

Natalia de Souza Araujo

PhD, Bioinformatician Genetics and Evolutionary biology

Personal information

ORCID: 0000-0002-0074-6844

Current address: Belgium

Contact: souza.nataliaa@gmail.com

Web Profiles

Webpage: <https://natevolution.com>

Twitter: @nat2bee

Code repository: <https://github.com/nat2bee>

Research Gate: https://www.researchgate.net/profile/Natalia_Araujo

Summary

Previous postdoctoral in bioinformatics at the University of Brussels with about four years of experience post PhD in the field of functional genetics, bioinformatics and evolutionary biology. I have established and implemented pipelines for the analyses of big biological datasets such as genomic, transcriptomic and epigenomic data applied to evolutionary questions. My major research interest is to integrate genetic OMICs and bioinformatics to understand evolutionary (mal)adaptations.

[Genetics] [Genomics] [Evolution] [Molecular Biology] [Bioinformatic] [Transcriptomic] [Epigenetic]

Research experience

April 2019 – March 2021

Post-doctoral researcher in Bioinformatics

Université Libre de Bruxelles – Laboratory of Evolutionary Biology & Ecology

Development and execution of analysis pipelines for transcriptomic and genomic datasets from ants to understand heat adaptation in desertic ants. Analyses performed include: transcriptome assembly, differential expression analyses, co-expression analyses, gene ontology enrichment, comparative genomics (new genes and family expansion).

August 2017 – March 2019

Post-doctoral researcher in Bioinformatics and Molecular Biology

Université de Liège – GIGA Unity of Animal Genomics

Development of a new analysis strategy to identify gene conversion events at high resolution in pedigrees complete genomes. Analyses performed include: genotyping and variant calling in full genomes and the generation of python scripts to identify non-mendelian haplotype transitions, Oxford nanopore long reads sequencing and analyses.

May 2014 – May 2015

Visiting Researcher

Queen Mary University of London – Laboratory of Ants, Evolution & Genomics

Training in programming and gene expression analyses

February 2007 – December 2010

Scientific trainee

University of São Paulo / Universidade Paulista – Laboratory of Evolution and Histophysiology

Fish experiment and sampling, gills histological analyses and processing, statistical data analyses.

Teaching experience

January 2016 – July 2016

Teaching assistant supporter

University of São Paulo – discipline of Biological Diversity and Phylogeny

Position included in the Teaching Improvement Program of the university.

Observation of exposition classes, teaching support during practical classes, and implementation of assessment tests. Preparation of samples and materials for practices. Student assistance for the

resolution of activities and general discussion sections. Support in assessment grading and minor administrative tasks.

January 2011 – July 2011

Teaching assistant supporter

University of São Paulo – discipline of Genetics

Position included in the Teaching Improvement Program of the university.

Support students in practices and in the development of their bachelor project-laboratories using classical genetics in *Drosophila melanogaster* breeding. Student assistance during weekly discussion sections.

February 2010 – July 2010

English teacher

SKILL Idiomas

Preparation and teaching of classes and extra activities using student-centred education approaches. Grade and assessment of students. Tutoring classes for struggling students.

August 2008 – December 2009

Teaching assistant supporter

Universidade Paulista – disciplines of Geology/ Palaeontology and Genetics/ Cytogenetics

Position included in the Teaching Improvement Program of the university.

Teaching support during implementation of assessment tests and field trips. Student assistance for the resolution of questionnaires. Assistance in grading.

Supervising and Mentoring

August 2018 – current

PhD co-supervisor

Paulo Cseri Ricardo – University of São Paulo

Study: “Expression of genes related to parasitic behaviour in bees”

August 2015 – February 2018

Undergraduate research mentor

Larissa Logullo Piconi – University of São Paulo

Study: “Gene expression analyses in bee social behaviour candidate genes”

Public outreach and volunteering

- [From September 2019 to June 2020] Participated in the Letters to a Pre-Scientist Program.
- [From February 2017 to May 2017] Biology teacher at the community prep school program of the secondary public school EMEF Desembargador Amorim Lima.
- [September 2016] Monitor at the 62nd Brazilian-International Congress of Genetics providing support for researchers during the posters presentation section and helping in the space organization.
- [In 2009 and 2010] Educational assistant in two itinerary versions of the project *Planeta Inseto* (“Insect Planet” - <https://www.planetainseto.com.br>). During this event, families and children of different ages got in contact and had the opportunity to learn about various insect groups. I participated in the cockroach race.
- [In 2009] Participated in the organization of the Biology week - *De onde vem a diversidade?* (“Where is the diversity coming from”) in the university (Universidade Paulista – UNIP).
- [In 2009] Educational assistant in two events promoted by the company *Dinosfera - Aventura Paleontológica* (<http://www.dinosfera.com.br>), in which young children could learn about dinosaurs through educational games.

Education

August 2012 – July 2017

Ph.D. in Genetics and Evolutionary Biology

University of São Paulo – Laboratory of Genetics and Evolution of Bees

Thesis: “Expression of Genes Involved in Social Behaviour in Bees with Different Levels of Eusociality”.

February 2010 – August 2012

M.Sc. in Genetics and Evolutionary Biology

University of São Paulo – Laboratory of Evolutionary Studies in True Fruit Flies
Monography: Analyses of the *Anastrepha fraterculus* complex (Diptera: Tephritidae) in Brazil based on mitochondrial *cytochrome oxidase I* sequences.

February 2006 – February 2010

Bachelor and Certified teacher in Biological Science

Universidade Paulista

February 2004 – July 2005

Technician in Chemistry

Escola Técnica Estadual Getúlio Vargas

Language and Programming skills

- Portuguese (native); English (fluent); French (conversational)
- Python; R and Unix Environment (bash and server analyses)

Awards and Honours

[2021] European Commission – Seal of Excellence to the project proposal MPOLBEE submitted under the Horizon 2020's Marie Skłodowska-Curie actions call H2020-MSCA-IF-2020 of 9 September 2020 (Score of 94%)

[2016] ICE – 2nd Place for Best Student Poster. Session: Genetics and Evolutionary Entomology

[2016] 62nd International-Brazilian Congress of Genetics – Honourable Mention for Participation in the Francisco Mauro Salzano Graduate Student Award of Evolution

[2014] IUSSI – 3rd Place for Best Student Poster

[2011] 57th International-Brazilian Congress of Genetics – Honourable Mention for Participation in the Graduate Student Oral Award of Animal Genetics

[2009] Instituto Biológico – Scientific Merit for Oral Presentation

Funding

- [2020] FAPESP – Research funding, associated researcher
- [2019] Pacbio, SMRT Leiden – Travel stipends
- [2017] Society for the Study of Evolution – Travel stipends
- [2013-2017] FAPESP – Regular Ph.D. Fellowship
- [2014-2015] FAPESP – BEPE Ph.D. Fellowship Abroad
- [2010-2012] CNPQ – Regular M.Sc. Fellowship
- [2008-2010] CNPQ/ UNIP – PIBIC Fellowship for undergraduate students
- [2006-2010] PROUNI – Scholarship for graduation costs

Recorded Talks

- DNA methylation and the evolution of bee eusociality [2017]
<https://www.youtube.com/watch?v=OuRrAc9Hrxs>
- Gene expression analyses of bivoltine behavior in the solitary bee *Tetrapedia diversipes* [2015]
https://www.youtube.com/watch?v=an6KET3R5_Y&t=1s

Press releases

- [May 2019] SMRT Leiden Symposium Showcases Successes in Clinical and Conservation Genomics
<https://www.pacb.com/blog/smrt-leiden-2019/>
- [Aug 2018] IUSSI 2018 Interviews
<https://youtu.be/MVsRwcQWoMA>

Publications

• Peer-reviewed journals

1. **Araujo, N.S.** and Arias M.C. (2021) Gene expression and epigenetics reveal species-specific mechanisms acting upon common molecular pathways in the evolution of task division in bees. *Sci. Rep.* doi.org/10.1038/s41598-020-75432-8
2. Françoso, E.*; **Araujo, N.S.***; Ricardo, P.C.; Santos, P.K.F.; Zuntini, A.R.; Arias, M.C. [2020] Evolutionary perspectives on bee mtDNA from mito-OMICS analyses of a solitary species. *Apidologie*. DOI: 10.1007/s13592-020-00740-x

3. **Araujo, N.S.** and Arias, M.C. [2019] Mitochondrial genome characterization of *Melipona bicolor*: Insights from the control region and gene expression data. *Gene*. DOI: 10.1016/j.gene.2019.04.042
 4. Santos, P.K.F.; **Araujo, N.S.**; Franoso, E.; Zuntini, A.R.; Arias, M.C. [2018] Diapause in a tropical oil-collecting bee: molecular basis unveiled by RNA-Seq. *BMC Genomics*. DOI: 10.1186/s12864-018-4694-x
 5. **Araujo, N.S.**; Santos P.K.F.; Arias M.C. [2018] RNA-Seq reveals that mitochondrial genes and long non-coding RNAs may play important roles in the bivoltine generations of the non-social Neotropical bee *Tetrapedia diversipes*. *Apidologie*. DOI: 10.1007/s13592-017-0542-2.
 6. **Araujo, N.S.**; Zuntini A.R.; Arias M.C. (2016) Getting useful information from RNA-Seq contaminants: A case of study in the oil-collecting bee *Tetrapedia diversipes* transcriptome. *OMICS: A Journal of Integrative Biology*. DOI: 10.1089/omi.2016.0054.
 7. Arias, M.C. **et al.** (2016) Microsatellite records for volume 8, issue 1. *Conservation Genetics Resources*. DOI: 10.1007/s12686-016-0522-2.
 8. **Araujo, N.S.** and Borges J.C.S. (2015) Rodlet cells changes in *Oreochromis niloticus* in response to organophosphate pesticide and their relevance as stress biomarker in teleost fishes. *International Journal of Aquatic Biology*. 3(6), 398-408.
- **Scientific communication**
 1. **Araujo, N.S.** (2021) Desert ant heat survival guide. *Myrmecological News Blog*. <https://blog.myrmecologicalnews.org/2021/01/07/desert-ant-heat-survival-guide/>
 - **Under review [pre-print]**
 2. Perez, R.*; **Araujo, N.S.** *; De France, M.; Aron, S. (2021) Molecular adaptations to heat stress in the thermophilic ant genus *Cataglyphis*. *Authorea*. DOI: 10.22541/au.161539101.11937589/v1
 - **Peer-reviewed conference proceedings**
 1. **Araujo, N.S.**; Fournier, D. Reproductive status and not parental reproductive strategy differentiate phenotypic and reproductive castes in a termite. In: *Biology & Genomics of Social Insects*, 2021, Cold Spring Harbor Laboratory meeting. Virtual event.
 2. **Araujo, N.S.**; Arias, M.C. Gene expression analyses of bivoltine behaviour in the solitary bee *Tetrapedia diversipes* and its implication in eusociality. In: *XI Encontro sobre Abelhas*, 2015, Ribeiro Preto. Anais do XI Encontro sobre Abelhas. Ribeiro Preto: Moringa Comunicao LTDA, 2015. p. 186.
 3. **Araujo, N.S.**; Arias, M.C. Transcriptome assembly for non-model Apinae bees: reference or de novo approach? In: *17th Congress of the International Union for the Study of Social Insects (IUSSI)*, 2014, Cairns. 17th Congress of the International Union for the Study of Social Insects (IUSSI), 2014.
 4. **Araujo, N.S.**; Silva, J.R.M.C.; Borges, J.C.S. Clulas bastonetes como biomarcadores para guas contaminadas por agrotxicos organofosforados. In: *7º Congresso de Iniciao Científica em Cincias Agrrias, Biolgicas e Ambientais*, 2009, So Paulo. O BIOLGICO. So Paulo, 2009. v. 71. p. 47-47.
 - **Monographies**
 1. Araujo, N.S. (2017) Expression of genes involved in the social behaviour of bees with different levels of eusociality. Doctoral theses, University of So Paulo, So Paulo – Brazil. DOI: 10.11606/T.41.2017.tde-04102017-081728
 2. Araujo, N.S. (2012) Analyses of the *Anastrepha fraterculus* complex (Diptera: Tephritidae) in Brazil based on mitochondrial cytochrome oxidase I sequences. MSc dissertation, University of So Paulo, So Paulo – Brazil. DOI: 10.11606/D.41.2012.tde-18122012-225903

Invited speaker talks

October 2018

University of Brussels

Gene expression analyses in the search for genetic mechanisms related to social behavior and other traits in bees. Invited by Dr. Claire Detrain, *Unit of Social Ecology*

August 2018

International Congress of IUSSI

Unveiling the expression dynamics of genes involved in bee sociality. *Symposium: From genes to societies*

Presentations in Scientific Meetings

• Talks

- Araujo, N.S. and Arias M.C. (2017) DNA methylation and the evolution of bee eusociality. Evolution
- Araujo, N.S.; Wurm Y.; Arias M.C. (2016) Worker Subcastes: What makes bees nurses? IUSSI-NAS Colloquium.
- Araujo, N.S. and Arias M.C. (2016) Evolution of GC Content in Genes Involved In Eusociality. Brazilian-International Congress of Genetics.
- Araujo, N.S. and Arias M.C. (2015) Gene expression analyses of bivoltine behavior in the solitary bee *Tetrapedia diversipes* and its implication in eusociality. Evolution

- Araujo, N. S.; Wurm, Y.; Arias, M. C. (2014) Highly Eusocial and Solitary Bees: what about their gene expression? NWIUSSI
- Araujo, N. S.; Perondini, A. L. P.; Selivon, D. (2012) Limitações do Uso de DNA mitocondrial em Estudos Filogenéticos de Moscas-das-frutas. Universidade Paulista
- Araujo, N. S. (2011) Sequenciamento da região COI do DNA mitocondrial no estudo de espécies crípticas do complexo *Anastrepha fraterculus* (Diptera: Tephritidae). Instituto Butantã
- Araujo, N. S.; Silva, J. R. M. C.; Borges, J. C. S. (2010) Células Bastonetes como Biomarcadores para Águas Contaminadas por Agrotóxicos Organofosforados. XII Encontro de Iniciação Científica da Vice Reitoria de Pós Graduação e Pesquisa UNIP/ PIBIC- CNPq
- Araujo, N. S.; Silva, J. R. M. C.; Borges, J. C. S. (2009) Células Bastonetes como Biomarcadores para Águas Contaminadas por Agrotóxicos Organofosforados. 7º Congresso de Iniciação Científica em Ciências Agrárias, Biológicas e Ambientais

- **Poster**

- Araujo, N.S. and Fournier, D. (2021) Reproductive status and not parental reproductive strategy differentiate phenotypic and reproductive castes in a termite – CSHL Biology & Genomics of Social Insects
- Araujo N.S. and Arias, M.C. (2019) Mitochondrial Genome Characterization of *Melipona bicolor*, an endemic bee from the Brazilian Atlantic Rain Forest – SMRT Leiden
- Araujo, N. S.; Wurm, Y.; Arias, M. C. (2017) Divisão de trabalho em operárias: O que torna as abelhas nutrizas? IV Workshop sobre Insetos Sociais – IUSSI Brazilian Section Annual Meeting
- Araujo, N.S. and Arias M.C. (2016) Evolution of GC Content in Genes Involved In Eusociality. Brazilian-International Congress of Genetics.
- Araujo, N.S.; Zuntini A.R.; Arias M.C. (2016) Getting useful information from RNA-seq contaminants: A case of study in *Tetrapedia diversipes* transcriptome. International Congress of Entomology (ICE).
- Araujo, N. S.; Arias, M. C. (2015) Gene expression analyses of bivoltine behaviour in the solitary bee *Tetrapedia diversipes* and its implication in eusociality. XI Encontro sobre Abelhas
- Araujo, N. S.; Arias, M. C. (2014) Transcriptome assembly for non-model Apinae bees: reference or de novo approach? 17th Congress of the International Union for the Study of Social Insects (IUSSI)
- Santos, P. K. F.; Araujo, N. S.; Arias, M. C. (2014) Comparing de novo assembly programs using transcriptome data from a non-model organism: *Tetrapedia diversipes* (Hymenoptera: Apidae: Tetrapediini). Congresso Brasileiro de Genética
- Araujo, N. S.; Perondini, A. L. P.; Selivon, D. (2011) Analyses of the *Anastrepha fraterculus* complex (Diptera: Tephritidae) based on mitochondrial *cytochrome oxidase I* sequences. 57º Congresso Brasileiro de Genética