

Curriculum Vitæ

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Summary

Natural biological processes emit signals, which are often too loud or too low for us to “hear”. My goal as a scientist is to develop and apply statistical and mathematical tools to decode and quantify these biological signals, specially those imprinted in pathogens’ – and their hosts’ – genomes. I hope a better understanding of these entities can contribute to the general theory of Biology and also lead to a progressive reduction of the world’s disease burden.

I have a broad range of interests in quantitative biology, from complex networks to spatial analysis to statistical phylogenetics. Nevertheless, my main scientific interest is to understand the complex interaction between rapidly evolving pathogens, such as RNA viruses, and their hosts. I have published peer-reviewed papers in indexed international journals, such as *Infection*, *Genetics and Evolution*, *Transactions of the Royal Society of Tropical Medicine and Hygiene* and *BMC Bioinformatics*. I have also attended to or had work presented at national and international conferences, such as the Brazilian Congress of Virology, the Joint Statistical Meetings, the International BioInformatics Workshop on Virus Evolution and Molecular Epidemiology and the Gordon Research Conference on Biology of Host-Parasite Interactions.

As you will notice if you continue reading, I am a big fan of collaboration, interacting with colleagues around Brazil and abroad. My current interests are:

- Phylogeny estimation: branch lengths in time-trees and MCMC exploration of the tree space;
- Coupling mathematical models to coalescent-based population reconstructions;
- Bayesian inference of deterministic models;
- Incorporating geographic structure (neighbourhood, natural barriers, etc.) into CMTC-based phylogeographic diffusion models (check <https://github.com/maxbiostat/PhylogeographeR>);
- Applying complex networks to data mining and visualisation in large genomic databases;

Please feel free to contact me if your interests lie anywhere near these topics.

Linkedin: <http://www.linkedin.com/profile/view?id=171872451>

ResearchGate: https://www.researchgate.net/profile/Luiz_Carvalho11

Lattes CV: <http://lattes.cnpq.br/7282202947621572>

Education

2009–2012	BSc Microbiology and Immunology, Federal University of Rio de Janeiro, Brazil.
2014–	PhD Evolutionary Biology, University of Edinburgh, UK.

Professional Experience

2010–2013	Pan American Health Organization (PAHO) Position: Statistical Assistant Role: Developed and analysed quality control experiments for veterinary diagnostic tests; Research on Foot-and-Mouth Disease virus phylodynamics
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Academic Experience

2009–2011	Sector of Infectious Diseases Epidemiology (SEDI), Institute of Microbiology, Federal University of Rio de Janeiro Position: Scientific initiation student Advisor: Prof. Dr. Fernando Portela Câmara Role: research on statistical methods in the epidemiology of AIDS, sylvatic yellow fever and dengue
2012–2013	Program for Scientific Computing (PROCC), Oswaldo Cruz Foundation (Fiocruz) Position: Scientific initiation student Advisor: Prof. Dr. Oswaldo Gonçalves Cruz Role: research on spatial partition methods for health areal data
2013–2014	Program for Scientific Computing (PROCC), Oswaldo Cruz Foundation (Fiocruz) Position: Scientific initiation student Advisors: Prof. Dr. Claudio Struchiner and Dr. Leonardo Bastos Role: research on Bayesian inference of deterministic population growth models, multilevel binary regression and opinion pooling
2014–	Institute of Evolutionary Biology (SBS), University of Edinburgh Position: PhD student Advisors: Andrew Rambaut and Darren Obbard Role: research on statistical phylogenetics methods for RNA virus phylodynamics.

A list of PDFs of my publications can be found at <https://github.com/maxbiostat/papers/tree/master/PAPERS>

Publications

Published/Accepted

- [1] Carvalho, L.M., L. Santos, P. Pereira, and W. Silveira, “Phylogenetics of foot-and-mouth disease virus: a complex network approach,” in *Proceedings of the 10th Brazilian Conference on Dynamics, Control and Their Applications*, Brazilian Society for Applied and Computational Mathematics, 2011.
- [2] F. P. Camara, A. L. Gomes, Carvalho, L. M., and L. G. Castello, “Dynamic behavior of sylvatic yellow fever in Brazil (1954-2008),” *Rev. Soc. Bras. Med. Trop.*, vol. 44, no. 3, pp. 297–299, 2011.
- [3] Carvalho, L. M. and F. P. Camara, “Epidemiological aspects of acquired immunodeficiency syndrome in older Brazilians: a comparative approach,” *Braz J Infect Dis*, vol. 16, no. 1, pp. 34–37, 2012.
- [4] F. P. Camara, Carvalho, L. M., and A. L. Gomes, “Demographic profile of sylvatic yellow fever in Brazil from 1973 to 2008,” *Trans. R. Soc. Trop. Med. Hyg.*, vol. 107, pp. 324–327, May 2013.
- [5] Carvalho, L. M., L. B. Santos, N. R. Faria, and W. de Castro Silveira, “Phylogeography of foot-and-mouth disease virus serotype O in Ecuador,” *Infect. Genet. Evol.*, vol. 13, pp. 76–88, Jan 2013.
- [6] F. Bielejec, P. Lemey, Carvalho, L. M., G. Baele, A. Rambaut, and M. A. Suchard, “BUSS: a parallel BEAST/BEAGLE utility for sequence simulation under complex evolutionary scenarios,” *BMC Bioinformatics*, vol. 15, p. 133, 2014.
- [7] F. Camara and Carvalho, L. M., “Febres Hemorrágicas virais [Viral hemorrhagic fevers],” in *Introdução à Virologia Humana* (N. Santos, M. T. Romanos, and M. D. Wigg, eds.), Rio de Janeiro: Guanabara Koogan, 3rd ed., 2014.
- [8] D. Mir, H. Romero, Carvalho, L. M., and G. Bello, “Spatiotemporal dynamics of DENV-2 Asian-American genotype lineages in the Americas,” *PLoS ONE*, vol. 9, no. 6, p. e98519, 2014.
- [9] Carvalho, L. M., “Métodos bayesianos para inferir o padrão de dispersão de agentes patogénicos : filogeografia do vírus da febre aftosa na América do Sul como um caso de estudo [Bayesian methods to infer spread patterns for pathogens: the phylogeography of Foot-and-Mouth Disease virus in South America as a case study],” in *Abordagens Moleculares em Veterinária* (M. V. Cunha and J. Inácio, eds.), Lisbon: Lidel Editora, 1st ed., 2014.
- [10] Carvalho, L. M., C. Struchiner, and L. Bastos, “Bayesian inference of deterministic population growth models,” in *Interdisciplinary Bayesian Statistics* (A. Polpo de Campos, F. Neto, L. Ramos-Rifo, J. Stern, and M. Lauretto, eds.), vol. Vol. 118, Springer Verlag, 2015.

Work in progress¹

Carvalho, L.M., G. Baele, N. Faria, A. M. Perez, M. Suchard, P. Lemey, and W. C. Silveira, “Spatiotemporal Dynamics of foot-and-mouth disease virus in South America,” In preparation.

Carvalho, L.M., L. Santos, and W. C. Silveira, “A complex network approach to investigate foot-and-mouth virus phylodynamics,” In preparation.

L. Zimmermann, Carvalho, L.M., L. Vasconcellos, L. Bastos, C. Struchiner, and A. H. Lopes, “Temperature-dependent oviposition and egg eclosion of Chagas disease vector *Rhodnius prolixus*,” In preparation.

¹Drafts in final phase of preparation

Conferences²

Presented work

- 2009 Gomes, A.L.B.B; Carvalho, L.M.; Camara, F.P. **Dinâmica Espacial da Dengue no Rio de Janeiro: 1986 a 2009 [Spatial dynamics of dengue in Rio de Janeiro: 1986 to 2009]**, 2009, II International Congress on Geography of Health, Uberlândia -MG, Brazil.
- 2011 Vianez Jr., J.L.; Carvalho, L. M.; Bisch, P. **Development of a workflow for large-scale epitope prediction: dengue virus as a study of case.** In: X Meeting 2011, 2011, Florianópolis-SC, Brazil. X Meeting 2011 Abstract Book, 2011. v. ID 234.
- 2011 Carvalho, L.M.; Santos, L.B.; Silveira, W.C. **Phylodynamics of Foot-and-Mouth Disease Virus: a Complex Network approach.** XXII Meeting of the Brazilian Society of Virology, Águas de Lindóia – SP, Brazil.
- 2012 Carvalho, L. M.; Santos, L.B.; Faria, N.R.; Silveira, W.C. **Phylogeographic Dynamics of foot-and-mouth disease virus in Ecuador 2002 to 2010**, 2012 In 17th International BioInformatics Workshop on Virus Evolution and Molecular Epidemiology, Belgrade, Serbia.
- 2012 Carvalho, L.M.; Faria, N.R.; Silveira, W.C. **Phylodynamics of Foot-and-Mouth Disease Virus in South America: a Comprehensive Analysis.** XXIII Brazilian Congress of Virology, Foz do Iguaçu – PR, Brazil.
- 2012 Vasconcellos, L.R.C.; Dias, F.A.; Soares, J. B. R. C.; Carvalho, L. M.; Oliveira, M. M.; Alves e Silva, T. L.; Gonçalves, I.; Oliveira, M. F.; Lopes, F.G.; Lopes, A. H. C. S. **Interaction of the hemipteran *Oncopeltus fasciatus* with the trypanosomatid *Leptomonas wallacei*: an insight into parasitism.** In: Gordon Research Conference on Biology of Host-Parasite Interactions, 2012, Newport, RI, USA. Annals of the Gordon Research Conference on Biology of Host-Parasite Interactions, 2012. v. 1. p. 1-2.
- 2013 Zimmermann, L.T.; Carvalho, L.M.; Vasconcellos, L.R.; Bastos, L.S.; Struchiner, C.J.; Lopes, A.H. **Temperature-dependent oviposition and egg eclosion of Chagas disease vector *Rhodnius prolixus*** In XXIX Annual Meeting of the Brazilian Society of Protozoology, 2013, Caxambu-MG, Brazil. Abstract book of the XXIX Annual Meeting of the SBPz, p. 159, ID V004.
- 2014 Carvalho, L. M.; Struchiner, C.J.; Bastos, L.S. **Bayesian inference of deterministic population growth models** In XII Brazilian Meeting on Bayesian Statistics (EBEB), 2014, Atibaia-SP, Brazil. Abstract book of the XII Brazilian Meeting on Bayesian Statistics, p. 63
- 2014 Bastos, L. S.; Carvalho, L. M. **Random Effects Binary Model with Misclassified Response** In Joint Statistical Meetings, 2014, Boston MS, USA.

²Main conferences I have attended to or had work presented at. For a complete list please visit my Lattes CV.

Participated

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| 2012 | VIII Brazilian Congress of Epidemiology, São Paulo–SP, Brazil. |
| 2013 | 1 st Symposium on Big Data and Public Health, Rio de Janeiro–RJ, Brazil. |

Invited Talks

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| 2011 | <i>Phylodynamics of Foot-and-Mouth Disease Virus: a Complex Network approach.</i> XXII Meeting of the Brazilian Society of Virology |
| 2011 | <i>Playing Dumb: The Misuse of Statistics in Biology.</i> Institute of Microbiology, Federal University of Rio de Janeiro. |
| 2012 | <i>Knowledge Discovery in Databases through Complex Networks: application to phylodynamics.</i> WaFIS 2012 |
| 2014 | <i>Bayesian inference of deterministic population growth models.</i> 12th Brazilian Meeting on Bayesian Statistics |

Memberships

Brazilian Society for Virology (SBV), Brazilian Statistical Association (ABE), Brazilian Society for the Advancement of Science (SBPC).

Teaching Experience

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| 2007–2011 | High School Chemistry and Biology
I was a voluntary teacher of whole-year high school courses on organic chemistry, general chemistry and biology. |
| 2010–2013 | Basics of Mathematics and Statistics for Microbiology
Federal University of Rio de Janeiro
Supervisor: Prof. Dr. Fernando Portela Câmara
Basics on descriptive statistics, Gaussian distribution and hypothesis testing. Lately, some basic calculus too. |
| 2010 | Topics in Human Physiology
Federal University of Rio de Janeiro
Supervisor: Prof. Dr. Pedro Paulo Elsas
By means of seminars and group discussions, we discussed particular aspects of human physiology and stimulate the students to draw general conclusions about the subjacent biological processes going on. |
| 2012 | Bioinformatics
Federal University of Rio de Janeiro
Supervisor: Prof. Andrew Macrae, PhD
Basics on Bioinformatics: basic genome annotation, databases, alignment, phylogenetics. |

Awards

2010	Honourable Mention - XVI Week of Microbiology and Immunology.
2011	Honourable Mention - XVII Week of Microbiology and Immunology.
2011	Selected for Oral presentation – XXII National Meeting of the Brazilian Society for Virology.
2012	Honourable Mention - XVIII Week of Microbiology and Immunology.
2014	Selected for Oral presentation – XII Brazilian Meeting on Bayesian Statistics.
2014	Principal's Career Development Scholarship, University of Edinburgh.

Languages

Portuguese	Native
English	Fluent (CAE – Grade A)
Spanish	Advanced

References

Reference	What for	email
Prof. Dr. Fernando Portela Câmara	Research and Teaching	portela@micro.ufrj.br
Prof. Ângela Hampshire Lopes, PhD	Research	angela.lopes@micro.ufrj.br
Prof. Andrew Macrae, PhD	Teaching	amacrae@biologia.ufrj.br
Prof. Dr. Pedro Paulo Xavier Elsas	Teaching	pxelsas@micro.ufrj.br
Prof. Claudio Struchiner, PhD	Research	stru@fiocruz.br
Prof. Leonardo Bastos, PhD	Research	lsbastos@fiocruz.br
Prof. Philippe Lemey, PhD	Research	philippe.lemey@rega.kuleuven.be