Curriculum Vitae

(SURJEET KUMAR ARYA)

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Educational qualification:

Ph.D. (2019)	**Biological Science (with specialization in Computational Biology)** **Title:** Transcriptome based screening of putative RNAi targets genes in Cotton mealybug, *Phenacoccus solenopsis,* and their functional validation. Plant Molecular Biology Lab, CSIR-National Botanical Research Institute, Lucknow, India. **[CGPA-**8.3**]**
M.Sc. (2012)	**Biotechnology - [CGPA-**7.8**]** Hyderabad Central University (H.C.U.), Telangana, India.
B.Sc. (H). (2010)	**Biomedical Science** Delhi University (D.U.), Delhi, India.

Research/Work Experience:

March 2025 to present

Position: **Research Scientist**

Place: University of Kentucky, Department of Entomology, College of agriculture, Food and Environment, Lexington, Kentucky, USA.

Topics: "Epigenetic Regulation of Hormonal Signaling and Development in Insects" [March-2025 to Present]

March 2023 to March 2025

Position: **Postdoctoral Research Sceintist**

Place: University of Kentucky, Department of Entomology, College of agriculture, Food and Environment, Lexington, Kentucky, USA.

Topics: "Single-cell sequencing of midgut from pest insects" [March-2022 to Present]

- Optimized methods for single-cell isolation in both lepidopteran and hemipteran insects.
- Conducted single-cell sequencing and analysis of the resulting datasets.
- Assessed the reproducibility of the datasets using Harmony.
- Developed standard pipelines for single-cell data analysis using the Shiny App ("**scRNAdb**").
- Uploaded the pipelines to the CAMTech secure website.

Research lead:

❖ Developed single RNA seq pipelines for all the datasets uploaded in the CAMTech secure website.

March 2020 to March, 2022

Position: Postdoctoral Research scientist

Place: University of Kentucky, Department of Entomology, College of agriculture, Food and Environment, Lexington, Kentucky, USA work in collaboration with USDA (**US Department of agriculture**), Columbia, Missouri (March 2020 to March 2022).

Topics: "Functional genomics of insect cell lines" [March-2020 to December-2021**]- Industry funded**

- Curation of cell line database.
- Generation of transcriptomic and proteomics from 8 insect cell lines and associated tissues.
- Comparative analysis of generated transcriptomic and proteomic data to the identification of common and unique genes and proteins.

Research lead:

- Developed insect cell line database and deposited in CAMTech secure website (https://entomology.ca.uky.edu/aginsectcellsdatabase).
- News Entomology today USA: https://entomologytoday.org/2022/11/04/insect-cell-line-database-help-researchers-across-globe/.

November 2019 to March, 2020

Position: Postdoctoral Research scholar

Place: Hebrew University of Jerusalem, Department of Plant Pathology and Microbiology, Robert H. Smith Faculty of Agriculture, Food and Environment, Rehovot, Israel (November 2019 to March 2020) (5 months).

Topic: "Micro-biota induced changes in medfly gene expression in a diet-dependent fashion"

- This works involves the generation of axenic and individual or mixed microbiota added fruit flies (*Ceratitis capitata*).
- Test the effect of the microbiota on behavioural nutrient homeostasis.
- Identification of gene pathways that affect medfly fitness in diet-dependent fashion using RNA-seq data available in the NCBI.
- Reference-based assembly of gut transcriptome data using medfly genome available in the NCBI.

August 2013 to October 2019

Project Research Fellow: Plant Molecular Biology Laboratory, **NBRI, Lucknow**, India (2018- 2019) **(10 Months)**

Topic: "Combining proteomics and transcriptome sequencing to identify putative RNAi targets for mealybug (*Phenacoccus solenopsis*) and their functional validation".

- In this work, firstly we have isolated the whole-body proteins from different developmental stages of mealybugs using phenol methods.
- Extracted proteins analysed using **1D-gel** and **2-D electrophoresis (2-DE)** electrophoresis.
- Proteins enzymatically digested into smaller peptides, and these thousands of peptides profiled in a single **LC-MS** run.
- LC-MS generated data analysed using **MaxQuant**.

Graduate Research Assistant: Plant Molecular Biology Laboratory, NBRI, Lucknow, India (2013-2019). **(5 years 10 months)**

During my doctorate, I worked on Topic: Transcriptome-based screening of putative RNAi targets and their functional validation in cotton mealybug, *Phenacoccus solenopsis*.

- Life cycle study of mealybug on a host and alternate host plant using **SEM** and **compound microscopy**.
- Optimization of in-vitro bioassay using designer Tools through analyzing the **1D-NMR** data of different phloem sap and honeydew samples.
- *De-novo*-transcriptome sequencing and data analysis of different developmental stages of mealybugs using **Trinity software**.
- Identification of potential **RNAi** target genes and their functional validation using Post translation transient gene silencing methods (**PITGS**).
- Transcriptome-wide analysis of selected target genes.

Patent analyst: Ashmar Technologies and Research Pvt. Ltd., Gurgaon (2012-2013). **(11 months)**

Topic: "Patentability and Marketability Report (PMR) and Prior Art Search Report (PASR)".

- Identify the patent-eligible subject matter from the subject invention.
- Determine the patent eligibility of the subject matter identified.
- Identify the potential key licensees of the technology.
- Analyse the marketability of the technology described in the subject invention
- **Scope of the Search-**
    - **Patent Databases**: Questel Orbit Patent Portal (FamPat), Patent Lens.
    - **Non-Patent Databases:** Google Scholar, IP.com Prior Art Database, and Scirus.

Research Assistant: Hyderabad, Central University (H.C.U.), Telangana, India (2011-2012). **(1 year)**

During my masters, I was involved in the project entitled: "Expression and purification of a putative AbrB-like protein, *Ssl2245* and its interaction with a heat-responsive transcriptional regulator".

- **Cloning and expression** of Ssl2245 Protein **using pET-*E. coli* system.**
- **Affinity purification** of Ssl2245 protein using **Nickel-NTA column**.
- Expression and purification of Ssl2245 along with the downstream gene sll1130.
- Interaction studies between Ssl2245 and sll1130.
- Effect of Ssl2245 and Sll1130 on the growth of *E. coli* host cells upon their induction.

Internship/Summer Training:

Junior Research intern: Selected for **Summer Undergraduate Research Project (SURP).** Ambedkar Center for Biomedical Research (ACBR), and Department of Molecular biology, Delhi, India (May to July 2011) **(3 months).**

- During this duration I worked on "To check the expression of Recombinant **RUNX-1** protein".
- During this internship I have learned different molecular biology techniques specifically: Plasmid DNA Isolation, Competent Cells Preparation, Bacterial Transformation, Agarose Gel Electrophoresis, SDS-PAGE, Western blotting.

Research papers published and communicated

1. **Arya, S. K.,** & Palli, S. R. (2025). N-alpha-acetyltransferase 40 Modulates Ecdysteroid Action Through Chromatin Accessibility Changes Near the Promoters of 20-hydroxyecdysone Response Genes in *Tribolium Castaneum* TcA cells. ***Insect Biochemistry and Molecular Biology*, 104285.**
2. **Arya, S.K.,** Douglas, A. H., Palli, S.R. **(2024)**. Deciphering Cellular Heterogeneity in *Spodoptera frugiperda* Midgut Cell Line through Single Cell RNA Sequencing. ***Genomics 116,** no. 5 (2024): 110898.*
3. **Arya, S.K.,** Douglas, A. H., Palli, S.R. **(2024)**. Cellular heterogeneity of the fall armyworm (*Spodoptera frugiperda*) midgut: a single cell RNA sequencing analysis. ***Journal of Pest Science,** pp.1-16.*
4. Chen, Xi., Koo, J., **Arya, S.K.,** Palli, S.R. **(2024)**. Chronologically inappropriate morphogenesis (Chinmo) is required for the maintenance of larval stages in a lepidopteran insect, *Spodoptera frugiperda.* ***PNAS,** 121(49), e2411286121.*
5. Kaur, G., **Arya, S.K.,** Singh, B., Singh, S., Saxena, G., Verma, P.C. and Ganjewala, D. **(2023)**. Comparative transcriptional analysis of metabolic pathways and mechanisms regulating essential oil biosynthesis in four

elite Cymbopogon spp. ***International Journal of Biological Macromolecules***, 229, pp.943-951.

6. **Arya, S.K.,** Goodman, C.L., Stanley, D. and Palli, S.R. **(2022)**. A database of crop pest cell lines. ***In Vitro Cellular & Developmental Biology-Animal***, 58(8), pp.719-757.
7. **Arya, S.K.,** Singh, S., Upadhyay, S.K., Tiwari, V., Saxena, G. and Verma, P.C. **(2021).** RNAi-based gene silencing in *Phenacoccus solenopsis* and its validation by in planta expression of a double-stranded RNA. ***Pest Management Science*, 77(4), pp.1796-1805.**
8. Kaur, G., **Arya, S.K.,** Singh, B., Singh, S., Dhar, Y.V., Verma, P.C. and Ganjewala, D. **(2019)**. Transcriptome analysis of the palmarosa *Cymbopogon martinii* inflorescence with emphasis on genes involved in essential oil biosynthesis. ***Industrial Crops and Products***, 140, p.111602.4.
9. **Arya, S.K.,** Dhar, Y.V., Upadhyay, S.K., Asif, M.H. and Verma, P.C. **(2018)**. De novo characterization of *Phenacoccus solenopsis* transcriptome and analysis of gene expression profiling during development and hormone biosynthesis. **Scientific Reports**, 8(1), p.7573.
10. **Arya, S.K.,** Jain, G., Upadhyay, S.K., Sarita, Singh, H., Dixit, S. and Verma, P.C. **(2017)**. Reference genes validation in *Phenacoccus solenopsis* under various biotic and abiotic stress conditions. ***Scientific reports***, 7(1), p.13520.

Book chapters:

1. **Arya, S.K.,** Moola, A.K., Balasubramania, S., Gurusamy, D. **(2024)**. NBS-LRRs: Role in defense signaling. Defense-Related Proteins in Plants. ***Elsevier*.**
2. Balasubramania, S., Gayathirib E., Gurusamy, D., Prakashd, P., Appue , M., **Arya, S.K.**, Moola, A.K. **(2024)**. Role of Heat Shock Proteins in Abiotic and Biotic Stress Response in Plants. Defense-Related Proteins in Plants. ***Elsevier*.**
3. Moola, A.K., Gurusamy, D., **Arya, S.K.**, Sivakumar, J.S., Elavarasan, K., Vasanth, K. **(2024)**. Defensins in Plants: Diversity and Role in Plant Defense. Defense-Related Proteins in Plants. ***Elsevier*.**
4. Singh, S., **Arya, S.K.,** Kaur, G., Saxena, G. and Verma, P.C. **(2019)**. Role of endosymbionts in nutritional uptake of sap sucking insects. Molecular Approaches in Plant Biology and Environmental Challenges, pp.487-499. ***Springer***.
5. **Arya, S.K.,** Shiva, S. and Upadhyay, S.K. **(2021).** Entomotoxic proteins from plant biodiversity to control the crop insect pests. Bioprospecting of Plant Biodiversity for Industrial Molecules, pp.15-52. ***Elsevier*.**

Conference/symposium/ seminar/abstracts/posters:

1. **Arya, S.K.,** Douglas, A. H., Palli, S.R., **(2024)**. **Invited as speaker to present talk on** "Cellular heterogeneity of the fall armyworm (*Spodoptera frugiperda*) midgut: a single cell RNA sequencing analysis". St. Louis, MO, USA.
2. **Arya, S.K.,** Douglas, A. H., Palli, S.R., **(2024, 2023, 2022)**. Single-cell sequencing of midguts from pest insects. **CAMTECH conference**, University of Florida (UF), University of Kentucky (UK), USA.
3. **Arya, S.K.,** Goodman, C.L., Stanley, D. and Palli, S.R., **(2019, 2021, 2020).** Single-cell sequencing of midguts from pest insects. **CAMTECH conference**, University of Florida (UF), University of Kentucky (UK), USA.
4. **Arya, S.K.,** G Jain, PC Verma. Reference Genes Validation in *Phenacoccus solenopsis* under Biotic and Abiotic Stress Conditions. **"International Conference on Advances in Plant & Microbial Biotechnology PMB-2017" organized by Department of Biotechnology, JIIT.** Noida, (India) [February 2-5, 2017**]**.
5. Dixit, S., Jain, G., **Arya, S.K.,** Verma, P.C. Enhanced biosynthesis of gossypol in cell suspension culture of *Gossypium hirsutum* through elicitation on by water-soluble carbon nanotubes. **"International**

Conference on Advances in Plant & Microbial Biotechnology PMB-2017" organized by Department of Biotechnology, JIIT, Noida (India) [February 2-5, 2017].

6. **Arya, S.K.,** Singh, S, Jain, Gourav, Verma, P.C. Developmental pathway hindrance: RNAi a promising bio-pesticide strategy against pest of cotton, *Phenacoccus solenopsis*. "**4th International plant physiology" conference organized by CSIR-NBRI, Indian society for plant physiology**. New Delhi, India [December 2-5, 2018].
7. Singh, S., **Arya**, **S.K.,** Verma, P.C. siRNA mediated control of Cotton mealybug (*Phenacoccus solenopsis*) using integrated transcriptomic and proteomic approaches. **"4th International plant physiology" conference organized by CSIR-NBRI, Indian society for plant physiology** New Delhi, India. [December 2-5, 2018].
8. Singh, S., **Arya, S.K.**, Verma, P.C. Combining proteomics and transcriptome sequencing to identify putative RNAi targets for mealybug *Phenacoccus solenopsis* and their functional validation. "**Best poster award**"- **"First international conference on biological control (ICBC)"** held at Bengaluru, India. [September 27-29, 2018].
9. Jain, G., Dixit, S., **Arya, S.K.,** Verma, P.C. Insect Inducible Methanol Production in Plants for Insect Resistance. **ICE 2017: International Conference on Entomology**, World Academy of Science, Engineering and Technology, Paris, France [Oct 19-20, 2017].

Techniques known/skills:

1. Bioinformatics or computational background:

Database:

- **Biological:** KEGG, KOBAS, NCBI, EMBL, GenBank, and ENA.
- **Insect cell line**: Cellosaurus.
- **Patent**: Questel Orbit Patent Portal (FamPat), and Patent Lens.

Data analysis:

- **Blast:** NCBI Blast, (PSI)-BLAST and Standalone Blast.
- **Reference genes finding:** RefFinder, NormFinder, and geNorm.
- **Sequence Alignments:** Clustal W or omega, and Mega Blast.
- **Microbiome analysis:** MetaWrap and QIIME 2.
- **Transcriptome analysis:** CLC Workbench, Trinity, bowtie2, DESeq, and SOAPdenovo.
- **Single-cell RNA (ScRNA, scATAC)**: Cell Ranger, Monocle, Seurat, Signac and Scanpy.
- **Machine learning (ML):** Supervised and unsupervised learning, and deep learning.
    - **Tool:** Pandas, Scikit-learn, and NumPy.

Computer skills:

- **Programming language**: **R**, & **Python**.
- **Software**: Microsoft office, GraphPad Prism, SPSS, and JMP.
- **Operating system: Linux** & Windows.
- **Web:** Internet & HTML Programming.

2. Molecular Biology:

Techniques:

Basic molecular: DNA, RNA extraction, dsRNA synthesis, dsRNA fluorescent tagging, and cloning.

Instrument: PCR, Real-Time PCR, and agarose gel electrophoresis.

Proteomics:

- **Expression:** Recombinant Expression in ***Escherichia coli***, and protein purification by **Ni-NTA** columns.
- **Protein gel:** SDS-PAGE, and Native Gel.
- **Sample preparation and Sequencing**: LC-MS/MS.

Insect Biochemistry: Amino-acid profiling, and Diet optimization.

Microscopy: SEM & Confocal microscopy.

Entomology:

- **Insect cell line maintenance:** BCIRL-CAMTech-SfMG1-0611-KZ, BCIRL-SfNS3-0827-TRL, RP-HzGUT-AW1, RP-HzVNC-AW1, BCIRL-AtE-CLG15A, NRCAN-LL-182A, BCIRL-DvWL2-0619-KZ, and BRL-AG-3C.
- **Insect rearing:** *Phenacoccus solenopsis*, *H. armigera*, *S. litura, Bemisia tabaci*, *Ceratitis capitata,* and *Aphis gossypii*.
- **Insect Bioassay:** artificial diet and using in-planta.
- **Generation of flies:** Axenic flies and gut microbiome treated (especially in medfly and olive flies).

NCBI DATA SUBMISSION

- NCBI SRA database, under the SRA accession number of **SRP133470**.

Workshop/training programs:

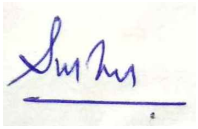
1. Certificate on **Python Developer Master Program**, Edureka.
2. Certificate on Bioinformatics with Python, Udemy.
3. Certificate on Python Programming Masterclass, Udemy.
4. Certificate on R Programming, Udemy.
5. Certificate of Hands-on Bioinformatics Training on **"Basic Bioinformatics, Programming and NGS-MicroBiome"** Organized by ArrayGen Technologies Pvt. Ltd., Pune, India. (15th January 2020 to 15th February 2020).
6. Certificate of Achievement for attending BiotecNika Joint workshop on "**Mass Spectrometry-Based Proteomics Analysis**" Organized by BiotecNika Info Labs Pvt. Ltd. on 22nd December 2019 to 5th January 2020.
7. Certificate of participation workshop on **"High-Performance Computing"** held at CSIR-NBRI, conducted by CDAC, Pune, and Govt. of India.
8. Certificate of Achievement for attending BiotecNika Schrodinger Joint workshop on "**Computer-Aided Drug Discovery**" Organized by BiotecNika Info Labs Pvt. Ltd. on 22nd July to 2nd August 2019.
9. Certificate of participation workshop on "Small molecule analysis by **"NMR Spectroscopy & Mass spectrometry"** from 13th-15th December 2017 at SAIF, CSIR-CDRI, Lucknow.
10. Certificate of participation in the Hands-on Training cum workshop on **"CRISPR/Cas9: a robust tool for genome editing"** held at KIIT University Bhubaneswar, Odisha (20TH ADNAT Convention).
11. Certificate of participation as delegate workshop on **"Intellectual Property Right (PATENT & INNOVATION)"** Held at King George's Medical University, Lucknow, U.P.
12. Certification of participation in the **"Transcriptome data analysis"** workshop in PGI, Lucknow conducted by Sandoor Life Sciences.
13. Certificate of participation in **"Young Scientist conclave"** organized as a part of India International Science Festival (IISF-2016).
14. Certificate of six-month training in **IPR and Patent analysis**- 2012-2013.
15. Certificate in Genomics training workshop for **Quantitative PCR and Microarray**.
16. Certificate in **HTML programming** from NIIT.

Fellowships and other achievements:

- Research fellowship grant from **Council of Scientific and Industrial Research-University Grant Commission**, India (July 2013).
- Qualified **CSIR-NET** Exam 2013-14.
- Qualified State eligibility Test **(SET)**-2012.
- Qualified Graduate Aptitude Test in Engineering **(GATE)** in Biotechnology – 2011 and 2013.
- Qualified **JNU All India Biotechnology** entrance exam (All India Rank 14th).

- Selected for **Biotechnology Industrial Training Program** (BITP)-2012.
- Qualified Karnataka Biotechnology aptitude test (KBAT)-2012(All India Rank 39th).
- Certificate of merit for an aptitude assessment test conducted by **NIIT**.
- Certificate in Regional Science Exhibition.
- Certificate of participation Help-Age India Inter-Generational Walkathon.
- Certificate in AD-MAD program conducted by Rajguru College of applied science (DU).

Declaration:
The information given above is true to my belief and knowledge.



Date: July-05 (2025)

Place: Lexington, KY, USA (**Surjeet Kumar Arya**)