



Dr. Mary Elizabeth Gnanambal, K
Professor (Biotechnology)
Faculty of Biomedical Sciences and Technology

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Google Scholar: Mary Elizabeth Gnanambal, K **PhD/Post Doc supervision slots available: 2**
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Personal Profile

A Marine Biologist and Biotechnologist graduated from the Centre of Advanced Study (CAS) in Marine Biology.

- Elizabeth researches on marine compounds as specific cancer targets. An interdisciplinary approach combining 1) Organic Chemistry-isolation and purification of active components, 2) Molecular Biology-screening, bioassays, specific gene and protein expression and 3. Bioinformatics-target identification and validation is carried out to screen and validate the compounds for in vivo assays.
- Her team also work on environmental pollution using a few novel hexadecane degrading bacteria from Polluted Indian coastal regions. Cloning of specific *rhl* genes yielded more rhamnolipids which enhanced hexadecane utilization.

Currently a Professor in the department of Biotechnology and also a research ambassador at SRIHER. Teaching records include theory and laboratory sessions in Cell culture, Environmental Biotechnology, Marine Biotechnology and Scientific Writing.

Research Interests

The team works on exploring marine compounds as specific cancer targets. Particularly to mention, Bis(palmitoleic acid) ester from a deep sea snail, *Conus* sp., acts as a Cannabinoid Receptor-agonist and inhibits ovarian cancer progression. Other targets include AR modulators, MMP-2/9 and CAIX inhibitors. We have purified the active compounds and the structure with spectroscopy details are available in the public domain; <https://pubchem.ncbi.nlm.nih.gov/source/23890>.
Current research: Gram-scale synthesis of the compounds for better understanding of bioactivities.

We also work in the area of hexadecane bioremediation, particularly, using a new bacterium, *Pseudomonas guguanensis* which produces an unusual monorhamnolipid (1500-Da). It utilized hexadecane to 75%, *ex-situ*. Whole genome has been sequenced and Rhamnosyltransferase genes were identified for the first time.

Current work: homologous and heterologous cloning of *rhl* genes.



Funding details:

The lab is funded by TNSCST-DST,MoES, SERB, SRIHER-GATE and fellowships through CSIR-SRF and ICSSR-SRF

The Marine Biotechnology Lab:

The lab facilitates to pursue research in diverse areas of fundamental and advanced biological discovery. MBL aims to conduct research to develop useful technologies for the sustainable utilization of marine resources. Major works conducted here are on bioprospecting of smaller invertebrates which solely deemed on chemical cues for their defense, discovery of novel bioactive compounds and screening for anti-cancer activities, exploring specific mechanism/s of action, chemical synthesis of novel compounds and also exploring hydrocarbon degrading bacteria, DNA barcoding, phylogenetic analysis, Whole Genome Sequencing of marine bacteria, bioremediation, which are the keys areas the lab focuses on

Lab Members-Present

Ph. Ds:
Ms. Rachel Veronica, Cloning and overexpression *rhl* in *Pseudomonas* for enhanced hexadecane remediation- Funded by SRIHER fellowship and ICSSR

PhD/Post-Doc slots are available under the following topics:
Novel marine compounds as potent molecular targets in solid tumors
Selective inhibition of MMP2/9 in malignant ascites using novel lipophilic marine compounds

- Past:**
- 1. Dr. RamyaDevi. KC: Structure elucidation of an unusual monorhamnolipid TNSCS&T-PA
 - 2. Dr. Christina. V.S - CSIR-SRF, Marine compounds in Cannabinoid Receptor signaling
 - 3. Dr. Shailaja. V. L- Novel lipophilic compounds as CA-IX and PkCε inhibitors in lung cancers- DST-JRF and SRF



Selected Publications:

- 1. A Novel Non-Psychoactive Fatty Acid from a Marine Snail, *Conus inscriptus*, Signals Cannabinoid Receptor 1 (CB1) to Accumulate Apoptotic C16:0 and C18:0 Ceramides in Teratocarcinoma Cell Line PA1 C, **Mary Elizabeth Gnanambal Krishnan et al.**, *Molecules* 2024, 29, 1737
- 2. A natural compound from a seagrass inhibits hypoxic human adenocarcinomic A549 cells and increases extracellular pH (pHe) by binding to the Zinc-Histidine residues of Carbonic Anhydrase IX, **Mary Elizabeth Gnanambal Krishnan et al.**, *Journal of Biomolecular Structure and Dynamics*, 2024, Accepted
- 3. Inhibition of MMP2-PDX by a novel ester of dihydroxy cinnamic and linoleic acid from the seagrass *Cymodocea serrulata*, **K. Mary Elizabeth Gnanambal et al.**, *Scientific Reports* volume 11, Article number: 11451 (2021)
- 4. 3-Hydroxypropone-1,2-Diyl Dipalmitoleate—A Natural Compound with Dual Roles (CB1 Agonist/FAAH1 Blocker) in Inhibiting Ovarian Cancer Cell Line, **Mary Elizabeth Gnanambal Krishnan et al.**, *Pharmaceuticals* 2021, 14(3), 25.
- 5. Structure elucidation and proposed de novo synthesis of an unusual mono-rhamnolipid by *Pseudomonas guguanensis* from Chennai Port area, **Mary Elizabeth Gnanambal, Krishnan et al.**, *Nature Scientific Reports*, volume 9, (2019) 5992.
- 6. A natural anticancer pigment, *Phaeophytin a*, from a seagrass acts as a high affinity human Mitochondrial Translocator Protein (TSPO) ligand, *in silico*, to reduce Mitochondrial Membrane Potential ($\Delta\psi_{mit}$) in adenocarcinomic A549 cells, **K. Mary Elizabeth Gnanambal et al.**, *Phytomedicine*, 61 (2019) 152858
- 7. Demonstration of bioprocess factors optimization for enhanced mono-rhamnolipid production by a marine *Pseudomonas guguanensis*, **Mary Elizabeth Gnanambal, Krishnan et al.**, *International Journal of Biological Macromolecules*, 108 (2018) 531–540
- 8. Bioremediation of a pentacyclic PAH, Dibenz(a,h)Anthracene- A long road to trip with bacteria, fungi, autotrophic eukaryotes and surprises, **Mary Elizabeth Gnanambal, Krishnan et al.**, *Chemosphere*, 2018, (202), 387-399
- 9. Dictyocercatidan poisons: Defined mark on microtubule/tubulin kinetics, **Mary Elizabeth Gnanambal, K and Shailaja. Vommi Lakshmiopathy.**, *Life Sciences*, 2016, 148: 229-240
- 10. *Phaeophytin a* isolated from the seagrass, *Syringodium isoetifolium* plausibly blocks *umuC* proteins of *E. coli*, *in silico*, **Mary Elizabeth Gnanambal, K et al.**, *Journal of Applied Microbiology*, 2016, 121 (6), 1592–1602
- 11. Isolation of a novel antibacterial thioketone from the seagrass, *Cymodocea serrulata*, **Mary Elizabeth Gnanambal, K, Jamila Patterson and Patterson. J. K Edward**, *Phytotherapy Research*, 2015, 29(4):554-60