

## Curriculum Vitae

# Matheus Macedo-Lima

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### Professional Overview

Is currently a postdoctoral associate at University of Maryland investigating neuromodulation of perceptual learning; Has experience in biophysics, physiology and neuroscience research. Has particular interest in comparative neurophysiology and neuroendocrinology. Has a Ph.D. in Neuroscience and Behavior from the University of Massachusetts Amherst and a Bachelor of Science degree in Biology from the Universidade Federal de Sergipe, with one-year exchange period at University of Washington-Bothell.

### Education

#### University of Massachusetts Amherst, 2014 – 2020

Amherst, Massachusetts, United States

Neuroscience and Behavior – PhD

Thesis title: How do adult songbirds learn new sounds? Using neuromodulators to probe the function of the auditory association cortex

Research focus: Neuromodulation of auditory learning in adult zebra finches

Advisor: Luke Remage-Healey

#### Universidade Federal de Sergipe, 2009 – 2013

Sao Cristovao, Sergipe, Brazil

Biology – Bachelor of Science

Thesis title: Distribution and characterization of NADPH-diaphorase-positive neurons in the hippocampal formation of the lizard *Tropidurus hispidus*

Advisor: Murilo Marchioro

GPA: 9.0 (10-point scale)

#### University of Washington-Bothell, 2012 – 2013

Bothell, Washington, United States

Biology – non-degree (exchange program)

GPA: 3.78 (4-point scale)

### Fellowships/Scholarships

- **Science without Borders/CAPES administered by LASPAU, 2014-2018:** 4-year doctorate fellowship.
- **Science without Borders/CAPES, 2012-2013:** Undergraduate fellowship for an exchange program at University of Washington-Bothell. Research assistant at Brenowitz Lab. Advisor: Rachel Cohen.
- **PIBIC/FAPITEC, 2012-2013 :** Undergraduate research fellowship. Project title: Neurogenic properties of *Tropidurus hispidus* lizard cerebral cortex after chemical lesion induced by pilocarpine. Advisor: Murilo Marchioro

- **PIBIC/CNPq, 2011-2012:** Undergraduate research fellowship. Project title: Distribution of NADPH-diaphorase-positive neurons in the cerebral cortex of *Tropidurus hispidus* lizards after chemical lesion induced by pilocarpine. Advisor: Murilo Marchioro
- **PIBIC/FAPITEC, 2010-2011:** Undergraduate research fellowship. Project title: Phytosociological diagnosis of essential oil producing plants of the apicultural flora of the state of Sergipe. Advisor: Adauto Souza Ribeiro

### Awards

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- **Golden Neuron Award:** Neuroscience and Behavior Program, in recognition of an exciting finding of a graduate student within the past year for the publication of **Macedo-Lima and Remage-Healey** (*Hormones & Behavior*, 2020). University of Massachusetts Amherst, 2020.
- **National Science Foundation Dissertation Improvement Grant application.** Priority score: high. 2017
- **Best Presentation Award:** Western Massachusetts Chapter of the Society for Neuroscience, in recognition of a Graduate Student who has demonstrated exceptional research success and potential through their poster presentation at the First Annual UMass Interdisciplinary Neurosciences Conference, 2018
- **Early Career Award:** Neuroscience and Behavior Program, University of Massachusetts Amherst, 2015.
- **Outstanding Biology undergraduate honors:** Biology Department, Universidade Federal de Sergipe, 2013.
- **Outstanding Undergraduate Research:** Thesis title: Neurogenic properties of *Tropidurus hispidus* lizards' cerebral cortex after chemical lesion induced by pilocarpine. Advisor: Murilo Marchioro - Universidade Federal de Sergipe, 2011.

### Teaching experience

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- **English as a second language teacher**, 2010-2011, 2013-2014  
**Instituto Canadá** – Aracaju, SE, Brazil  
Taught English as a second language to Brazilian students.  
Levels: Basic, Intermediate, Advanced and Proficiency training

### Research experience

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- **Postdoctoral associate**, 2020 – present  
**Caras Laboratory, University of Maryland** – College Park, MD, USA  
Conducts research on neuromodulation of perceptual learning in gerbils. Employed techniques: immunohistochemistry, confocal microscopy, viral injections, optogenetics, multielectrode extracellular recordings, single unit sorting, Kilosort, behavioral assays, Python, R, MATLAB programming.
- **Graduate research assistant**, 2014 – 2020  
**Healey Laboratory, University of Massachusetts Amherst** – Amherst, MA, USA  
Conducted research on songbird neuroendocrinology. Developed research projects aiming at clarifying the role of neurosteroids and dopamine in a secondary auditory region of the songbird brain by devising and using operant behavior paradigms, microdialysis, extracellular

and intracellular electrophysiology. Employed techniques: histochemistry, immunohistochemistry, patch clamp, multielectrode extracellular recordings, single unit sorting, Kilosort, microdialysis, ELISA, behavioral assays, Python, R, IgorPro and MATLAB programming. Mentored 7 undergraduate students (2 Honors theses)

- **Undergraduate research assistant, 2010 – 2013**  
**Neurophysiology Laboratory, Universidade Federal de Sergipe** – Sao Cristovao, SE, Brazil  
Assisted and conducted research projects concerning lizard neurobiology (epilepsy in a reptile model, synaptic zinc staining, nitric oxide neurons, and neurogenesis); rodent hippocampal electrophysiology, essential oil effects on the CNS, essential oil effects on a rodent Parkinson model. Employed techniques: autometallography, histochemistry, immunohistochemistry, electrophysiology, behavioral assays
- **Undergraduate research assistant, 2012 – 2013**  
**Brenowitz Laboratory, University of Washington** – Seattle, WA, USA  
Assisted in research concerning the effects of sexual hormones on the songbird song learning/planning system, focusing on neurogenic properties of HVC and the development/regression of HVC-RA connections across seasons  
Employed techniques: histochemistry, immunohistochemistry, PCR, Western blotting, ELISA, behavioral assays (song spectrum analysis)

## Publications

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### Scientific Journals:

- **Macedo-Lima, M;** Ramage-Healey, L. Auditory learning in an operant task with social reinforcement is dependent on neuroestrogen synthesis in the male songbird auditory cortex. *Hormones & Behavior*.121:104713. 2020.
- **Macedo-Lima, M;** Ramage-Healey, L. A new auditory-dependent operant task with social reinforcement for songbirds. In preparation. 2020.
- **Macedo-Lima, M;** Boyd, HM, Ramage-Healey, L. Distribution and physiology of dopamine D1 receptors in the songbird secondary auditory cortex. In preparation. 2020.
- **Macedo-Lima, M;** Ramage-Healey, L. Dopamine modulation of motor and sensory performance: an evolutionary perspective. In preparation. 2020.
- Krentzel, AA; **Macedo-Lima, M;** Ikeda, MZ; Ramage-Healey, L. A membrane g-protein coupled estrogen receptor is necessary but not sufficient for sex-differences in zebra finch auditory coding. *Endocrinology*. 1;159(3):1360-1376. 2018.
- Vahaba, DM; **Macedo-Lima, M;** Ramage-Healey, L. Sensory Coding and Sensitivity to Local Estrogens Shift during Critical Period Milestones in the Auditory Cortex of Male Songbirds. *eNeuro*. 2017.
- Lee, V; Pawlisch, BA; **Macedo-Lima, M;** Ramage-Healey, L. Norepinephrine enhances song responsiveness and encoding in the auditory forebrain of male zebra finches. *Journal of Neurophysiology*. 2017.

- Remage-Healey, L; Krentzel, AA; **Macedo-Lima, M**; Vahaba, DM. Species diversity matters in biological research. *Policy Insights from the Behavioral and Brain Sciences* 4 (2), 210-218. 2017.
- **Macedo-Lima, M**; Freire, MAM; Pimentel, HC; Lins, LCRF; Medeiros, KAAL; Viola, GG; Santos, JR; Marchioro, M. Characterization of NADPH Diaphorase- and Doublecortin-Positive Neurons in the Lizard Hippocampal Formation. *Brain, Behavior & Evolution*, v. 88:3-4, p. 222-234, 2017.
- Lins, LCRF; Souza, MF; Cintra, RR; Medeiros, KAAL; **Macedo-Lima, M**; Moraes, SZC; Stevam, CS; Almeida, GKM; Santos, SL; Ribeiro, AM; Silva, RH; Santos, JR; Marchioro, M. Attenuation of motor deficits by hydroethanolic extract of *Poincianella pyramidalis* in a Parkinson's disease model. *Boletín Latinoamericano y del Caribe de Plantas Medicinales y Aromáticas*, v. 16:2, p. 150-161, 2017.
- Lima, CA; Silva, AM; Alves, C; Alves Jr, A; Lima, S; Cardoso, E; Brito, E; **Macedo-Lima, M**; Lyra Jr, D; Lyra, P; Lima, MM. Solid pseudopapillary tumor of the pancreas: Clinical features, diagnosis and treatment. *Revista da Associação Médica Brasileira*, v. 63:3, p. 219-223. 2017.
- Cohen, R; **Macedo-Lima, M**; Miller, K; Brenowitz, E. Adult neurogenesis leads to the functional reconstruction of a cortical-like neural circuit. *The Journal of Neuroscience*, v. 36:34, p. 8947-8956. 2016.
- Venancio, AM; Ferreira-da-Silva, FW; Silva-Alves, KS; Pimentel, HC; **Macedo-Lima, M**; Santana, MF; Alves, PB; Silva, GB; Leal-Cardoso, JH; Marchioro, M. Essential oil of *Ocimum basilicum* L. and (-)-linalool blocks the excitability of rat sciatic nerve. *Evidence-Based Complementary and Alternative Medicine*, v: 2016, p. 1-7, 2016.
- Lima, CA; Silva, AM; Kuwano, AY; Rangel, MRU; **Macedo-Lima, M**. Trends in prostate cancer incidence and mortality in a mid-sized Northeastern Brazilian city. *Revista da Associação Médica Brasileira*, v. 59, p. 15-20, 2013.
- Lima, CA.; Rangel, MRU; **Macedo-Lima, M**; Silva, AM. Time trends in breast cancer incidence and mortality in a mid-sized northeastern Brazilian city. *BMC Public Health*, v. 12:883, 2012.
- Marchioro, M; Pimentel, HC; Santos, ML; **Macedo-Lima, M**; Santos, JR; Ponsoda, X; Molowny, A; Lopez-Garcia, C. Low temperature-acclimation impairs cellular migration in the adult cerebral cortex of the tropical lizard, *Tropidurus hispidus* (Spix, 1825) (Squamata: Tropiduridae). *Archives Italiennes de Biologie*, v. 150(1), p. 22-30, 2012.
- Pimentel, HC; Santos, JR; **Macedo-Lima, M**; Almeida, FTC; Santos, ML; Molowny, A; Ponsoda, X; Lopez-Garcia, C; Marchioro, M. Structural organization of the cerebral cortex of the neotropical lizard *Tropidurus hispidus*. *Cell and Tissue Research*, v. 343, p. 319-330, 2011.

#### Book chapters:

- **Macedo-Lima, M**; Pimentel, HC; Santos, JR; Marchioro, M. Neuronal Plasticity in the Lizard Brain. In: *Advances in Zoology Research*, Owen P. Jenkins. (Org.). Hauppauge: Nova Science Publishers, v. 2, p. 121-144, 2012.

#### Popular science articles:

- 76 publications as of May 2020. Author page: <https://saense.com.br/author/matheuslima/>

## Presentations

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- **Macedo-Lima, M;** Boyd, H; Ramage-Healey, L. How does an adult songbird learn new sounds? Using neuromodulators to probe the auditory association cortex's function. Talk – 2019 Bird song and animal communication meeting. Millbrook, NY, 2019.
- **Macedo-Lima, M;** Boyd, H; McGrath, A; Ramage-Healey, L. Distribution and physiology of dopamine D1 receptors in the songbird secondary auditory cortex. Poster – Neuroscience 2018. San Diego, CA, 2018.
- **Macedo-Lima, M;** Boyd, H; Ramage-Healey, L. Aromatase inhibition in the songbird auditory cortex impairs learning in a novel behavioral task. Poster – 9<sup>th</sup> International Congress of Neuroendocrinology. Toronto, ON, 2018.
- **Macedo-Lima, M;** Ramage-Healey, L. Impaired auditory learning in a novel behavioral task during aromatase inhibition. Poster – 1<sup>st</sup> UMass Interdisciplinary Neurosciences Conference. Amherst, MA, 2018.
- **Macedo-Lima, M;** Krentzel, AA; Vahaba, DM; Pollak, D; Lee, V; Ramage-Healey, L. Decoding neural responses to complex sounds: an evaluation of pattern classification approaches in a secondary auditory region of a songbird. Poster – Neuroscience 2017. Washington DC, BC, 2017.
- Vahaba, DM; **Macedo-Lima, M;** Ramage-Healey, L. Shifts in auditory processing across development and in response to neuromodulatory estrogens in juvenile male songbirds. Poster – Neuroscience 2017. Washington DC, BC, 2017.
- **Macedo-Lima, M;** Ramage-Healey, L. Impaired auditory learning in a novel behavioral task during aromatase inhibition. Poster – 21<sup>st</sup> Society for Behavioral Neuroendocrinology meeting. Long Beach, CA, 2017.
- Ikeda, MZ; Cowell, R; **Macedo-Lima, M;** Ramage-Healey, L. Multifaceted modulation of auditory signal detection and encoding by norepinephrine: Evidence for differential adrenergic receptor mediation. Poster – Neuroscience 2015. Chicago, IL, 2015.
- Krentzel, AA; **Macedo-Lima, M;** Ramage-Healey, L. Sex differences in physiological properties of auditory neurons in the zebra finch. Poster – Society for Behavioral Neuroendocrinology 19<sup>th</sup> annual meeting. Pacific Grove, CA, 2015.
- **Macedo-Lima, M;** Ramage-Healey, L. Circadian estradiol levels in vivo in the songbird caudomedial nidopallium, a secondary auditory region. Poster – IX International Brain Research Organization Congress. Rio de Janeiro, RJ, Brazil, 2015.
- Santos, LG; **Macedo-Lima, M;** Lucena, KAA; Lins, LCRF; Viola, GG; Freire, MAM; Marchioro, M; Santos, JR. Fear/anxiety type behavior assessment in the lizard *Tropidurus hispidus*. IX International Brain Research Organization Congress. Rio de Janeiro, RJ, Brazil, 2015.
- **Macedo-Lima, M;** Ostrovskaya, J; Han, J; Hong, G; Ancheta, S; Rhode, N; White, B. Planarians do not require a light stimulus to regenerate functional photoreceptors. Stem Cell Symposium. Seattle, WA, 2013.

- **Macedo-Lima, M**; Pimentel, HC; Melleu, FF; Santos, TS; Oliveira, CL; Marino-Neto, J; Marchioro, M. Lizard dorsomedial cortical neurons do not express doublecortin or NeuN proteins. Poster – XXXVII Reunião da Sociedade Brasileira de Neurociência e Comportamento. Belo Horizonte, MG, 2013.
- Lima, CA; Silva, AM; **Macedo-Lima, M**; Rangel, MRU. Trends in Cancer Incidence and Mortality in Aracaju, Sergipe, Brazil. In: 35th Annual Meeting of the International Association of Cancer Registries, 2013, Buenos Aires. International Association of Cancer Registries 35th Conference, 2013.
- Santos, JR; **Macedo-Lima, M**; Pimentel, HC; Freire, MA; Ribeiro, S; Marchioro, M. Neuroplastic features of the lizard cortex: zinc, nitric oxide and ZIF268 studies. 2013. Poster – XXXVII Reunião da Sociedade Brasileira de Neurociência e Comportamento. Belo Horizonte, MG, 2013.
- Cohen, RE; **Macedo-Lima, M**; Brenowitz, E. Steroid hormone receptor activation is necessary for the addition of adult-born neurons in a song control region of the white-crowned sparrow. Poster – Neuroscience 2012. New Orleans, LA, 2012.
- **Macedo-Lima, M**; Santos, ML; Pimentel, HC; Marchioro, M. Lizard hippocampal zincergic and nitrenergic systems are modified after pilocarpine administration. Poster – Neuroscience 2012. New Orleans, LA, 2012.
- **Macedo-Lima, M**; Pimentel, HC; Marchioro, M. Pilocarpine-induced changes in the lizard cortex's zincergic circuitry. Speech – XXI Encontro de Iniciação Científica da UFS. Aracaju, SE, 2011.
- **Macedo-Lima, M**; Santos, ML; Pimentel, HC; Marchioro, M. Distribution of NADPH-diaphorase-positive neurons in *Tropidurus hispidus* lizards' cerebral cortex after chemical lesion induced by pilocarpine. Poster – Federação das Sociedades de Biologia Experimental. Rio de Janeiro, RJ, 2011.
- Pimentel, HC; Santos, JR; Macena, AM; Santos, ML; **Macedo-Lima, M**; Marchioro, M. Distribution of NADPH-diaphorase-positive neurons in *Tropidurus hispidus* lizards' cerebral cortex: age differences. Poster – XXXIV Encontro da Sociedade Brasileira de Neurociências e Comportamento. Caxambu, MG, 2010.

## Outreach

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- **Popular science article contributor to the blog Saense, 2015 – present:** [www.saense.com.br](http://www.saense.com.br)
- **Skype a Scientist contributor, 2018 – present:** <https://www.skypeascientist.com/>  
I have Skyped with kindergarten-8<sup>th</sup> grades, talking about general science topics, my personal trajectory and personal science
- **UMass Life Sciences Café organizer, 2018 – 2020:** <https://oebsciencecafe.org/>  
Helped organize, develop and present the Life Sciences Café, an initiative to bring science to the community in the shape of interviews with science experts on various topics.
- **UMass Neuroscience and Behavior Historian, 2017 – 2020:**

Manages the graduate student twitter account (@UMassNSBGrad); documents and disclose graduate student activities, such as, but not restricted to, symposia, colloquia, meetings, outreach activities, retreats, discussions, ceremonies and thesis defenses.

## **Skills**

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### **Language skills:**

- Portuguese: native speaker
- English: fluent (115 on TOEFL IBT (ETS); Grade A on FCE (Cambridge English Language Assessment))
- Spanish: basic

### **Laboratory skills:**

- Histology/immunohistochemistry
- Microdialysis
- Confocal microscopy
- Patch clamp electrophysiology
- Multielectrode extracellular electrophysiology
- Single-unit sorting
- Enzyme-linked immune-absorbent assays (ELISA)
- Biostatistics
- Animal handling and surgery
- Behavioral automation (Arduino, Raspberry Pi)

### **Informatics:**

- Programming: R, Python, MatLab, C++, Java, IgorPro
  - Bioinformatics: databases, alignments, BLAST searches
  - CorelDraw, Adobe Photoshop, Adobe Illustrator, Statistical packages (Prism, SPSS, Origin, R), Patch clamp data analysis (IgorPro), Single-unit sorting (Kilosort)
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