# Shanika L. **Amarasinghe**

Postdoctoral Research Officer · Bioinformatics

*Australian Regenerative Medicine Institute (ARMI), Monash University, Clayton Campus, 3800, Victoria, Australia*

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## Professional Summary

- A bioinformatician with more than 10 years' of experience in the field of Biology, Statistics, Chemistry, Computer Science, and bioinformatics.
- BSc and PhD in bioinformatics that serve as qualifications for a life scientist and a medical research scientist.
- Multiple job roles in analysing high-throughput genomics data and developing tools for analysing large genomics data.
- A dedicated female academic in STEMM worked in bio-medical and developmental biology research.
- Author of multiple research articles and the lead scientist on research projects recognized and funded by international funding bodies.

## Educational Qualifications

**PhD in Bioinformatics** 04/14 to 03/18

*The University of Adelaide, Adelaide, Australia*

Thesis title: Transcriptional Networks Associated with Plant Salinity Tolerance **(Awarded Dean's Commendation for Thesis Excellence)**.

**B.Sc. (Hon's) in Bioinformatics** 07/07 to 11/11

*University of Colombo, Reid Avenue, Colombo 07, Sri Lanka*

Project title: Molecular Phylogenetic Study of Three Asexual Erythrocytic Stage Vaccine Candidate Antigens of *Plasmodium vivax* **(Awarded Second Class Upper Division (G.P.A.: 3.36/4.00))**.

## Certificates and Diplomas

**Coursera Online Certification for Machine Learning**
Offered by Professor Andrew Ng, Stanford University, California, USA (Pending)

**ChIP-Seq Practical Training**
Offered by EMBL-EBI, John Hopkins University, Baltimore, USA (April, 2018)

**Coursera Online Certification for Data Science Specialization**
Offered by John Hopkins University, Baltimore, USA (January, 2013)

**Institute of Biochemistry, Molecular Biology and Biotechnology, University of Colombo, Sri Lanka**
Certificate Course in Molecular Biological Techniques (August, 2012)

**British Computer Society, UK**
Professional Graduate Diploma (2010), Graduate Diploma (2010), Certificate Level (2007)

**Coursera Online Certification for R programming**
Offered By Professor Roger Peng, John Hopkins University, Baltimore, USA (January, 2013)

## Academic Experience

**Postdoctoral Research Officer - Bioinformatics (full time)**

07/22 to Present

*ARMI, Clayton, Victoria, Australia*

Joined as a part of Rosello-Diez lab. Working on bulk and single-cell RNA-Seq, long-read and integrative data analysis on mouse models with development defects. These projects involve nation and world-wide collaborators and time0sensitive and high-demand data analysis.

- I am currently guiding a PhD student at ARMI; This includes but are not limited to guidance with scripting and analysis directions, weekly meetings, assessing presentations, progress and reports, guidance in writing reports and research articles.

**Postdoctoral Research Officer - Bioinformatics (full time)**

09/18 to 07/22

*WEHI, Parkville, Victoria, Australia*

Joined as a part of Ritchie Laboratory (Epigenetics and Development Division). Working on single cell RNA-Seq, single-cell ATAC-Seq and long-read sequencing data and related tool development. We also work on benchmarking a dataset that can be used in analyzing newly developed single-cell and long-read data analysis tools. I have also guided multiple collaborations involving the analysis of high-throughput CRISPR-Cas9 genetic screen data.

- *Top 3 DOIs resulted from the work:*
  - 10.1093/gigascience/giab003
  - 10.1186/s13059-020-1935-5
  - 10.1101/2020.08.10.243543
- I have and currently am supervising three scholars; A Master's student, 2 Metcalf scholarship students and a research assistant. These supervisions include but are not limited to weekly meetings, assessing their presentations, progress and reports, guidance in writing reports and research articles.
- Reviewer for Nature Scientific Reports and BMC Genomics.

Cutting-edge bioinformatics techniques and tools used:

| | |
|---|---|
| Single-cell transcriptomic analysis | scran, scater, Monocle, SCENIC, dropletUtils, vireo, Limma, edgeR, DESeq, Kallisto, Salmon, Rsubread R packages |
| Single-cell ATAC-Seq analysis | scATAC-pro, scPipe, snapATAC, signac, cisTopic, MACS2, csaw, ArcheR, CisTopic, Cicero |
| Bulk and single-cell long-read analysis | minimap2, SQANTI3, TALON, flair, Jaffal, FLAMES, bambu, nanopolish |
| Bulk and single-cell short- and long-read integration analysis | other than above, Seurat, cellSNP, demuxlet |
| Other areas | HPC WEHI, Slurm and PBS workload management systems |

**PhD Student - Bioinformatics (full time)**

04/14 to 03/18

*The University of Adelaide, Adelaide, South Australia, Australia*

The overall scientific goal of my PhD project was to fathom some aspects of salinity tolerance mechanisms in plants such as Arabidopsis and barley through bioinformatics techniques such as molecular phylogenetics, transcriptomics, network analysis and variant analysis. The specific objectives of this project were to a) identify the downstream regulatory network controlled by AtCIPK16 in Arabidopsis thaliana b) perform a comprehensive evolutionary study of CIPK16s in grasses and c) evaluate the salt tolerance mechanisms of Hordeum vulgare L. (barley).

*DOIs of the leading publications that stemmed from this research are:*

- 10.1016/j.envexpbot.2019.103812
- 10.1016/j.ympev.2016.03.031
- 10.1101/2020.02.17.953216

Bioinformatics techniques and tools used:

| | |
|---|---|
| Alignment and Transcriptomic tools | TopHat, Bowtie, STAR, Hisat2, FastQC, Limma, edgeR, DESeq, Rsubread R packages |
| Co-expression network analysis tools | WGCNA |
| Sequence/variant analysis | BLAST++, Jalview, CLUSTAL W, MUSCLE, FASTX-Toolkit, SAM tools, BCF tools, VCF tools, SNPEff, SNPSift, GATK suite |
| Operating systems | Windows 98/2000/XP/Vista, Solaris, Linux/Unix, Mac |
| Programming languages | R, Python, Perl, awk, sed |
| Annotation and visualisation tools/resources | Cancer Cell Atlas, NCBI, Aracyc, Metacyc, KEGG, KASS, Blast Koala, BLAST2GO, Mapman, Cytoscape, AgriGO, TAIR, CLC Genomics Workbench |
| Other areas | LIMS (Laboratory Information Management System), Zotero, Minitab, Microsoft Office tools, Adobe software (Photoshop, Illustrator) |

**Scientist - Bioinformatics (full time)**

04/13 to 03/14

*Human Genetics Unit, Faculty of Medicine, University of Colombo, Sri Lanka (HGU)*

- Developed the Genome Analyzing Pipeline for HGU.
- Developed and managed HGU's official website.
- Documented the workflows and end user documentation for the website and the genome analysing pipeline.
- Provided guidance and assistance to projects and prepare project reports.
- Maintained the personal genome database.

**Teaching Assistant (full time)** 10/11 to 02/13

*Department of Plant Sciences, Faculty of Science, University of Colombo*

- Was in-charge teaching assistant for the special students of bioinformatics from 3rd and 4th years.
- Supervised student research projects in bioinformatics.
- Conducted practical tutoring sessions for the undergraduates of the department.
- Was involved in tutoring for other levels of undergraduates in the department.

**4th Year Research Project (full time)** 01/11 to 10/11

*Department of Plant Sciences, Faculty of Science, University of Colombo*

The project was titled *"Molecular Phylogenetic Study of Three Asexual Erythrocytic Stage Vaccine Candidate Antigens of Plasmodium vivax"*. The project involved,

- Designing the experiment and conducting data collection using various bioinformatics tools and databases such as NCBI.
- Data analysis using bioinformatics tools such as BLAST, SWISS-PROT, PHYRE, and MEGA.
- Studying the structure of biomolecules such as proteins using bioinformatics platforms.
- Examining the malaria parasite proteins and the structure of the malaria virus using bioinformatics tools such as SWISS-MODEL and using prior available literature on malaria surface proteins.
- Investigating the effects of disease on humans using existing literature.
- Investigating the effects of the malaria virus on human health using existing research publications and identifying conserved protein structures as vaccine candidates (*in-silico*) for a cocktail vaccine for the malaria parasite.
- Investigating the effects of identified vaccine candidates on human health using bioinformatics tools and existing literature.
- Writing abstracts for conference presentations, final project thesis and a manuscript on the research findings (10.1016/S1995-7645(14)60146-2).
- Conducting presentations in scientific sessions, conferences, and seminars to disseminate the knowledge gathered from the research.

## Research Experience and Publications

- **Lim H.J., Wubben J., Garcia C.P., Cruz S., Mak J., Hachani A., Anderson R., Painter G., Goyette J., Amarasinghe S.L., Ritchie M.E., Roquilly A., Gaus K., Fairlie D., Rossjohn J., Villadangos J., McWilliam H. (2022)**A specialized tyrosine-based endocytosis signal in MR1 optimizes metabolite antigen presentation to MAIT cells J Cell Biol. 5;221(12):e202110125. DOI: 10.1083/jcb.202110125.
- **Amarasinghe, S.L., Ritchie M.E., Gouil Q. (2021)** long-read-tools.org: an interactive catalogue of analysis methods for long-read sequencing data. GigaScience, 10,2. DOI: 10.1093/gigascience/giab003
- **Tian L., Jabbari J.S., Thijssen R., Gouil Q., Amarasinghe S.L., et. al.,(2021)** Comprehensive characterization of single-cell full-length isoforms in human and mouse with long-read sequencing. Genome Biol 22, 310. DOI: 10.1186/s13059-021-02525-6
- **Amarasinghe S., Su S., Dong X. et al. (2020)** Opportunities and challenges in long-read sequencing data analysis. Genome Biol 21, 30. DOI: 10.1186/s13059-020-1935-5
- **Amarasinghe S., Watson-Haigh N.S., Byrt C., James R., Qiu J., Berkowitz O., Whelan J., Roy, S.J., Gilliham M., Baumann U. (2019)** Transcriptional variation is associated with differences in shoot sodium accumulation in

distinct barley varieties. Environmental and Experimental Biology. DOI: 10.1016/j.envexpbot.2019.103812

- **Amarasinghe S., Watson-Haigh N.S., Gilliham M., Roy, S.J., Baumann U. (2016)** The evolutionary origin of CIPK16: A gene involved in enhanced salt tolerance, Molecular Phylogenetics and Evolution. DOI:10.1016/j.ympev.2016.03.031
- **Amarasinghe S., Kathriarachchi H., and Udagama P. (2014)** Conserved Regions of *Plasmodium vivax* Potential Vaccine Candidate Antigens in Sri Lanka: Conscious *In-silico* Analysis of Prospective Conformational Epitope Regions Asian Pacific Journal of Tropical Medicine. DOI: 10.1016/S1995-7645(14)60146-2

*Preprints*

- **Dong X, Du MRM, Gouil Q, Tian L, Baldoni PL., Smyth GK, Amarasinghe SL, Law CW, Ritchie ME (2022)** Benchmarking long-read RNA-sequencing analysis tools using *in silico* mixtures bioRxiv. DOI: https://doi.org/10.1101/2022.07.22.501076
- **Viacheslav Kriachkov, Hamish E G McWilliam, Justine D Mintern, Shanika L Amarasinghe, Matt Ritchie, Luc Furic, Danny M Hatters (2021)** Arginine-rich C9ORF72 ALS Proteins Stall Ribosomes in a Manner Distinct From a Canonical Ribosome-Associated Quality Control Substrate. bioRxiv. DOI: 10.1101/2022.02.09.479805 (to be submitted to NAR)
- **Amarasinghe S., Watson-Haigh N.S., Gilliham M., Roy, S.J., Baumann U. (2020)***AtCIPK16* Mediates Salt Stress Through Phytohormones and Transcription Factors. bioRxiv. DOI: 10.1101/2020.02.17.953216 (to be submitted to Plant Cell)

*Manuscripts in preparation*

- **Amarasinghe SL, Yang P, Voogd O, Yang H, Ritchie ME** Preprocessing scATAC-Seq data with scPipe (to be submitted to NAR Application Note)
- **Dias S., Amarasinghe S., Premerathne H. P., Kathriarachchi H., Udagama P., Escalante A.A.** Combined Analysis of the Genetic Diversity of CSP, MSP-1, MSP-3, AMA-1 and DBP Vaccine Candidate Antigens of *Plasmodium vivax* in Sri Lanka; (to be submitted to Elsevier Vaccine)

*Selected Oral Presentations*

- **Amarasinghe S., Gouil Q., Ritchie M.E. (2019)** long-read-tools.org, Virtual Nanopore Day, Australia, 18th November 2020.
- **Amarasinghe S., Tian L., Paoli-Iseppi R.E., Clark M.B., Jabbari J.S., Ritchie M.E. (2019)** Long Reads for scATAC-seq, AGTA, Melbourne, 7-9th October 2019, Pullman Melbourne Albert Park.
- **Amarasinghe S., Kathriarachchi H., and Udagama P. (2012).** Predicting the conformational Epitope Regions of Potential Asexual Erythrocytic Stage Vaccine Candidate Antigens of *Plasmodium vivax* using Bioinformatics Tools, Proceedings of the 6th Biennial Scientific Sessions of Allergy and Immunology Society of Sri Lanka (in collaboration with National Science Foundation), 14-15 June 2012, Medical Research Institute, Colombo.

*Selected Posters Presentations*

- **Amarasinghe S., Tian L., Jabbari J.S., Ritchie M.E. (2020)** scPipe-ATAC: A flexible R/Bioconductor module for pre-processing platform-independent scATAC-Seq data, BioC2020, Virtual Conference, July 27 - 31, 2020.
- **Amarasinghe S., Watson-Haigh N.S., Gilliham M., Roy, S.J., Baumann U. (2014).** Narrowing Down on CIPK16 Orthologues: A Gene Involved In Enhanced Salt Tolerance. BioinfoSummer 2014 (Monash University, Clayton Campus, Melbourne, Australia).

## Conferences Attended/Presented Work In

Invited talk: "Pre-process your sincgle-cell ATAC-Seq data with scPipe", Single Cell Research User Meetings (SCRUM), 2022 Invited talk:"scPipe - a flexible R/Bioconductor pipeline for single-cell data preprocessing", Bioinformatician's Shed, University of Melbourne, 2022BioC 2020 (presented title: scPipe::ATAC - A flexible R/Bioconductor module for pre-processing platform independent scATAC-Seq data), Virtual conference. Invited talk: "long-read-tools.org: a catalogue of tools for long-read data analysis", Nanopore Day, 2020 (Virtual conference) AGTA 2019 (presentation title: Long Reads for scATAC-seq), Pullman Albert Park, Melbourne Nanopore Day 2019 Melbourne, University of Melbourne. Oz-single cell 2019, University of Melbourne, Melbourne. Bioinfosummer 2019, University of Western Australia, Perth. Bioinfosummer 2016 (presentation title: Linking Transcriptome of *Arabidopsis thaliana* CIPK16 Transgenics with the Response to Initial Stages of Salt Stress), SAHMRI, Adelaide. Joint Research Meeting 2016, Australian Centre for Plant Functional Genomics, University of Adelaide, Adelaide. Combine student symposium 2015, Charles Perkins Centre, The University of Sydney, Sydney. ABACBS 2015, Charles Perkins Centre, The University of Sydney. Bioinfosummer 2014 (presentation title: Narrowing Down on CIPK16 Orthologues: A Gene Involved in Enhanced Salt Tolerance), Caulfield campus, Monash University, Melbourne. 6th Biennial Scientific Sessions of Allergy and Immunology Society of Sri Lanka (presentation title: Predicting the conformational Epitope Regions of Potential Asexual Erythrocytic Stage Vaccine Candidate Antigens of *Plasmodium vivax* using Bioinformatics Tools).

## Academic Achievements

- Travel grant of $2000 to attend Lorne Genome 2023, Australian Regenerative Medicine Institute (2022).
- Paige Betheras Award for Female Researchers, WEHI (2021).
- Travel grant of $2000 to attend BioC 2020 in New York, USA (unused due to COVID-19 pandemic travel restrictions) (2020).
- Craven and Shearer award for female researchers, WEHI (2019).
- Travel grant to attend BioinfoSummer 2018 in Perth Australia (2018).
- Dean's Commendation for Thesis Excellence, The University of Adelaide (September 2018).
- The conference travel scholarship to attend BioInfoSummer 2014 in Melbourne, Australia (2014).
- Full fee scholarship from the University of Adelaide and ACPFG PhD scholarship (2014).
- Merit Award by the National Research Council, Sri Lanka for research paper published in Asian Pacific Journal of Tropical Medicine 10/2014; 7(12):832-840. DOI: 10.1016/S1995-7645(14)60146-2 (2014).
- Best Science Student, Haverstock Secondary School, London, UK (2000).
- Proficiency prize for the exhibit in the Science section; science and mathematics exhibition, Sirimavo Bandaranaike Vidyalaya (1997).
- Proficiency prize for the exhibit in the Social Studies section; science and mathematics exhibition, Sirimavo Bandaranaike Vidyalaya (1997).
- Prize for 8A's at G.C.E. O/L examination, Annual Prize Giving, Sirimavo Bandaranaika Vidyalaya (2002).
- Subject Prize (Buddhism), Annual Prize Giving, Sirimavo Bandaranaika Vidyalaya (1998).
- Class Prize for Grade 4, Annual Prize Giving, Sirimavo Bandaranaika Vidyalaya (1995).
- Merit for Proficiency in Grade 2, Annual Prize Giving, Sirimavo Bandaranaika Vidyalaya (1993).

## Extracurricular Activities

**Professional Development, Volunteering, Office Bearing in Organizations and Societies**

- Executive committee (Professional Development and Finance), Postdoctoral Association - Walter and Eliza Hall Institute (2019-2020).
- Executive committee member, WiSPP, (2020).
- Facilitator for the hands-on R workshop, WEHI, (October 2020).
- Executive committee (Professional Development), Postdoctoral Association - Walter and Eliza Hall Institute (2018-2019).
- Volunteered for a community engagement event of WEHI, "Art of Science", (September 2019).
- Facilitator for the hands-on R workshop, WEHI, (October 2018).
- South Australia representative of COMBINE (a student-run Australian organisation for researchers in computational biology, bioinformatics, and related fields) (2017).
- Executive committee member of AgPoGs (currently known as P.A.W.S) – University of Adelaide (2016).
- Executive Leadership Body member of AIESEC Organization for consecutive 2 years (2010-2012).
- Member of Botanical Society, University of Colombo (2010-2011).
- The Editor of Photographic Society, Sirimavo Bandaranaike Vidyalaya, Colombo 07 (2004-2005).
- The President, Computer Society, Sirimavo Bandaranaike Vidyalaya, Colombo 07 (2004-2005).

**Leadership Development Conferences**

- Sri Lanka
  - National Leader's Development Seminar, Sri Lanka (2009. 2010, 2011)
- Overseas
  - National Leader's Development Summit , Singapore (2009): Representing Sri Lanka
  - UNLEASH, , Leader's Seminar, Malaysia (2011): Representing Sri Lanka

**Recreational Activities and Sports**

- Member, University Tennis Team, Women, University of Colombo, Colombo 03 (2007-2008).
- Inter-faculty sports meet (Tennis, women), University of Colombo, Colombo 03 (2008).
- Member, School Swimming Team, Sirimavo Bandaranaike Vidyalaya, Colombo 07 (2000-2005).
- School Eastern Music orchestra, leading violin player, Sirimavo Bandaranaike Vidyalaya, Colombo 07 (2004-2005).
- The "Best Young Leader" award, CIMA awards Night, National Leader's Development Seminar, MIMT, Thulhiriya, Sri Lanka (2010).
- The "Best Organizing Committee" award for CDD 2010, CIMA awards Night, National Leader's Development Seminar, MIMT, Thulhiriya, Sri Lanka (2010).
- Bhathkande Sangeeth Exam, Lucknow, Class, Prathama in Violin Section (2003).
- Royal School of Music, Level II Violin, Merit (2000).
- Merit awards in School Swimming Competitions (2000-2005).

## References

As per request