivo interaction of dendritic cells (DCs) and *Chlamydia*: Possible role of DCs in harboring live *Chlamydia* organisms. 9<sup>th</sup> International Conference on Dendritic Cells, September, 16-20, 2006. Edinburgh, Scotland
27. Zaharik ML., **Rey-Ladino J.**, and Brunham RC. Delta4 expression on murine-bone marrow derived dendritic cells: implications for chlamydial vaccine development. 9<sup>th</sup> International Conference Dendritic Cells, September, 16-20, 2006. Edinburgh, Scotland.
28. **Rey-Ladino, Jose**, Koochesfahani KM, Shen C, Brunham RC. Maturation of dendritic cells is required for the development of DC-mediated protective immunity to *Chlamydia trachomatis* mouse pneumonitis infection: implications for vaccine development. Keystone Symposia, February 1-7, 2005. Vancouver, BC, Canada,
29. Michelle Zaharik, Tarum Nayar, Rick White, Kasra M. Koochesfahni, **Jose Rey-Ladino**, Caixia Shen, and Robert C. Brunham. Gene expression profiling of murine bone marrow-derived dendritic cells upon infection with *Chlamydia trachomatis*: implications for vaccine development. Keystone Symposia, February 1-7, 2005. Vancouver, BC, Canada,
30. **Rey-Ladino, Jose**, Koochesfahani KM, Shen C, Brunham RC. Live but not inactivated *Chlamydia* organisms induce full dendritic cell (DC) maturation. 8<sup>th</sup> International Symposium on Dendritic Cells,

17-21 October, 2004. Brugge, Belgium.

31. Tien, A., Bremner, C. Jose **Rey-Ladino**, Cheryl D. Helgason. Analysis of dendritic cell development and phenotype in a mouse model of prostate cancer. The Keystone Meeting, January 2003). Keystone, Colorado, USA.
32. **Rey-Ladino, Jose**, Caroline Bodner, R. Keith Humphries, and Cheryl D. Helgason. SHIP (SH2 containing inositol-5-phosphatase) regulates dendritic cell development and homeostasis. Seventh symposium on dendritic cells, September 17-24, 2002. Bamberg, Germany.
33. **Rey-Ladino, Jose**, Kieran Quinn, Amy Tien, Caroline Bodner, R Keith Humphries, and Cheryl D. Helgason. Dendritic cell development is regulated by SHIP (SH2 containing inositol-5-phosphatase). 2002 Annual Cancer Conference, November 1-3, 2002. Vancouver, Canada.
34. Maureen F., Jose **Rey-Ladino**, Amy Tien, Sharon Lowis, Terry Thomas and Cheryl Helgason. Efficient isolation of functional bone marrow derived dendritic cells from normal and transgenic mouse strains. The FASEB J. Experimental Biology 2001. March 31-April 4, 2001, Orlando, Florida. USA.
35. Marwali, M. R., Jose **Rey-Ladino**, Fumio Takei. Regulation of cell adhesion mediated by LFA-1: dominant negative effect of exogenous CD18 cytoplasmic domain and possible role of lipid raft. The FASEB J. Experimental Biology 2001. March 31-April 4, 2001, Orlando, Florida. USA.
36. **Rey-Ladino, Jose**, M. R. Marwali and F. Takei. Localization of LFA-1 within the lipid rafts. The Gordon Research Conference on Cell Contact and Adhesion, June 9-15, 2001. Boston, MA. USA.
37. **Rey-Ladino, Jose**, E. Bell and F. Takei. Inhibition of LFA-1, Mac-1 and V $\alpha$ -4 by the CD18 cytoplasmic domain. The FASEB J. Immunology 2000, Abstracts presented at the American Association of Immunologists and the Clinical Immunology Society Joint Annual Meeting. May 12-16, 2000. Seattle, USA.
38. **Rey-Ladino, Jose**, Michael Huber, Ling Liu, Jacqueline E. Damen, Gerald Krystal, and Fumio Takei. The Lymphocyte Function Associated Antigen (LFA-1) is up-regulated by overexpression of the SH2-domain containing inositol phosphatase, SHIP. The Gordon Research Conference on Cell Contact and Adhesion, June 8-14, 1999. Boston, MA. USA.
39. **Rey-Ladino, Jose**, L. Liu, J. E Damen, G. Krystal, and F. Takei. 1998. Role of SHIP in the "inside out" signaling pathway of LFA-1 activation. The 27th Annual meeting of the International Society for Experimental Hematology. August 1-5, Vancouver, Canada.
40. **Rey-Ladino, Jose**, A. Pyszniak, and F. Takei. 1997. Chimeric  $\beta_2$ -cytoplasmic domain induces dominant negative effects on lymphocyte adhesion to ICAM-1 and fibronectin. The Gordon Conference on Cell Contact and Adhesion. June 8-13, Boston, MA. USA.
41. **Rey-Ladino, Jose**, P. Joshi, B. Singh, R. Gupta, and N. E. Reiner. 1995. Molecular cloning and sequencing of the Heat Sock Protein 60 gene from *Leishmania major* reveals sequences for analysis as vaccine candidates. The Clinical Research Meeting. May 5-8, San Diego, CA. USA.
42. **Rey-Ladino, Jose**, and N. E. Reiner. 1993. Infection of bone murine marrow-derived macrophages with *Leishmania donovani* is associated with the expression of leishmania heat-regulated proteins of M $_r$  65 and 67 and a M $_r$  70 leishmania heat shock cognate protein. Annual Meeting of the Canadian Society for Clinical Investigation. September 10-23, Vancouver, Canada.
43. **Rey-Ladino, Jose**, A. Z. Valencia, B. L. Travi. 1987. Ciclos de desarrollo y morfología *in vitro* de las subespecies de *Leishmania braziliensis*. Memorias del II Congreso Latinoamericano y V Congreso Colombiano de Medicina Tropical. May, 25-29, Bogotá, Colombia.
44. Shibalova, T. A., L. K. Lubimova, I. M. Tereshin, Y. K. Martynich, and **Jose Rey-Ladino**. 1981. Characterization of the antitrypanosomal activity of the polyenic antibiotics. 9th International Conference of the World Association for Veterinary Parasitology, July 13-17, Budapest, Hungary.
45. Shibalova, T. A, L. K Lubimova, **Jose Rey-Ladino**. 1982. Mechanisms of anti-trypanosomal activity of the polyene antibiotics: Morphological changes of *T. lewisi* under the action of levorin as determined by electron microscope. "Problems in Protozoology" 3rd Conference of the Protozoologists of the USSR, July 10-20, Vilnius, Lithuania.


