**CURRICULUM VITAE**

**Dr. S. ANBUMANI M.Sc., Ph.D.**

PRINCIPAL SCIENTIST

ECOTOXICOLOGY LABORATORY, REACT DIVISION

CRK CAMPUS, CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH (IITR), KANPUR ROAD, LUCKNOW – 226008 UTTARPRADESH, INDIA.

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**Research Interests**

* ***Regulatory perspective*** - Hazard and risk identification of plant protection products, industrial chemicals, new chemical entities, pharmaceuticals, and personal care products to aquatic and terrestrial ecosystems in OECD recommended model systems (Algae, Daphnia, Zebrafish, Earthworm, Honeybee, Japanese Quail) based on national and international regulatory guidelines as per the OECD principles of GLP. The data generated will be helpful for the regulators / implementing agencies to classify the category of products in terms of consumer safety and environmental health protection.
* ***R&D perspective***
* Deciphering the underlying cellular and molecular mechanisms of neurodevelopmental and complex behavioral toxicity by emerging environmental contaminants such as organic UV filters (OUVF), microplastics, flame retardants etc. in developing zebrafish model.
* Interaction and toxicity of microplastics and PAHs (US EPA prioritized) on early development using vertebrate model (*Danio rerio*).
* Exploring the earthworm, *Eisenia fetida* as suitable terrestrial sentinel model to assess the detrimental impacts of emerging contaminants (OUVF, microplastics, PAHs, biodegradable plastic additives, and novel flame retardants etc.)
* Impact of emerging contaminants on crustacean growth, development and reproduction in *Daphnia magna* model using multi-omics approach.

**Accomplishment**

* After joining CSIR-IITR as a Scientist in 2014, Ecotoxicology laboratory was established to conduct the safety evaluation of plant protection products such as pesticides, biocides, industrial chemicals, and others etc. This untiring effort acquired the accreditation by National GLP Compliance Monitoring Authority (NGCMA) under the aegis of Department of Science and Technology (DST), India to conduct environmental toxicity studies on aquatic and terrestrial organisms as per the OECD principles of GLP. **Ecotoxicology Laboratory at IITR, CRK Campus is the first and only Government Lab in India having GLP accreditation to conduct ecotoxicity studies.**
* Based on my scientific contribution in the field of Ecotoxicology, am serving as a regular reviewer in various peer-reviewed SCI journals like Aquatic Toxicology, Chemosphere, Bulletin of Environmental Contamination and Toxicology, Ecotoxicology and Environmental Safety, Environmental Science and Pollution Research, Environmental Pollution, Science of the Total Environment, Ecotoxicology, Environmental Research, Journal of Hazardous Materials, Critical Reviews of Environmental Science and Technology etc.
* Expert Committee Member for setting-up Ecotoxicology Lab in Institute of Pesticide Formulation & Technology (IPFT), Ministry of Chemicals & Fertilizers, India.

**Ph.D. Guidance**

Completed: 01; On-going: 04

**Funded Projects - National**

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| **Title** | **Funding Agency & Role** |
| **Occurrence, Toxicity and Microbial Remediation of PAHs in Indian WWTPs Sludge** | CSIR-E3OW  (PI)  (2021-2023) |
| **Brief Role:** PI laboratory is studying the occurrence of PAHs in wastewater treatment plant sludge (WWTPs) in pre-monsoon and post-monsoon from Lucknow, Kanpur and Allahabad and evaluating the underlying mechanism of toxicity using earthworm (*Eisenia fetida*) as a model system. The findings will be helpful for regulatory authorities to derive permissible limits for PAHs in Indian context. | |
| **Interaction, Toxicity of Microplastics and PAHs in Developing Zebrafish Embryos – An Exploratory Study** | ICMR  (PI)  (2021-2024) |
| **Brief Role:** PI laboratory is focusing on the impacts of microplastics and PAHs contaminants in developing zebrafish (Danio rerio) model to study the combined toxicity since microplastics act as vectors in carrying hydrophobic organic contaminants from one place to other. Being a vertebrate model, utilizing zebrafish will give insights on the combined exposure and its subsequent toxicological cascading events. | |
| **Bioaugmentation of activated sludge for enhanced biodegradation of paper mill wastewater: An effort to restore river ecosystem** | DBT  (2017-2020)  (Co-PI) |
| **Brief Role (As Co-PI):** The co-principal investigator laboratory involved in studying the ecotoxicological effects of raw and microbial augmented paper mill effluent in the freshwater fish, *Cyprinus carpio* (common carp) under controlled laboratory conditions. Fish will be exposed to raw and treated effluents. End points like LC50, NOEC, Somatic index, oxidative stress enzyme analysis, DNA damage assessment will be evaluated to ascertain the difference in toxicity response in freshwater sentinels upon effluent exposure. | |
| **Remediation and Reclamation of Hexachlorocyclohexane (HCH) Dumpsite by using Microbial Bioremediation Technology** | DBT  (2017-2019)  (Co-PI) |
| **Brief Role (As Co-PI):** Co-principal investigator laboratory involved in studying the ecotoxicological risk assessment of HCH contaminated soil samples in the earthworm, *Eisenia fetida* under controlled laboratory conditions. The extent of toxicity response will be compared with microbial augmented soil sample. Avoidance behavior, oxidative stress enzyme analysis before and after remediation, growth, and reproduction output (in terms of cocoon and juvenile production) are the critical endpoints/objectives of the project. | |
| **Engineered Bioremediation Approaches for Onsite Treatment of Soil Contaminated with Crude Oil** | DBT  (2019-2022)  (Co-PI) |
| **Brief Role (As Co-PI):** Co-principal investigator laboratory involves in studying the ecotoxicological risk assessment of crude oil contaminated soil samples in the earthworm, *Eisenia fetida* under controlled laboratory conditions. The extent of toxicity response will be compared with microbial augmented soil sample. Avoidance behavior, oxidative stress enzyme analysis before and after remediation, growth and reproduction output (in terms of cocoon and juvenile production) are the critical endpoints/objectives of the project. | |

**Funded Projects – International**

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| **Title** | **Participating Countries & Funding Agency** |
| **Sustainable and Integrated Solutions for Monitoring and Remediation of Emerging Contaminants (Organo-chlorines) from Non-point Sources** | India, Russia & China – BRICS  (DST)  (2021-2024) |
| **Brief Role (As PI):** The project aims to address the contamination of organo-chlorines from non-point sources in real-life situations and their adverse impacts on aquatic (algae) and terrestrial sentinels (earthworms). | |
| **A multidisciplinary approach to assess the environmental impacts of landfill sites** | India & UK (University of Plymouth)  (Global Challenges Research Fund - GCRF)  (2021-2023) |
| **Brief Role (As PI):** The project deciphers the levels of chemical contamination in landfill leachate and soil samples through chemical finger printing (heavy metals, pesticides, pharmaceutical and personal care products, phthalates etc.) and their ecotoxicological impacts on soil dwelling organism, Eisenia fetida at different levels of biological organization. Besides, the application of artificial intelligence will also be used to study the predictive toxicity of emerging contaminants. | |

**Publications**

1. Prakash et al. 2024. 4-Methylbenzylidene camphor induced neurobehavioral toxicity in Zebrafish (*Danio rerio*) embryos. ***Environmental Research***, 242, pp.117746 **(Impact Factor: 8.3)**
2. Gautam et al. 2023. Understanding the interaction and toxicopathological impact of polyethylene microplastic and carbendazim in *Eisenia fetida*. ***Environmental Pollution* (Impact Factor: 8.9)**
3. Gautam, K and Anbumani, S. 2023. Recent trends in analytical measures of microplastics in soil and toxicopathological risk assessment in earthworms. ***Trends in Analytical Chemistry*,** 168, pp. 117292 **(Impact Factor: 13.1)**
4. Gautam, K., Mishra, S. and Anbumani, S., 2023. Environmental toxicity of organic UV filters at predicted no-effect concentrations in soil organism, Eisenia fetida. ***Environmental Technology & Innovation***, p.103224. **(Impact Factor: 7.1)**
5. Kumari, S., Gautam, K., Seth, M., Anbumani, S. and Manickam, N., 2023. Bioremediation of polycyclic aromatic hydrocarbons in crude oil by bacterial consortium in soil amended with *Eisenia fetida* and rhamnolipid. ***Environmental Science and Pollution Research***, pp.1-15. **(Impact Factor: 5.8)**
6. Mehrotra, S., Rai, P., Gautam, K., Saxena, A., Verma, R., Lahane, V., Singh, S., Yadav, A.K., Patnaik, S., Anbumani, S. and Priya, S., 2023. Chitosan-carbon nanofiber based disposable bioelectrode for electrochemical detection of oxytocin. ***Food Chemistry***, *418*, p.135965. **(Impact Factor: 9.231)**
7. Rai, P., Mehrotra, S., Gautam, K., Kar, A.K., Saxena, A., Patnaik, S., Anbumani, S., Pandey, A., Priya, S. and Sharma, S.K., 2023. Polylactic acid/tapioca starch/banana peel-based material for colorimetric and electrochemical biosensing applications. ***Carbohydrate Polymers***, *302*, p.120368. **(Impact Factor: 10.723)**
8. Pandey, N., Verma, R., Patnaik, S. and Anbumani, S., 2023. Abundance, characteristics, and risk assessment of microplastics in indigenous freshwater fishes of India. ***Environmental Research***, *218*, p.115011. **(Impact Factor: 8.431)**
9. Shilpa, G., Lakshmi, S., Jamsheena, V., Lankalapalli, R.S., Prakash, V., Anbumani, S. and Priya, S., 2022. Studies on the mode of action of synthetic diindolylmethane derivatives against triple negative breast cancer cells. ***Basic & Clinical Pharmacology & Toxicology***, *131*(4), pp.224-240. **(Impact Factor: 3.688)**
10. Iminova, L., Delegan, Y., Frantsuzova, E., Bogun, A., Zvonarev, A., Suzina, N., Anbumani, S. and Solyanikova, I., 2022. Physiological and biochemical characterization and genome analysis *of Rhodococcus qingshengii* strain 7B capable of crude oil degradation and plant stimulation. ***Biotechnology Reports***, *35*, p.e00741.
11. Gautam, K., Seth, M., Dwivedi, S., Jain, V., Vamadevan, B., Singh, D., Roy, S.K., Downs, C.A. and Anbumani, S., 2022. Soil degradation kinetics of oxybenzone (Benzophenone-3) and toxicopathological assessment in the earthworm, Eisenia fetida. ***Environmental Research***, *213*, p.113689. **(Impact Factor: 8.431)**
12. Downs, C.A., Diaz-Cruz, M.S., White, W.T., Rice, M., Jim, L., Punihaole, C., Dant, M., Gautam, K., Woodley, C.M., Walsh, K.O. and Perry, J., 2022. Beach showers as sources of contamination for sunscreen pollution in marine protected areas and areas of intensive beach tourism in Hawaii, USA***. Journal of hazardous materials***, *438*, p.129546. **(Impact Factor: 14.224)**
13. Prakash, V. and Anbumani, S., 2021. A Systematic Review on Occurrence and Ecotoxicity of Organic UV Filters in Aquatic Organisms. ***Reviews of Environmental Contamination and Toxicology*** *Volume 257*, pp.121-161. **(Impact Factor: 7.563)**
14. Prakash, V., Jain, V., Chauhan, S.S., Parthasarathi, R., Roy, S.K. and Anbumani, S., 2022. Developmental toxicity assessment of 4-MBC in *Danio rerio* embryo-larval stages. ***Science of The Total Environment***, *804*, p.149920. **(Impact Factor: 10.754)**
15. Singh, A., Kar, A.K., Singh, D., Verma, R., Shraogi, N., Zehra, A., Gautam, K., Anbumani, S., Ghosh, D. and Patnaik, S., 2022. pH-responsive eco-friendly chitosan modified cenosphere/alginate composite hydrogel beads as carrier for controlled release of Imidacloprid towards sustainable pest control. ***Chemical Engineering Journal,*** *427*, p.131215. **(Impact Factor: 13.273)**
16. Dwivedi, S.K., Ali, R., Singh, M., Gupta, T., Kar, A.K., Prakash, V., Sadasivam, A., Patnaik, S. and Misra, A., 2020. A simple naphthalimide based PET probe for Fe3+ and selective detection of pyrophosphate through displacement approach: Cell imaging studies and logic interpretation. ***Journal of Photochemistry and Photobiology A: Chemistry***, *403*, p.112854. **(Impact Factor: 5.141)**
17. Anbumani, S. and Kakkar, P., 2018. Ecotoxicological effects of microplastics on biota: a review. ***Environmental Science and Pollution Research***, *25*, pp.14373-14396. **(Impact Factor: 5.8) (Cited 628 times)**
18. **Anbumani S.,** Livanova A.A., Fedortseva R.F. 2017. Various types of nuclei pathology in somatic cells as a universal indicator of ionizing radiation. Medical-Biological and Socio-Psychological Problems of Safety in Emergency Situations. 2: 66 – 75.
19. Musthafa, M.S., Athaullah, A., Anbumani, S., Ali, A.J., War, M., Paray, B.A., Al-Sadoon, M.K., Muthiah, S.S., Kembeeram, P. and Harikrishnan, R., 2017. Ameliorative efficacy of bioencapsulated Chironomous larvae with Shilajit on Zebrafish (*Danio rerio*) exposed to Ionizing radiation. ***Applied Radiation and Isotopes***, *128*, pp.108-113. **(Impact Factor: 1.787).**
20. Anbumani, S. and Mohankumar, M.N., 2016. Gene expression in *Catla catla* (Hamilton) subjected to acute and protracted doses of gamma radiation. ***Aquatic Toxicology***, *178*, pp.153-157. **(Impact Factor: 5.202)**
21. Anbumani, S. and Mohankumar, M.N., 2015. Nucleoplasmic bridges and tailed nuclei are signatures of radiation exposure in *Oreochromis mossambicus* using erythrocyte micronucleus cytome assay (EMNCA). ***Environmental Science and Pollution Research***, *22*, pp.18425-18436. **(Impact factor – 5.8).**
22. Anbumani, S., and Mohankumar, M.N., 2015. Gamma radiation induced cell cycle perturbations and DNA damage in *Catla Catla* as measured by flow cytometry. ***Ecotoxicology and Environmental Safety***, *113*, pp.18-22. **(Impact factor – 7.129)**
23. Anbumani, S., and Mohankumar, M.N., 2015. Cytogenotoxicity assessment of monocrotophos and butachlor at single and combined chronic exposures in the fish *Catla catla* (Hamilton). ***Environmental Science and Pollution Research***, *22*, pp.4964-4976. **(Impact factor – 5.8).**
24. Rajini, A., Gopi, R.A., Bhuvana, V., Goparaju, A. and Anbumani, S., 2013. Alachlor 50% EC induced biochemical alterations in *Clarias batrachus* during and after cessation of exposure. ***International Journal of Fisheries and Aquatic Studies*, 2(2): 59-63. ISSN: 2347-5129**
25. Anbumani, S., and Mohankumar, M.N., 2012. Gamma radiation induced micronuclei and erythrocyte cellular abnormalities in the fish *Catla catla*. ***Aquatic toxicology***, *122*, pp.125-132. **(Impact factor – 5.202)**
26. Anbumani, S., and Mary N. Mohankumar (2011). Occurrence of Nuclear and Cytoplasmic abnormalities in the fish *Catla catla* (Ham.) exposed to low doses of physical and chemical agents using micronucleus assay. ***Research Journal of Environmental Sciences,* 5(12), (ISSN 1819-3412) (H Index – 4).**
27. Anbumani, S., and Mary N. Mohankumar (2010). Assessment of Baseline Cytogenetic damage in fishes inhabiting the backwaters of Kalpakkam. **IGC Newsletter, Vol 84, (ISSN 0972 – 5741).**

**Professional Experience**

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| **DESIGNATION** | **NAME OF THE INSTITUTE/UNIVERSITY/ORGANIZATION** | **PERIOD OF WORK** | **NATURE OF WORK** |
| Principal Scientist | Ecotoxicology Laboratory,  CSIR-Indian Institute of Toxicology Research (IITR), Lucknow | Jan 2022 – till date | (i) Conductingtoxicitystudies in aquatic and terrestrial model systems as per the OECD guidelines in compliance with GLP.  (ii) Ecotoxicity evaluation of emerging contaminants in aquatic and terrestrial model systems. |
| Scientist | Ecotoxicology Laboratory,  CSIR-Indian Institute of Toxicology Research (IITR), Lucknow | Jan2014 – Jan 2018 | (i) Conducting toxicity studies in aquatic and terrestrial model systems as per the OECD guidelines in compliance with GLP.  (ii) Ecotoxicity evaluation of emerging contaminants in aquatic and terrestrial model systems. |
| Scientist | Micro Therapeutics Research Labs Pvt. Ltd.  No:50/51, 3rd Street, Balaji Nagar,  Padi, Chennai – 600050. | August 2013 – Dec 2013 | Conducting environmental  genotoxicity studies as per OECD Guidelines with the compliance of GLP |
| Senior Research Officer (Ecotoxicology**)** | Jai Research Foundation  Vapi, Gujarat | Jan 2013 – July 2013 | Conducting toxicity studies in aquatic and terrestrial organisms like Fish, Daphnia, Algae, Earthworm, Honey bee, Japanese Quail ase donOECD and other guidelines as per the principles of GLP. Writing SOP’s and study reports preparation |
| Lecturer | University of Seychelles and American Institute of Medicine(USAIM-WHO Recognised)  Admtd.By.  Aashirwad Health and Education Trust  Navakkarai, Coimbatore. | Sep 2007 – June 2008 | Teaching Pharmacology and Toxicology |
| Guest  Lecturer | Department of Marine Sciences  Bharathidasan University  Trichy. | Aug 2006 – Sep 2007 | Teaching Ecology &Marine  Toxicology at post graduate level. |
| Scientist  **Grade II** | International Institute Of Biotechnology And Toxicology (IIBAT) – German Certified GLP Lab. Chennai. | Aug 2004 – July 2006 | Conducting Ecotoxicology Studies as per OECD principles in compliance with GLP. |

**Academic Credentials**

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| **COURSE/DEGREE** | **INSTITUTE/UNIVERSITY/SCHOOL** | **PERCENTAGE OF MARKS & CLASS OBTAINED** | **YEAR OF COMPLETION** |
| Ph.D.  **Environmental Toxicology – Life Science** | Bio-Dosimetry Laboratory  Radiological Safety Division,  Indira Gandhi Centre for Atomic Research (IGCAR), Department of Atomic Energy (DAE),Govt.of India, Kalpakkam. | Degree  Commended | 2008- 2013 |
| M.Sc.  **Environmental Toxicology** | Department of Pharmacology and Toxicology  Dr.A.L.M.Post Graduate Institute of Basic Medical Sciences (PG IBMS), University of Madras, Taramani Campus, Chennai. | 76% | 2002-2004 |
| B.Sc.  **Chemistry** | Bishop Heber College,  Bharathidasan University,  Tiruchirapalli. | 80% | 1999-2002 |
| H.S.C | Gymnasia Matric.Hr.Sec.School,  Jayankondam. | 79% | 1998-1999 |
| S.S.L.C | Modern Matric Hr.Sec.School,  Jayankondam. | 77% | 1996-1997 |

**Doctoral Degree Experience**

* My doctoral research work was focused on the impact of ionizing radiation using DNA damage as an endpoint in the freshwater fish, *Catla catla* exposed to acute and protracted doses of gamma radiation and sublethal concentration of agrochemicals, monocrotophos and butachlor using cytogenetic and molecular studies to identify specific biomarkers (if any) upon radiation exposure.
* Prior to this, base line DNA damage assessment has been carried out in various fish species inhabiting Kalpakkam backwaters located in the vicinity of nuclear reactor. Significant DNA damage in the form of micronuclei and other nuclear anomalies was noted due to enhanced levels of pesticides and heavy metals.
* Techniques/assays like erythrocyte micronucleus assay (EMNA), flow cytometry and RT-PCR to assess DNA damage, cell cycle perturbations and expression profile of candidate genes *gadd45a*, *cdk1*, and *bcl-2* in fish exposed to ionizing radiation are studied. This work has enabled me to rename the existing erythrocyte micronucleus assay (EMNA) into erythrocyte micronucleus cytome assay (EMNCA) in the field of environmental toxicology, an analogue to CBMN Cytome assay by Michael Fenech in mammals.

**Doctoral Thesis**

**“Cytogenetic and Molecular Studies in the Fish *Catla catla* Exposed to Chemicals and Ionizing Radiation”** under the guidance of **Dr. Mary N. Mohankumar**, Former Senior Scientist, Bio-Dosimetry Laboratory, Radiological Safety Division (RSD), Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam, Affiliated to University of Madras, Chennai. **Certified as** **“Best Thesis” by the overseas examiner (Dr. Micheal Fenech, (Principal Research Scientist, CSIRO, Australia)**

**Awards/Fellowships Received**

* Received best performance scientist award from CSIR-IITR in November 2020.
* Received “Certificate of Excellence” in reviewing from Editors of Chemosphere Journal, Elsevier, Amsterdam, The Netherlands.
* Received Recognized Reviewer Certificate from Aquatic Toxicology and Chemosphere Journals, Elsevier, Amsterdam, The Netherlands.
* Qualified State Eligibility Test (SET) in Life Sciences for Lecturership in Tamilnadu and Union Territory of Puducherry.
* Research fellowship from Department of Atomic Energy (DAE), INDIA in Collaboration with Loyola College, Chennai for a period of three years (2008 – 2011).
* Best poster award for the paper, “Genotoxic evaluation of agrochemicals using the erythrocyte micronucleus assay in the fish *Catla catla* exposed singly and in combination” in International Symposium on Environmental Risk Assessment (ISERA – 2011), Department of Zoology, Bharathiyar University, Coimbatore.
* First to rename the existing Erythrocyte Micronucleus Assay (EMNA) into Erythrocyte Micronucleus Cytome Assay (EMNCA) in the field of aquatic toxicology.
* Resource person and Demonstrator in “Workshop on assays in toxicology (WAT 2009) – Biomarkers in Toxicology and Disease.

**Book Chapter/s**

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| **S. No** | **Chapter Title** | **Author’s Name** | **Publisher** | **Year of Publication** |
| 1 | Micronucleus Experiments with Fishes | S. Anbumani & Mary N. Mohankumar | Royal Society of Chemistry (RSC), U.K. | 2019 |
| 2 | Ecotoxicological effects of organic micro-pollutants on environment  environment | Krishna Gautam &  S. Anbumani | Elsevier,  ISBN: 9780128195949 | 2020 |
| 3. | Occurrence and ecotoxicological effects of microplastics on aquatic and terrestrial ecosystems | Ved Prakash, Shreya Dwivedi,Krishna Gautam, Monika Seth & S. Anbumani | Springer Nature  ISBN: 9783030562700 | 2020 |
| 4 | Breasts and birth control implants: An Overview | Krishna Gautam, Shreya Dwivedi, Ved Prakash, Dhirendra Singh & S Anbumani | Elsevier  ISBN: 9780128207284 | 2020 |
| 5 | Microplastics in Biota | Krishna Gautam, Shreya Dwivedi &  S. Anbumani | Springer Nature  eBook ISBN:  9783030106188 | 2020 |

**Personal Details**

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Gender : Male

Marital Status : Married

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