SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
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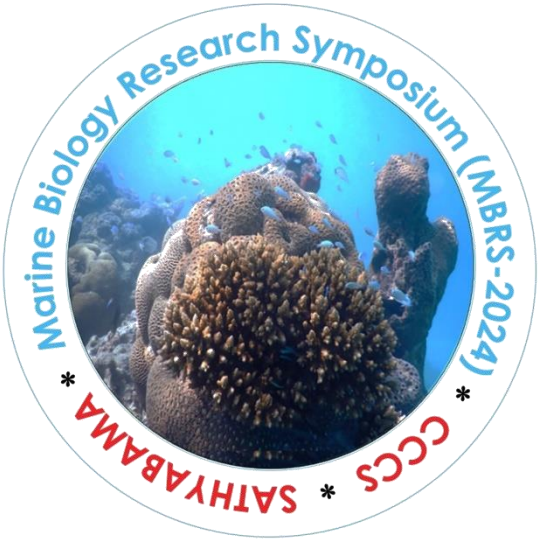
BOOK OF ABSTRACTS

"MARINE BIOLOGY RESEARCH SYMPOSIUM"

MBRS 2024

23 – 25 January 2024



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SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY
CHENNAI, TAMIL NADU, INDIA

BOOK OF ABSTRACTS

MARINE BIOLOGY RESEARCH SYMPOSIUM – MBRS 2024
(23 to 25 January 2024)

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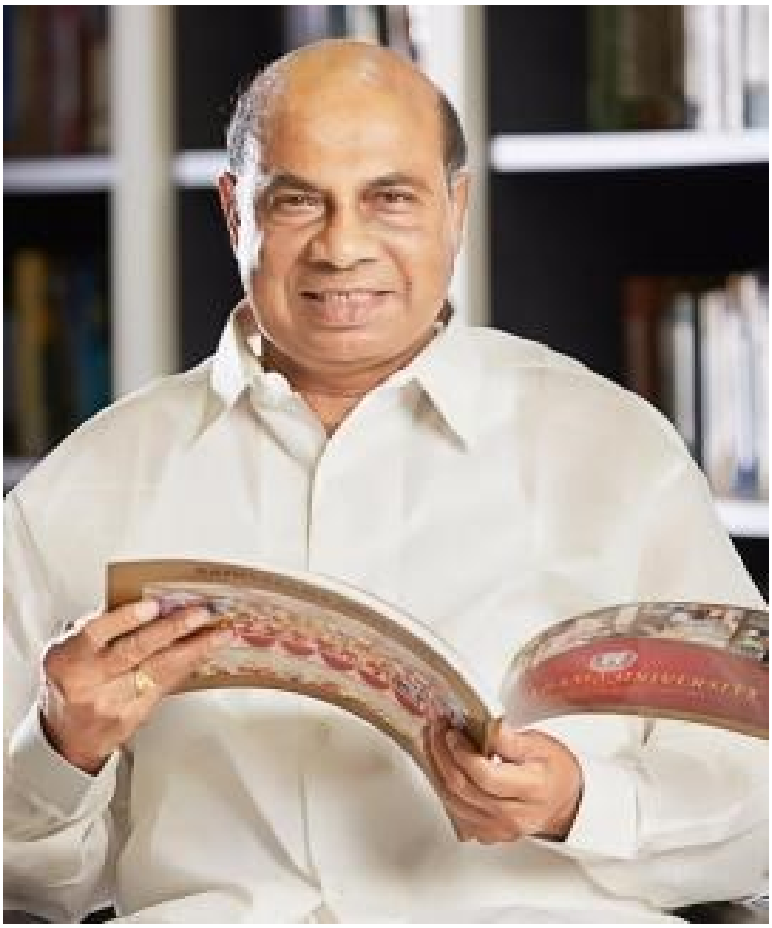

Centre for Climate Change Studies

Proudly presents

Second National Event for
Marine Biology Enthusiasts

"MARINE BIOLOGY RESEARCH SYMPOSIUM MBRS 2024"

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CHANCELLOR AND PRESIDENT MESSAGE

We feel enthralled on this gracious occasion to welcome you to the Second National Event for the Marine Biology Enthusiasts "Marine Biology Research Symposium – MBRS 2024" organized by the Centre for Climate Change Studies from 23 to 25 January 2024 at Sathyabama Institute of Science and Technology, Chennai.

The symposium provides ample opportunity to the marine biology researchers across the country to transmit the knowledge generated through their research. We are also glad to learn that many academicians, eminent scientists, students and other industry partners from India and all over the world have shown interest to participate in this symposium. We are sure this symposium will quench the knowledge of thirst of research activists and share their knowledge and valuable experience and time in the field of taxonomy, biodiversity and conservation, blue carbon, marine pollution, climate change, marine microbial and molecular ecology and coastal aquaculture.

Finally, we would like to thank all the authors, the reviewers, editors and the delegates for their contributions and participation. The symposium will not be a success without your expertise and active participation. On behalf of the organizing committee, we thank you for making this conference a great success.

Dr. MARIAZEENA JOHNSON
Chancellor

Dr. MARIE JOHNSON
President

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MESSAGE FROM VICE CHANCELLOR

I take the privilege to welcome the eminent scientists, researchers and the students for the Second National Event "Marine Biology Research Symposium - MBRS 2024" org organized by the Centre for Climate Change Studies from 23 to 25 January 2024 at Sathyabama Institute of Science and Technology, Chennai.

I expect it to be a great opportunity and an inspiring occasion for learning. I hope that the symposium will provide a better platform to interact and share their remarkable knowledge and experience with the eminent speakers on the cutting-edge themes of Marine Biology.

Dr. T. SASIPRABA
Vice Chancellor,
Sathyabama Institute of Science and Technology.

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Preface

On behalf of the MBRS 2024 organizing committee and Sathyabama Institute of Science and Technology, Chennai I cordially invite you for the Second National Event "Marine Biology Research Symposium MBRS 2024" organized by the Centre for Climate Change Studies from 23 to 25 January 2024 at Sathyabama Institute of Science and Technology, Chennai.

So far, we have received 49 abstracts and 78 participants from various central, state government, and private research institutions and universities, NGO's and Industries from India and all over the world. Twenty-one full length articles have been received for peer review and publishing in the form of proceedings. Over the 3 days of symposium, abstracts have been distributed under 6 thematic sessions for both Oral and Poster presentations. The quality and the credibility of the symposium goes to the dedicated conveners (Dr. S. Prakash and Dr. Amit Kumar) and the co-organizers Ms. K. Kunjulakshmi, Mr. D. Kavin and Ms. Silpa MS.

I take this immense opportunity to express my heartfelt thanks and gratitude to the management of SATHYABAMA especially our Honorable Chancellor Dr. Mariazeena Johnson, our president Dr. Marie Johnson, and Vice Presidents Ms. Maria Bernadette Tamilarasi Johnson, Mr. J. Arul Selvan, Ms. Maria Catherine Jayapriya, without whose guidance and support this event could not reached this level.

I wish to convey my earnest wishes to our internal organizing committee of our university. Indeed, I am deeply moved by the selfless dedication and commitment of the Conveners whose hard work has contributed to the success of this conference.

Organizing Secretary,
Dr. T. Sasipraba,
Vice Chancellor
Sathyabama Institute of Science and Technology,
Chennai 600119.

CHIEF PATRONS

Dr. Mariazeena Johnson, B.E., MBA., M.Phil., Ph.D.,

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Dr. Amit Kumar, Associate professor (Research)

Co-conveners – Centre for Climate Change Studies

Ms. K. Kunjulakshmi, Scientific Asst.

Mr. Kavin, D, Scientific Asst.

Ms. M. S. Silpa, Scientific Asst.

About Sathyabama Institute of Science and Technology

(Deemed to be University)

Sathyabama is a prestigious institution which excels in the fields of Engineering, Science and Technology for more than three successful decades. It offers multi-disciplinary academic programmes in various fields of Engineering, Science, Technology, law, Dental Science, Pharmacy, Nursing, Management, Arts and Science and Allied Health Sciences. It is established under Sec.3 of UGC Act, 1956 and is been Accredited with 'A++' Grade by the National Accreditation and Assessment council. Recently, university received "Category 1" status by UGC. The Institution persistently seeks and adopts innovative methods to improve the quality of higher education and is responsive to the changes taking place in the field of education on a global scale. The Institution has a team of dynamic and outstanding faculty, innovative pedagogical practices, state of the art infrastructure and world class Research Facilities. This glorious Institution is functioning under the dynamic leadership of Dr. Mariazeena Johnson, Chancellor, Dr. Marie Johnson, President and Ms. Maria Bernadette Tamilarasi Johnson, Vice President.

Sathyabama has a good presence in rankings and ratings at National and International level. The Institution has been ranked one among the top 50 Universities for five consecutive years. Sathyabama is ranked among the Top 5 Institutions in the Country for Innovation by ATAL ranking of Institution for Innovation Achievements, Govt. of India. Times Higher Education and QS has ranked Sathyabama among the top Institutions worldwide. Sathyabama Institute of Science & Technology has alliances with leading Universities and research establishments at National and International Level. It is a research-intensive University with world class laboratories and research facilities and is involved in research in the emerging areas of Science and Technology. Sathyabama has undertaken various sponsored and collaborative R&D projects funded by National and International Organizations. Sathyabama has written a special page in the history of space research on 22nd June 2016 with the launch of "SATHYABAMASAT" in association with ISRO.

Sathyabama has emerged as a leading Institution and achieved excellence in higher education to international standards owing to its research and academic excellence.

About Centre for Climate Change Studies (CCCS)

The **Centre for Climate Change Studies (CCCS)** was established in the January 2014 at International Research Centre (IRC) with the primary mandate of investigating the impact of predicted climate change on marine organisms associated to various ecosystems like coral reefs, seagrass meadows, seaweeds, intertidal zones and mangrove ecosystems etc.

At present, in the CCCS, the following research activities are going on: (i) Implications of climate change on natural life history traits of coral reef caridean shrimps; (ii) Response of micro-planktons to elevated temperature and decreased pH using multidisciplinary approach including proteomics, biochemical and physiological assays; (iii) Contribution of seaweeds towards sustainable future by playing a role in climate change mitigation and adaptation; (iv) Diversity and status of coral reef shrimps in Gulf of Mannar Biosphere Reserve, Tamil Nadu and Lakshadweep and (iv) Plant-insect interaction under climate change scenario. Besides, the Centre is also instrumental in spreading awareness about conservation of marine ecosystem to schools and teachers through citizen science program.

Researchers at CCCS have been actively working at Sathyabama Marine Research Station (SMRS), recently established at Rameswaram to encourage research on cutting-edge marine ecology and climate change to sustainably use, manage, and conserve natural ecosystems for the benefit of the coastal communities of Gulf of Mannar and Palk Bay regions.

About Marine Biology Research Symposium – MBRS 2024

Being a young researcher, we have a time-sensitive academic path, and the current pandemic may affect our research career. At the same time, the pandemic has challenged and demanded us to revise the research strategies to manage the current difficulties as well as to overcome similar bottlenecks in the future.

In view of the above, the second National Event ***"Marine Biology Research Symposium"*** mainly focuses in bringing budding Marine Biology enthusiasts and researchers all over India and rest of the world to share their research ideas, meet with subject experts, and discuss collaborations in the cutting-edge research themes. The main aim of this symposium is to provide platform to gain new experience, to interact with experts from diverse disciplines and to build the network of like-minded people for Marine Biology Research in India.

The agenda of the symposium were designated under SIX thematic areas:

- Taxonomy, Biodiversity and Conservation (Code: TBC)
- Blue Carbon and Coastal Ecosystems (Code: BCCE)
- Physiology of Marine Organisms to Climate Change (Code: PMCC)
- Marine Pollution and Impact (MPI)
- Marine Microbial Ecology & Bioprospecting (Code: MMEB)
- Coastal and Ornamental Aquaculture (Code: COA)

The symposium features eminent keynote speakers under the above areas followed by presentation by students, and researchers all over the country and rest of the world.

List of speakers

Dr. T.T. AJITH KUMAR
Principal Scientist & Head
Centre for Peninsular Aquatic Genetic Resources
ICAR - National Bureau of Fish Genetic Resources
Kochi, India

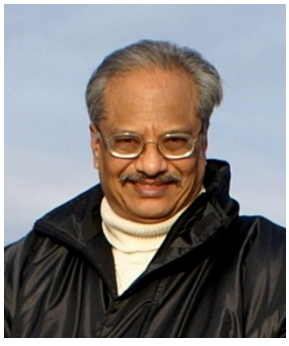
Title - Marine Ornamental Aquaculture: Is it an option for bridging conservation and community upliftment in coastal and island regions?

Dr. PUNYASLOKE BHADURY
Professor,
Department of Biological Sciences
IISER Kolkata, India

Title - Climate Change and Blue Economy with special reference to Sundarbans

Dr. N. MARIMUTHU
Scientist E
Officer-in-Charge (General Non-chordata section)
Zoological Survey of India (MoEF&CC)
Kolkata, India

Title - Methods, validation limits and prerequisites on coral reef habitat assessment and their restoration processes



Dr. T. S. SURYANARAYANAN
Director
Vivekananda Institute of Tropical Mycology (VINSTROM)
A Unit of the Ramakrishna Mission Vidyapith
Chennai, India

Title - Unraveling the marine fungal endosymbionts for their diversity and technological potential

Dr. K. SIVAKUMAR
Professor
Department of Ecology and Environmental Sciences
Pondicherry University
Pondicherry, India

Title - SDG 14 and India's action towards Dugong, Whale shark and Turtle Conservation

Dr. G. SEGHAL KIRAN
Professor
Department of Food Science and Technology
Pondicherry University
Pondicherry, India

Title - Marine Microbial Bioprospection

Dr. GURDEEP RASTOGI
Senior Scientist
Wetland Research and Training Centre
Chilika Development Authority
Pokhriput Road, Bhubaneswar – 751020, Odisha

Title - Molecular microbial ecology of Chilika, a brackish coastal lagoon of India

Organized by Centre for Climate Change Studies
Sathyabama Institute of Science and Technology, Chennai
Contact us: training.cccs@gmail.com

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TAXONOMY, BIODIVERSITY AND CONSERVATION

TBC – 101 – OR

Elasmobranch Fish Identification using YOLO - A Deep Learning Approach

Ajay Baldaniya and Pradeep Mankodi

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Abstract

In the face of global environmental challenges, the conservation of marine biodiversity has emerged as a critical imperative. Elasmobranch fishes hold a special ecological significance. Elasmobranchs are vital apex predators that helps to maintain oceanic ecosystem. However, their populations have been significantly threatened by human activities, leading to alarming declines in many species. Traditional methods for elasmobranch fish identification and diversity monitoring are laborious, time-consuming, and often inadequate for large-scale conservation efforts. In response to these challenges, this research introduces a conservation-centric approach: YOLO a deep learning tool for elasmobranch fish identification. YOLO, known for its efficiency and real-time object detection capabilities, is adapted to address the unique demands of image analysis and species recognition. The proposed model consists of two components. One is designed for the feature extraction process based on the ResNet-50, wherein, the second component is designed for the detection of Elasmobranch fish based on YOLO v2 which Individually identify fish based on their morphological patterns. The data was collected from different locations of Gujarat coast, India and Dataset split into two parts 80% training images, and 20% testing images. The model was trained on a data set of 80 % images focusing on the fish body with a labelled bounding box approach. The final performance show value of accuracy, sensitivity and F1 score is close to 1. So, the model is reliable and underperformed. So, this study conclude that YOLO object detection improves fish identification, conservation, and ecosystem protection by enhancing monitoring precision and efficiency.

Keyword: Elasmobranch, YOLO, ResNet50, Deep Learning

TBC-102-OR

Ecological Status, Length-Weight Relationship and Condition Factor of *Peronia verruculata* (cuvier, 1830) along Coastal Saurashtra, Gujarat, India

Pooja A. Agravat[1], Jatin V. Raval[2], and Pradeep C. Mankodi[1]

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[2]Zoology Lab, Department of Life Sciences, Bhakta Kavi Narsinh Mehta University, Government Polytechnic Campus, Khadiya, Junagadh

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Abstract

Peronia verruculata is a shell less Gastropod, which exhibits a steady population in the intertidal zone. *P. verruculata* is quite common molluscan species and has a uniform distribution pattern throughout the year in the intertidal substratum of coastal Saurashtra. Being dominating species, fluctuation in physical condition hardly brings any change on their distribution. Standard quadrate sampling was done throughout the year to analyze population ecology of *P. verruculata*. Distribution values did not show any definite trend at the sites. It was evident that there was no significant difference in the population abundance existed between the sites as well as among the seasons. Along with this Length-Weight relationship (LWR) of *P. verruculata* was analyzed from coastal Saurashtra. A total of 360 specimens were collected at low tide and systematic measurements (length and weight) were taken to quantify its size. The LWR of *P. verruculata* was estimated using the formula $W = aL^b$. The growth pattern varied at different locations. The length-weight relationship expressed negative allometric growth. The fulton's condition factor was measured and the obtained condition factor along all the study sites was >1. Thus, the study showed correlation between length - weight, condition factor and significant difference among ecological conditions along study sites.

Keywords: *Peronia verruculata,* distribution pattern, Length-Weight relationship, condition factor

TBC-103-OR

Diversity of Leaf Fungal Endophytes of Gujarat Mangroves

Bharathwaj S[1,2], Suryanarayanan, TS[1*], Govinda Rajulu MB [1] and Thirunavukkarasu N[2]

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[2]PG & Research Department of Botany, RKM Vivekananda College, Chennai, India

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Abstract

Fungal endophytes represent a major component of plant microbiome. Endophytes are effective in combating several abiotic stresses faced by their host plants, such as drought, salinity, nutrient deficiency, and metal toxicity, etc., and biotic stresses caused by pathogens and insect pests. With regard to the mangroves, while macroscopic basidiomycetes and marine fungi of mangroves have been studied for their diversity and distribution at the community level, investigations on their endophytes pertain only to a few mangrove species. However, their distribution and diversity in a mangrove community has not been addressed excepting by us on 20 mangrove species of the Andaman Islands. Here, we studied 6 mangrove species of Gujarat (Sanjan Bandar creek, Umargam) for leaf fungal endophytes (LFE). Totally, 371 endophyte isolates were recovered from the leaves. Their Colonization Frequency % ranged from 34 in *Sonneratia apetalae* to 146 in *Excoecaria agallocha*. The leaf of *Acanthus ilicifolius* supported the maximum LFE species while that of *Aegiceras corniculatum* harboured the minimum number of LFE species. The species diversity was highest for *Acanthus ilicifolius* (5.21) and lowest for *Excoecaria agallocha* (1.53). *Nodulisporium* spp. and *Alternaria* sp. 1 were present in 5 of the 6 mangrove species screened. *Phyllosticta capitalensis* was wide spread and was present in *Acanthus ilicifolius*, *Excoecaria agallocha* and *Aegiceras corniculatum* and 112 isolates of the total of 371 isolates belonged to this species. The similarity of the endophyte community hosted by the leaves of *Avicennia officinalis* and *Sonneratia apetala* was 46% as revealed by a statistical similarity analysis. TSS thanks the MoEFCC, Govt. of India (F.No.19-46/2020/RE) for granting this project.

Keywords: Plant microbiome, mangrove ecosystem, foliar endophyte, *Phyllostica capitalensis*

TBC-104-OR

Length-Weight Relationship of Deep-Sea Congrid Eel (Anguilliformes: Congridae) from the Southwest Coast of India, Arabian Sea

P. Kodeeswaran, A. Kathirvelpandian, T. T. Ajith Kumar* and Uttam K Sarkar

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Abstract

The conger eels are the most specious group of the order Anguilliformes with 232 valid species under 32 genera. Studies on the distribution and biology of the deep-sea fishes, particularly, congrid eel is very meager along the Indian waters. Moreover, only a few studies are known from world waters also. In this milieu, the present study deals with the length-weight relationship of four deep-sea congrid eels, collected from the southwest coast of India. Samples were collected from the major fishing harbors of southern India, Kalamukku (9º59'2" N, 76º14'7" E), off Kochi, Kerala and Colachel (8°10'21"N; 77°15'2"E), off Kanyakumari, Tamil Nadu during February 2021 to August 2022. Deep-sea trawlers engaged in fishing at the said regions were found with 35 mm of cod-end mesh and operated at the depth of about, 200-250m along the Southwest coast of India, Arabian Sea. A total of 174 specimens belongs four species and three genera were analyzed in the present study. The intercept 'a' value ranged from 0.0006 (*Congrhynchus talabonoides*) to 0.0045 (*Ariosoma maurostigma*) and slope 'b' value ranged from 2.8 (*A. maurostigma*) to 3.19 (*A. indicum*). Coefficients of determination (r2) ranged from 0.818 (*C. talabonoides*) to 0.946 (*A. indicum*). The studied animals were rare in the landings and mostly derived as by-catch. This analysis provides the baseline information of four deep-sea congrid eels from the Arabian Sea and the results might contribute to future fishery management of the species in the way of conservation measures and commercialization.

TBC-105-OR

Bottom Trawling and its Negative Impact on Batoid Species: Implications for Sustainable Fisheries Management and Conservation Efforts

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Abstract

Bottom trawling is widely acknowledged around the world as the most efficient way to catch prawns and the intensity of trawling negatively affects biodiversity and benthic ecology. The lack of available information on coastal trawling fisheries is of great concern given the number of elasmobranch bycatch and thus the impact of fisheries emphasizes the need to assess not only the conservation status of target species, but also that of bycatch and discarded species. Thus, the collection of species-specific data on these fishing methods is of the outmost importance and should therefore be implemented. Field survey and sample collections were done on 3 major harbors of southern India, which included Colechal-Tamil Nadu, Shakthikulangara-Kollam and Munampam -Cochin from August 2022-October 2023 with exception in trawling periods. A total of 20 batoid species of 5 orders were recorded and in the recorded families higher number of species belong to Dasyatidae, followed by Torpedinidae and Dasyatidae. A total of 54% of species was contributed by *Maculabatis gerrardi* and *Maculabatis bineeshi*. *Acrosteriobatus variegatus* and *Rhinobatos annandalei* formed major catch composition in trash in September and October. Female with pups were noted for the species *Narcine spp.* in Colechal harbour, and other *Narcin*e species recorded were *Narcine occulifera*, *Narcine brevilabiata* and *Narcine timeli*. An unexpected occurrence of Torpedo spp. with pups were noticed in Kollam and the massive occurrence of the guitar fishes *Acrosteriobatus variegatus* along with *Glaucostegus granulatus* in the trash were noted from both landing centers of colechal and Kollam harbor. All identified species were caught as bycatch mainly from shrimp trawl fishery and this trash mostly contains endangered batoid species or non-commercial fishes. According to the IUCN Red List, most of the identified species are classified as "data deficient" (DD), followed by "vulnerable" (VU) and "endangered" (EN) species. Thus, conclude that local and regional measures of management and control will be more effective when supported by systematic surveillance to assess the intensity of the impact of bottom trawling on non-target species, and provide basic data on the impact of these fisheries. Our government should implement bycatch reduction device, and continuously monitor in spatio-temporal pattern in fish capture and efforts.

Keywords: Batoids, Bycatch, Endangered, South-Kerala, Morphometric characters.

TBC-106-OR

Diet Variation, Food Overlapping and Biology of Reef Associated *Lutjanus* spp. with Biometric Analysis from Andaman Waters

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Abstract

Diet variation, food partitioning, reproductive biology, and biometric studies of four *Lutjanus* species i.e., *Lutjanus lutjanus, Lutjanus indicus*, *Lutjanus quinquelineatus* and *Lutjanus fulviflamma*. A total of 50 samples were collected from each species, sourced from diverse landing centers across different regions of the Andaman coast. The present study analysed ontogenetic diet changes and food partitioning in four reef-associated *Lutjanus* spp. of the archipelago. There was a significant variation in the proportion of prey types between both species and size classes, providing evidence of food partitioning. The Bray-Curtis similarity revealed the diet similarity in similar length class of different species. PERMANOVA also revealed the significance of the diet selection at the species level (P= 0.035). The PCA analysis estimated the total variability of 67.9% at species level, even though the higher length classes of each species shows the diet partitioning. The ratio of the morphometric characters in %SL, % HL were calculated. The length-weight relationship and condition factor resulted with a b value of 3.350, 2.917, 3.320 and 3.083 respectively indicating the well beingness of the species during the research period. The indices of biology revealed the similar trend in all four spp. from Andaman Islands. Maturity stages and the gonadosomatic indices imply that the fishes are not going through their spawning season. The present study concluded the similar dietary niche among four species of snappers in various fishing grounds of Andaman and Nicobar Islands.

TBC-107-OR

Navigating Molecular Taxonomy to Explore the Known, Unknown and Misunderstood Diversity of a Rich Marine Ecosystem

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Abstract

The species boundaries of some marine invertebrates are difficult to define based solely on morphological features due to their indistinct intra- and interspecific phenotypic complexity. Present study specifies the role of molecular taxonomy in addition to traditional morphology by exploring taxonomically poorly understood marine fauna. A few marine invertebrates were studied to justify their accurate systematic position from Gujarat coastline of India. Results reveals phylogenetic relationship with intraspecific variations in six species of cnidarians: *Isaurus tuberculatus, Zoanthus kuroshio, Zoanthus sansibaricus, Palythoa tuberculosa, Palythoa* sp. JVK-2006 and *Palythoa heliodiscus*, single species of sponge *Cliona utricularis* and single species of mollusca: *Cellana karachiensis*. Due to morphological complexity, a number of species were previously either not identified or incorrectly identified; this is now resolved through DNA barcoding.

Keywords: Molecular taxonomy, DNA Barcoding, Marine Invertebrates, Intertidal zone, Gujarat Coast

TBC-108-OR

Diversity of Brackish Water Ornamental Shrimps of Coastal Karnataka

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Abstract

The aquarium trade is a multibillion-dollar industry that is rapidly expanding. Although fish (both freshwater and saltwater) were previously the most widely traded species, marine invertebrates have risen in appeal as a result of their vibrant colours, small size, and capacity to deal with algae problems. Karnataka is located in the Western Ghats and has about 320 kilometres of coastline as well as 8000 hectares of brackish water region. Due to the existence of four major rivers (Nethravathi, Gurupura, Nandini, and Shambhavi) and its proximity to the sea, Mangalore (Dakshina Kannada District, Karnataka) is home to a diverse range of brackish water species. Despite the abundance of natural resources, research in this region has been limited to edible shrimps and prawns, with no significant work done on shrimps with ornamental potential from the families Atyidae (Genus *Caridina*), Palaemonidae (Genus *Macrobrachium* and *Palaemon*), and Alpheidae (*Potamalpheos* & *Alpheus*). With rapid urbanization and an increase in urban population, many of these ecosystems will either disappear or become unfit for aquatic life. As a result, gathering baseline data on these species diversity is critical. The current study covers a wide range of themes, including species diversity, taxonomic status and confusion, molecular taxonomy, habitat distribution, research challenges, and conservation techniques for ornamental shrimps of coastal Karnataka.

Keywords: Caridean shrimps, *Macrobrachium*, *Palaemon*, *Caridina*, Freshwater, India

TBC-109-PO

Performance Tuning in Classifier for Underwater Marine Organism

C. Ishwarya, T. Sasipraba, Amit Kumar, S. Prakash, Muthiah, M.A., Mathan N
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Abstract
In this research, we present a comprehensive investigation into the optimization of a deep neural network (DNN) architecture for the classification of 20 distinct marine organisms in underwater environments. Our primary focus is on achieving superior performance through the careful selection and tuning of activation functions. A standard architecture was employed, incorporating seven different activation layers: Sigmoid, Relu (Rectified Linear Unit), Leaky Relu, Clipped Relu, ELU (Exponential Linear Unit), Tanh, and Soft Plus. Through rigorous experimentation, our findings indicate that the Leaky Relu activation function consistently outperformed the other activation functions in terms of classification accuracy. Leveraging the unique characteristics of Leaky Relu has demonstrated its effectiveness in enhancing the DNN's ability to discern and classify underwater marine organisms accurately. This research contributes valuable insights into the optimization of deep network architectures for underwater organism classification, shedding light on the significance of activation functions in achieving high-performance outcomes. The results underscore the importance of considering activation functions as a critical element in the design and tuning process, providing a foundation for further advancements in the field of marine organism classification using deep learning techniques.

Keywords: Underwater Marine Organism, Deep Neural Networks (DNN), Classifier, Activation Functions, Classification, Deep Learning.

TBC-110-PO

Diversity and Distribution of Hermit Crabs along the Coast of Port Blair, South Andaman Islands

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Abstract

Hermit crabs are decapod crustaceans, which come under the infraorder Anomura. These organisms have received relatively little research, which could be primarily due to their lower commercial importance. The study aimed to understand the diversity and distribution of hermit crabs along the coast of Port Blair, South Andaman Islands. In the course of the investigation, 15 species of hermit crabs from the Coenobitidae and Diogenidae families were identified from four stations, viz., Burmanallah, Corbyn's Cove, Kodiyaghat, and Science Centre, during December 2022–March 2023. The study revealed that the coexistence of several hermit crab species may be due to habitat partitioning. The spatial distribution pattern of the species of hermit crabs was observed to be the same in all the study areas and during all the samplings, which proves that the zonal distribution of hermit crabs in the intertidal region is fixed. Even though most of the crabs were found in the intertidal area of rocky shores, they were found to inhabit different microhabitats. Land hermit crabs (crabs belonging to the Coenobitidae family) were always found in mixed populations, in contrast to the other species. They were also discovered in regions where there is a high level of plastic pollution. Throughout the investigation, the dominant genus found was *Clibanarius (33%),* and the dominant species was *Calcinus laevimanus (25%)*. Biodiversity indices were analysed using PRIMER *v6.1*. The highest values of Species richness (S), Margalef's index (d), Pielou's evenness (J'), and Shannon-Wiener index (H') were observed in Burmanallah, a station with a rocky shoreline and a mangrove forest, viz., (S:3.7), (d:0.9), (J:0.8), and (H:1.0), respectively. Using the Bray-Curtis similarity index, it was observed that the distribution of intertidal hermit crabs in each station can be grouped into two based on the waterline: high-water and mid-water line.

Keywords: Anomura, Crustacea, Hermit crab, South Andaman

TBC-111-PO

Distribution, Diversity and Abundance of Class Holothuroidea (Sea Cucumber) in the Intertidal Region of South Andaman coast

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Abstract

Sea cucumbers, or Holothuroidea, are exclusively marine and economically significant animals with cosmopolitan and eurybathic distributions. Around 1,400 sea cucumber species exist in oceans worldwide, ranging from shallow, intertidal waters to deep seas. The present study was carried out to examine the distribution, diversity, and abundance of Class Holothuroidea in the intertidal region of the South Andaman Island, Andaman and Nicobar Islands, India, from December 2022 to April 2023. Twenty-one species belonging to seven genera, three orders, and three families were recorded in the course of investigation from four sites: Kodiyaghatt, Burmanallah, Science Centre, and Beodnabad. *Holothuria atra* (47%) was the most dominant species, followed by *Stichopus chloronotus* (13%) and *Actinopyga mauritiana* (12%). The family Holothuriidae has the highest number of species, subsequently Stichopodidae. The study revealed that sandy, muddy, reef-flat, and rocky shores were the most favourable habitats, and the less stressed habitat supported the maximum diversity and abundance of species for the holothurians. Holothurians were mostly recorded from the high-water line to the low-water line. The last one is the order Apodida, which comprises two species coming under the family Synaptidae. Faunal assemblage is done by using Bray Curtis' similarity index in PRIMER v6.1, which showed that Beodnabad and Burmanallah have 60% similarity, and Science Centre and Kodiyaghat showed 55% similarity. The species' richness and abundance are calculated using the Shannon-Weiner formula. Beodnabad showed the highest species richness (S = 7.3) and Margalef's diversity (d = 1.9). But the Science Centre showed high Pielou's eveness (J = 1).

Keywords: Sea cucumber, diversity, Andaman, Intertidal, Holothuroidea.

TBC-112-PO

New Distributional Record of *Pontocaris affinis affinis* (Alcock, 1901) (Decapoda: Caridea: Crangonidae) from the Gujarat coast of North-eastern Arabian Sea

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Abstract

Crangonid shrimp occurrence is generally rare as they inhabit 250-300 meters of depth. During the regular sampling day at Veraval fishing harbor (20º 50' N and 70º 28' E**),** Gujarat, Northwest coast of India two male specimens (n=2) of *Pontocaris affinis affinis* (Alcock, 1901) belonging to the family Crangonidae were collected from the bycatch of demersal trawler targeted for commercial crustaceans. From Indian coast the crangonid shrimp, *P. affinis affinis* was previously recorded from Bombay, Kerala and Bay of Bengal regions. The morphometric character of the observed specimens is 10-11 mm of carapace length and 7-8 mm of carapace width. The documentation of the species in the coastal region may be due to the decline in commercial fishery has led to the exploitation of the deep-sea resources or this species is already occurring in this coast which is not scientifically overlooked or collected due to the lack of taxonomical notes. The present study provided detailed morphological description and taxonomic illustration with photograph of the fresh specimen further adding a new fauna to the crustacean diversity of Gujarat.

Keywords: Deep-Sea, Crangonid shrimp, *Pontocaris*, Taxonomy

TBC-113-PO

New Distributional Record of Red Egg Crab, *Atergatis laevigatus* A. Milne-Edwards, 1865 (Decapoda: Brachyura: Xanthidae) from the Gujarat coast of North-eastern Arabian Sea

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Abstract

Gujarat coast is blessed with higher potential for the marine fisheries resources and reef associated crustaceans. The present study documents the first report of red egg crab, *Atergatis laevigatus* A. Milne-Edwards, 1865 from Gujarat coast of India. The crab specimen (n=1) was collected from the Veraval fishing harbor (20º 50' N and 70º 28' E), Gujarat. Previously from the Indian coast *A. laevigatus* was recorded from Maharashtra, Goa, Kerala and Tamil Nadu. *A. laevigatus* can be distinguished from the other xanthid crabs based on the egg-shaped carapace with uniform red colouration and slender shaped Gonopod (G1). The observed morphometric of *A. laevigatus* (male) is 76 x 41.5 mm (CW x CL). The possible occurrence of this crab may be due to the dynamic water current circulation pattern along the Arabian Sea. The paper provides detailed taxonomic characteristics of the species with photographs.

Keywords: *Atergatis laevigatus*, North-west coast of India, Range extension, Taxonomy, Xanthid crab

MARINE POLLUTION AND IMPACT

MPI-401-OR

Nutritional Value and Bioaccumulation of Heavy Metals in Some Commercially Important Marine Cephalopods (Cuttlefish and Squid) from Rameswaram Fish Landing Center

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Abstract
This study evaluates the nutritional value and bioaccumulation of heavy metals levels in selected Cuttlefish (*Sepia officinalis*) and Squid (*Sepiateuthis lessoniana*) from the fish landing center of Rameshwaram, southeast coast of Tamil Nadu, India. According to the biochemical analysis, Cuttlefish comprises 23.99% protein, 11.78% lipids, and 36.57% carbohydrates. Squid includes 20.66% of protein, 8.98% of lipids, and 30.78% of carbohydrates. The moisture content of the Cuttlefish and Squid samples ranges from 74.06% -97.03%, and among the species, Cuttlefish has the highest energy value of 695 Cal/100g, and Squid has the most negligible energy value of 360 Cal/100g from Rameshwaram. These species are excellent sources of minerals, PUFA, and proteins, which shows that these two species are highly nutritious.

Keywords: Cephalopods, Proximate composition, Fatty acid, Heavy metals, GC-MS, ICP-MS

MPI-402-OR

Chronic Toxicity Assessment of Selenium Nanoparticle on a Freshwater Zooplankton, *Daphnia pulex*

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Abstract

Nanotechnology has undeniably revolutionized the fields of medicine, energy, and agriculture. However, the rapid proliferation on nanomaterials usage raises concerns over their potential environmental impact. Striking the right balance between the transformative benefits of nanotechnology and responsible environmental stewardship is crucial for a sustainable and safe integration of the ecosystem into our increasingly nano-enabled world. The complexities surrounding the bioremediation and their eco-toxicity are yet to be fully addressed. In this study, the toxicity of selenium nanoparticles (SeNPs) on *Daphnia pulex* as a primary consumer model was investigated. The results revealed that an ingestion of 76.2 mg/L of SeNPs are known to be a lethal dose for 50 % (LD_{50}) of the population. Imaging on SeNPs accumulation, illustrated apoptotic effects on *D. pulex* cells, particularly in the gut region. In this accordance, various biochemical parameters were examined. Reactive oxygen species production showed a maximum increase of 120.1 ± 0.8 % during exposure to 100 mg/L for 96 hours. Similarly, the lactose dehydrogenase enzyme maintained higher levels at 36.2 ± 0.32 mU/mL under the concentration of 100 mg/L for 96 hours. Fecundity of adult females were assessed using concentrations below the LD_{50}. The treated organisms displayed 41 % reduction in the reproduction rate, indicating a chronic impact of SeNPs consumption on subsequent generations. This investigation emphasizes the importance of chronic impact on trophic level transfer of selenium at the point of release.

Keywords: *Nanoparticle; ecotoxicology; fecundity; Selenium nanoparticle*

MPI-403-OR

Effect of Sewage Water Intrusion on Coastal Marine Life

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Abstract

The entire life of the world depends going on water and therefore the hydrological study is very greatly essential to comprehend the relationship among its diverse trophic levels and food webs. As a largest ecosystem with diverse inter-dependent tropic levels Marine ecosystem constitute multiple food chains and food webs, the deviation even in the single tropic level may lead to the collapse of the entire ecosystem. Sewage intrusion is one of the most challenging and widespread environmental problems that threaten the marine organisms and ecosystem which has a huge impact on the maritime flora and fauna. Water quality parameters like temperature, pH, salinity, DO, BOD, suspended solids, turbidity, conductivity, organic carbon sediment composition were analysed from samples collected from 11 places at Visakhapatnam in Andhra Pradesh to study the deviation of standard parameters in coastal waters and sediments due to sewage intrusion and its effects on marine life caused by alteration of physical and chemical parameters.

MPI-404-PO

Melanophore Index in Fishes: Insights into Heavy Metal Induction

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Abstract

The escalating threat of heavy metal contamination in aquatic ecosystems poses a severe risk to the intricate balance of aquatic life, particularly affecting the well-being of fish populations. This review elucidates the intricate interplay between heavy metal exposure and the melanophore index in fishes, emphasizing the latter as a discerning biomarker indicative of environmental stressors. Melanophores, integral to piscine physiology, intricately regulate coloration dynamics, adaptive camouflage, and responsiveness to environmental cues. Against this backdrop, heavy metal-induced perturbations in fish physiology result in pronounced alterations in the melanophore index, rendering it a refined biological indicator of environmental distress.

Immersing into the multifaceted realm of heavy metal toxicity, the review meticulously navigates diverse sources and intricate mechanisms. The demystified and precisely measured melanophore index emerges as a robust metric for discerning piscine well-being under the duress of heavy metal exposure. A comprehensive survey of various studies follows, encapsulating methodological intricacies, seminal findings, and the influence of myriad factors on melanophore response. Unveiling species-specific differentials and unraveling the impact of environmental variables, such as temperature and pH, enhances comprehension of the dynamic interplay.

The review further contemplates the profound implications of altered melanophore indices on fish populations and broader ecological equilibrium, thereby accentuating the overarching impact of heavy metal pollution on aquatic realms. It concludes with a forward-looking stance, delineating unexplored avenues for future research and emphasizing the imperative of sustained scientific scrutiny to unravel the subtle intricacies characterizing the nexus between heavy metal exposure and the melanophore index in fishes. In essence, this review unfurls a comprehensive tapestry of knowledge, fostering a nuanced understanding of the intricate repercussions of heavy metal incursion into aquatic habitats.

Keywords: Heavy metal toxicity, melanophore index, fish, biological indicator, ecological equilibrium, aquatic ecosystem

MPI-405-PO

Assessing Marine Pollution and Its Impacts in Diveagar, Raigad District: An In-depth Analysis and Future Research Directions

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Abstract

Diveagar, situated in the Raigad district, Maharashtra, India, is a coastal region experiencing the confluence of anthropogenic activities and pristine marine ecosystems. This abstract presents a focused examination of marine pollution in Diveagar, considering the local context, sources of contamination, and the subsequent impacts on marine biodiversity and the livelihoods of coastal communities. The assessment encompasses the analysis of water quality, sediment composition, and the presence of pollutants such as plastics and other waste. Field surveys, supplemented by laboratory analyses, form the foundation for understanding the specific nature and extent of pollution in Diveagar's marine environment. The impacts of pollution on local marine life, including fish populations and other vital ecosystems, are evaluated, emphasising the potential repercussions for both ecological integrity and the socio-economic fabric of the region. Furthermore, the review investigates the effectiveness of existing environmental regulations and community-led initiatives in mitigating pollution in Diveagar. To guide future research endeavors, this abstract suggests avenues for additional studies. It underscores the importance of longitudinal monitoring to discern temporal trends in pollution levels, the role of climate change in exacerbating local stressors, and the development of community-based conservation strategies. Additionally, the abstract highlights the need for interdisciplinary collaborations integrating natural and social sciences to comprehensively address the complex dynamics of marine pollution in this specific coastal context. References include regional environmental studies, local governmental reports, and globally recognized research on marine pollution. By grounding the analysis in both local and international literature, this abstract aim to contribute to a well-rounded understanding of the challenges faced by Diveagar and provide a basis for future research and targeted interventions to safeguard its marine ecosystems.

Keywords: Diveagar, Raigad District, marine pollution, water quality, ecosystem impact, community-based conservation, interdisciplinary research

MARINE MICROBIAL ECOLOGY AND BIOPROSPECTING

MMEB-501-OR

Nanoparticle Substrates for Detection of Heavy Metal Ions in Wastewater: Comprehensive Insights into Biosynthesized Metal Oxide Nanoparticles and Carbon Dots

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Abstract

Metal Oxide nanoparticles and carbon dots are a promising substrate in sensing and detection studies, wherein they are used for detection of contaminates in waste water samples. Surface plasmon absorption and easy accessibility towards surface functionalization are the major advantages rendered by these particles. In this study, metal oxide nanoparticles and carbon dot synthesized using various biological substrates were analyzed for their efficiency in detection of toxic heavy metal ions in wastewater sample and Yamuna water. Gold nanoparticles synthesized using amino acid valine was observed to effectively detect lead ion in water sample. This was due to the high binding affinity of Pb^{2+} ions to free $–COO^-$ groups of valine. Silver nanoparticles synthesized from biosurfactant extracted from *Bacillus tequilensis* was observed to be highly selective to mercury ions. The particles were also highly sensitive and capable of detecting mercury in presence of interfering ions, with minimum detection limit of 20 ppm. Likewise, highly fluorescent carbon dots were synthesized from *Ficus benghalenis* of average size 2.28 nm showed high selectivity towards iron and nickel. The limit of detection was found to be 0.0015µmol/mL and 0.000014µmol/mL respectively. Further, a short bed adsorbed column system was prepared by functionalizing the synthesized CD with silica and removal percentage of 77 and 74% was observed for Fe and Ni respectively. The developed nanoparticle substrate was highly efficient with future research perspectives for generation of on-site detection chips for heavy metal detection in wastewater samples. Moreover, the developed particles allowed feasible and convenient detection of ions in a single go along with the advantages of elimination of two-step, costly functionalization steps.

Keywords: Heavy metals, Metal oxide nanoparticles, Carbon dots, Electrostatic interaction, Column purification

MMEB-502-OR

Candida albicans Biofilm Inhibition by Gold Nanoparticles (Au-Nps) Synthesized Using *Sphaeranthus amaranthoides a Medicinal Herb*

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Abstract

Gold Nanoparticles are most widely used metal in green chemistry, offers a major efficacy in biomedical and therapeutic applications due to its unique surface Plasmon resonance character. In the present study gold nanoparticles (Au-NPs) was synthesized by the reduction of gold metal ions with the aqueous extract of *Sphaeranthus amaranthoides*. Gold nanoparticles of *Sphaeranthus amaranthoides* were characterized by Ultra Violet spectroscopy, Fourier Transformed InfraRed spectroscopy and Scanning Electron microscopy. Prepared nanoparticles were further analyzed for anti-Candidal activity on *Candida albicans* Bio film and toxicity studies on Zebra Fish. Presence of a Surface Palsmon Resonance single peak band was observed at 540-550 nm range which was corroborated with the Scanning electron microscopy. Further analysis of IR bands from Fourier infrared spectroscopy (FTIR) revealed that the appearance of the sharp band at 1500 cm^{-1} - 1700 cm^{-}. Anti candidal investigation using Crystal violet assay revealed that Au-NPs at 1000 ng concentration have inhibited 70.6% of *C. albicans* biofilm. *In vivo* toxicity test with zebrafish embryo substantiated that Au-NPs showed >85% survival rate at 48h of exposure to Au-NPs. *S. amaranthoides* extract as capping agent as a potential agent for surface coating material for prosthetic devices to control and prevent *C. albicans* biofilm as well as biofilm mediated infection.

Key words: *Candida albicans*, Biofilm, *Sphaeranthus amaranthoides, Toxicity, Zebra fish*

MMEB-503-PO

Computational Approach-Based Identification of Potential Urease Inhibitors from Macroalgae

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Abstract

The urease enzyme has gained recognition in causing severe diseases to humankind, like, *Helicobacter pylori* infection. Besides the bacterial ureases, fungal ureases have also been listed in the current list. The present study identifies the potential inhibitors of ureases for two fungal pathogens namely, *Aphanomyces astaci* and *Aspergillus sydowii* from seaweed (macro-algae) through structure-based virtual screening, where several compounds were analyzed that have druglike properties. Molecular docking using the CB-dock online tool, followed by identifying available FDA-approved drugs using Swiss similarity, yielded few molecules that can be employed for the diseases associated with these fungal ureases. From the docking results followed by Swiss similarity, Eckstolonl and 4'-Chlorostypotriol triacetate can be used but demands further studies before marketed. This computational study thus concluded the efficient employment of seaweed metabolites as effective urease inhibitors. Still, it also demands high-throughput screening assays and *in vitro* studies

Keywords: Fungal diseases; urease inhibitors; seaweed; molecular docking; SwisSimilarity

MMEB-504-PO

Validation of Antioxidant Properties of Seagrass using Computational Approach

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Abstract

Marine plants, particularly seagrass, are recognized for their potential as sources of nutraceuticals and pharmaceutical compounds beneficial for human health. With approximately 80% of various plant and animal species thriving in marine ecosystems, seagrass stands out with a global distribution encompassing around 57 distinct species.

Seagrass, typically found in coastal regions with tropical or subtropical climates, has gained attention due to its antioxidant properties. Antioxidants play a pivotal role in safeguarding cellular structures against damage induced by free radicals, thereby preventing oxidative stress. Unlike synthetic antioxidants, which may lead to adverse effects, natural antioxidants, such as those present in seagrass, exhibit a significant capacity to neutralize free radicals without causing untoward reactions.

Among the seagrass species, *Cymodocea nodosa, Cymodocea rotundata, and Cymodocea serrulata*, belonging to the Cymodoceaceae family, have been traditionally used for various medicinal purposes. These applications range from treating wounds, fever, and muscular discomfort to addressing stomach disorders and skin infections. The species' historical use also includes serving as a sedative for infants. In the context of non-curable diseases, the interfacial role of matrixins, potentially referring to matrix metalloproteinases (MMPs), is highlighted. Computational studies have been employed to validate the interconnectedness of matrixins with antioxidants. These computational approaches provide insights into the molecular interactions and mechanisms through which antioxidants derived from seagrass may modulate the activity of matrixins, contributing to potential therapeutic benefits in various health conditions.

MMEB-505-PO

Acute Growth Inhibition and Toxicity Analysis of Titanium Oxide Nanoparticles on *Isochrysis galbana*

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Abstract

The increasing use of metal oxide nanoparticles (MONPs) has indirectly led to their discharge in the marine environment. This work aims to assess the toxicity of titanium oxide nanoparticle (TiONPs) using the marine algae *Isochrysis galbana* as a primary producer for ecological implications. Physical characteristics of TiONPs like sedimentation rate and aggregation plays a major role in exerting the toxicity to the target organisms. Homo and hetero aggregation of cells and TiONPs revealed that the cells and TiONPs tend to form more aggregates in later stage of exposure and thereby providing increased toxicity. Exposure to higher concentration of TiONPs (40 mg/L and 50 mg/L) significantly reduced the cell number of *I. galbana* over 96 h of experiment. The reduction in cell number is mainly due to effect of TiONPs on the photosynthetic mechanism which were indicated by the reduced chlorophyll content of algal cells and lowered photochemical quantum yield. Acute exposure to higher concentration of TiONPs caused significant variation in the biomass dry weight and its biochemical composition including carbohydrates, proteins and lipids. Oxidative stress is another possible mechanism for TiONPs to induce toxicity validated by membrane damage by lactate dehydrogenase analysis, SYTOX green analysis and lipid peroxidation. Reactive oxygen species have been produced in varying concentration due to acute toxicity exposure. Microscopic observations were carried out to determine the morphological variations and live dead cells in the treated groups. These results highlight the potential ecological risks associated with TiONPs and emphasize the critical need to consider their environmental impact in industrial applications.

Keywords: Marine microalgae; Primary producers; Nanotoxicity; Titanium oxide; Lethal dose; Cell viability

MMEB-506-PO

Tailoring Microscale Features by Soft Lithography on Silicone-Mediated Polymers for Biofilm Adhesion Studies

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Abstract

Biofilm formation is a common challenge faced by various industries, including those operating in marine environments. In marine environments, biofilm consists of complex communities of microorganisms, including bacteria, and algae. Thus, soft lithography opens novel applications in anti-biofilm properties and self-cleaning engineered surfaces. In this study, hydrophobic topographies are created using soft lithography on silicone-modified polymer to evaluate its attachment studies. Silicone-based organic polymer is widely used in soft lithography because of its biocompatibility, low toxicity, and mechanical flexibility. It has been observed that its water contact angle is in the range of 109° with a surface energy of 7.59 j/m^2 after standardization with a curing temperature of 80°C. Further, the polymer was characterized using FTIR and TGA to study its functional properties and its thermal stability. This study focuses on the replication of the unique hydrophobic surface of Gore-Tex fabric using Silicone-modified polymer as a mimic substrate, which is further used to investigate the Biofilm attachment studies on the replicated surface. It has been observed that the negative replica exhibits a high contact angle of 115°, indicative of good hydrophobic properties similar to Gore-Tex. To assess the Biofilm attachment studies on the negative replica, the surface is exposed for adhesion studies, and comparative studies are conducted between the replica surface and a control surface to assess the extent of biofilm adhesion, growth, and stability. Understanding the surface's anti-biofilm properties will contribute to the development of novel materials and coatings with enhanced resistance and the development of effective strategies for combating biofilm-associated problems in industries.

Keywords: Biofilm, Hydrophobicity, soft lithography, Gore-Tex, Negative replica

MMEB-507-PO

Characterization, Response Mechanism and Biofouling Potential Analysis of Marine Bacterium *Pseudomonas aeruginosa*-2S isolated from Pulicat Lake, India

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Abstract

Pseudomonas, as a model species of biofilm bacteria, holds a pivotal role in various ecological processes in the marine environment. Due to their ability to form resilient biofilms, these species also serve as potent micro-foulers. Throughout this investigation, the isolation, identification, and characterization of biofilm-forming *P. aeruginosa*-2S isolated from Pullicat Lake, India. The biofilm-forming ability of isolated strain on different metal surfaces (Stainless steel, titanium, copper, and aluminium) under controlled static conditions was performed using an excitation-emission matrix (EEM), Fourier transforms infrared correlation spectroscopy (ATR-FTIR), FT-NMR, TGA-DSC, fluorescence, and scanning electron microscope. From the results, biofilm morphology and matrix composition showed different patterns. EPS production, biochemical composition (carbohydrate, protein, and lipid), and discrepancies of fluorophores were comparatively speckled from each strain individually as well as on different surfaces. Accordingly, molecular biomarker response (SOD, CAT, glutathione, ROS) and metabolic activity (ATPs) of objective strain were assorted. In addition, modulation of functional groups and structural composition of biofilm mediate EPS were observed. This investigation aims to improve our knowledge about how bacteria attach to metal substrates and offer insights into controlling biofilms in the future

MMEB-508-PO

Physiochemical Responses of Marine Bacterium Exposed to Different Levels of Polystyrene Nanoplastics: Insights into Oxidative Stress and Biofilm Modulation

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Abstract

Large amounts of discarded plastics in the environment can be aged into microplastics and nanoplastics, which are not easily removed, posing potential nonnegligible risks to the ecosystem and human health. Biofilm formation is an essential feature of marine bacteria. They can adapt to various extreme environments by the production of extracellular polymeric substances (EPS) and play an important role in biogeochemical cycles. Although limited studies have revealed that nanoplastics have detrimental impacts on microorganisms, the potential response mechanisms of marine biofilm bacteria toward nanoplastics are still lacking. In this study, biofilm synthesis, and physiochemical responses of marine bacterium Pseudomonas sp. BFB-4S to different levels of polystyrene nano plastics (PS NPs) exposure was evaluated using multi-staining fluorescence microscopic, spectroscopic (fluorescence excitation-emission matrix, 2D-Fourier transform infrared correlation spectroscopy, FTNMR), multi-marker based oxidative stress and genotoxicity assessment. The results showed that PS NPs had dual effects on BFB-4S, and different concentrations of PS NPs demonstrated different effects on the growth, biofilm synthesis, extracellular polymeric substances modulation (EPS), and oxidative stress of BFB-4S. All levels of PS NPs had no obvious biocidal effect on BFB-4S. In addition, biochemical composition in EPS varied differently in response to increased NP exposure, as the ratio of polysaccharide/protein/lipid. Additionally, spectroscopic annotation revealed obvious heterogeneities in biochemical component variations in response to MPs, as the carbonyl, carboxyl, and amino functional groups and glycosidic bonds in the EPS preferentially responded. Further analysis of the toxicity mechanism of PS-NPs indicated that they could induce reactive oxygen species production, DNA damage, and modify antioxidant enzyme activity. Our findings would provide new insights into the interactions between environmental bacteria and PS NPs, thereby enhancing our understanding of the potential risks of PS NPs to microbial ecosystems and public health.

Keywords: Marine bacteria, Nanoplastics, Biofilm, Spectroscopic annotation, Oxidative stress

MMEB-509-PO

Isolation and Characterization of Air Borne Microbes over Interspatial Surface of the Tropical Seawater

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Abstract

This study is aimed to investigate the presence of bacteria in marine environment. The air borne bacterial community present in the coastal sites were collected with help of air sampler. The sample was collected near interspatial surface. Samples were cultivated in various growth media such as Nutrient Agar, Zobel Marine Agar, Thiosulfate-Citrate-Bile-Salt Sucrose Agar and Potato Dextrose Agar. Followed by biochemical and molecular characterization the species were identified. This work was carried out to compare the abundance of airborne microbes present in different seas and to find out the ocean atmospheric interaction for microbial transmission. This study will provide a collection of data which in detail explain about the relationship between the bacterial community and marine environment associated with marine flora and fauna human health.

Keywords: Airborne microbes, bioaerosols, Air sample, Marine microbes.

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Extraction and Purification of Anti-Aging Bioactive Compound from Selected Seaweeds

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Abstract

Seaweeds, also known as macroalgae, are abundant sources of various bioactive components with a wide range of biological functions. Seaweed is recognized for generating a variety of bioactive compounds. The numerous biological functions associated with these extracted bioactive substances from seaweeds have the potential to enhance their value in promoting well-being within both the food, Cosmetics, and pharmaceutical sectors. Aging is a significant risk factor for numerous chronic diseases like cancer, cardiovascular issues, and diabetes. Seaweeds serve as an outstanding food source, given their abundance in vitamins, minerals, fiber, polyunsaturated fatty acids, and other beneficial substances. Seaweed has a bright possibility for biomedical applications with antioxidant properties, anti-inflammatory activity, and antineoplastic activity, and organic particles of bioactive components develop the animal's tissue regeneration and tissue engineering. The various extraction methods such as Microwave-assisted Extraction (MAE), Enzyme-assisted Extraction (EAE), Supercritical Fluid Extraction (SFE), and Ultrasound-assisted Extraction (UAE) were utilized in place of the traditional approach to separate the bioactive components, and the extract was further refined using chromatographic technique analysis to guarantee its purity. Utilizing extracts for skin care becomes crucial due to the skin's exposure to various harmful factors during one's life, some preventable and others inevitable. Moreover, genetics plays a significant role, in influencing molecular characteristics. The skin also undergoes additional processes related to oxygenation and reduction.

Keywords: Bioactive compound, Skin, Enzymes-assistance, Supercritical fluid

COASTAL AND MARINE ORNAMENTAL AQUACULTURE

COA – 601-OR

Introducing Macroalgal Reactor in Recirculating Aquaculture System (RAS): An Innovative Approach Towards Sustainable Shrimp Farming

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Abstract

The adoption of recirculating systems for the cultivation of shrimp stands as a promising and sustainable solution to the prevailing challenges of land and water scarcity, concurrently alleviating environmental concerns. Research has delved into the amalgamation of seaweeds and shrimp across various cultivation systems. However, there is a dearth of studies on their efficacy in waste removal within recirculating aquaculture systems (RAS). The study aimed to investigate the efficiency of macroalgal reactors in influencing the growth and survival percentage of shrimp (*Penaeus vannamei*) under high stocking density conditions within a recirculating aquaculture system. Three unique reactor configurations, namely the rotating wheel, raceway type, and closed horizontal tubing, were constructed using the red seaweed *Agarophyton tenuistipitatum*. This seaweed is well-known for its adaptability in brackishwater salinity and tropical climatic conditions. The findings demonstrated that the raceway-type reactor in the RAS effectively sustained optimal water quality throughout the entire cultivation period. In the raceway system, the removal efficiency for NH_4–N and PO_4–P was notably elevated at 74.86% and 55.58%, respectively. It surpassed the performance observed in both the rotating wheel and closed horizontal tubing systems. The utilization of the race-type algal reactor in the culture system has demonstrated a remarkable increase in shrimp biomass yield and specific growth, coupled with an impressive 97% survival rate. Moreover, it is noteworthy that the Feed Conversion Ratio exhibited a pronounced reduction in the raceway system, registering at 1.28, in stark contrast to the FCR values observed in the tube and wheel systems over the 80-day culture period. Simultaneously, the raceway-type reactor in the cultivation system proved to be highly effective, resulting in an excellent seaweed harvest compared to the other two models. This opens up a valuable opportunity for farmers to generate extra income, thanks to the high commercial value of the species, particularly in the lucrative agar and other agricultural applications. This innovative approach demonstrated to be highly effective in enhancing overall productivity and ensuring the successful development of shrimp in recirculating aquaculture system.

Keywords: Innovative; macroalgal reactor; recirculating aquaculture system; shrimp farming, sustainable.

COA-602-OR

Immune Response and Cytokine Gene Expression in Clownfish Using Mangrove Herb Metabolites to Enhance Survival and Produce Disease Resistant Fish

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Abstract

Clownfishes are the most widely demanding marine aquarium fish in the global marine ornamental fish trade. Fish raised in hatcheries and supplied to the aquarium trade offer an alternate system of safeguarding the coral reef environment from over-exploitation, while also providing breeders and other stakeholders with a stable income. However, diseases are the major challenge in the clownfish breeding and rearing units and create heavy mortality with financial loss. Increasing fish survival and producing disease-resistant fish is a key factor in maintaining economic profitability in hatcheries and healthy feedback from hobbyists. Hence, the present study was carried out to enhance innate immunity in clownfish by supplementing feed with secondary metabolites of the mangrove plant, *Avicenia marina* to produce and supply quality and disease-free clownfish seeds. The fishes were fed with diets containing 4 different doses of supplemented feed (0 mg/kg (Control), 100 mg/kg (Group - A), 200 mg/kg (Group - B), 500 mg/kg (Group - C) for 30 days. The experimental group fishes exhibited remarkable results in serum lysozyme activity, alternative complement (ACH_{50}) assay, respiratory burst assay, total white blood cell (WBC) count and phagocytic activity assay compared to the control group. The results of mRNA gene expression studies (qRT-PCR) showed that the expression of proinflammatory cytokines, such as interleukin-1β (IL-1 β), interleukin-6 (IL-6) and tumor necrosis factor-α (TNF α) increased 2 to 7-fold expression in group A (100 mg/kg), group - B (200 mg/kg) and group - C (500 mg/kg), when compared to Group - D (Control). At the end of the experiment, the supplemented-fed fishes showed distinguished survival against the predominant bacterial pathogen, *Vibrio alginolyticus* AUMOFP2 (JN820097). The study suggested that secondary metabolites of mangrove herbal can be used to produce quality and immune resistant clownfish, which will promote sustainable aquarium trade.

Keywords: Clownfish, mangrove herbs, innate immune response, qRT-PCR, cytokine gene.

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The **Centre for Climate Change Studies (CCCS)** was established in the January 2014 at International Research Centre (IRC) with the primary mandate of investigating the impact of predicted climate change on marine organisms associated to various ecosystems like coral reefs, seagrass meadows, seaweeds, intertidal zones and mangrove ecosystems etc.

At present, in the CCCS, the following research activities are going-on: (i) Implications of climate change on natural life history traits of coral reef caridean shrimps; (ii) Response of micro-planktons to elevated temperature and decreased pH using multidisciplinary approach including proteomics, biochemical and physiological assays; (iii) Contribution of seaweeds towards sustainable future by playing a role in climate change mitigation and adaptation; (iv) Diversity and status of coral reef shrimps in Gulf of Mannar Biosphere Reserve, Tamil Nadu and Lakshadweep and (iv) Plant-insect interaction under climate change scenario. Besides, the Centre is also instrumental in spreading awareness about conservation of marine ecosystem to schools and teachers through citizen science program.

Researchers at CCCS have been actively working at Sathyabama Marine Research Station (SMRS), recently established at Rameswaram to encourage research on cutting-edge marine ecology and climate change to sustainably use, manage, and conserve natural ecosystems for the benefit of the coastal communities of Gulf of Mannar and Palk Bay regions.

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