

ABSTRACT BOOK

3rd INTERNATIONAL AQUATIC BIOTECHNOLOGY SYMPOSIUM

25-27 SEPTEMBER 2024

İstanbul University
Faculty of Aquatic Sciences

ORGANIZER

3rd INTERNATIONAL AQUATIC BIOTECHNOLOGY SYMPOSIUM

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Prof. Dr. Meriç ALBAY
Symposium Co-Chair
İstanbul University, Faculty of Aquatic Sciences

FOREWORD

We are proud to present the proceedings of the 3rd International Aquatic Biotechnology Symposium (Aquabiotech2024), organized by İstanbul University Faculty of Aquatic Sciences and held at İstanbul University, Türkiye, on September 25-27, 2024. The symposium brought together a diverse community of leading scientists, experts and professionals from academia, industry, research and public institutions, emphasizing the critical importance of collaboration between these sectors.

Since the first event in 2018, we deeply appreciate the vision and efforts of our Founding Members, especially Prof. Dr. Meriç ALBAY, whose fundamental work continues to inspire and guide this vibrant community.

Aquabiotech2024 brought together 134 participants from 12 different countries, including 90 academicians, 44 students and industry professionals. The symposium featured 41 oral and 19 poster presentations on the latest research and innovations in the field of Aquatic Biotechnology. In addition to the inspiring scientific program, we are also proud to have offered a very satisfying and enjoyable social program to our participants within the scope of our event held in Istanbul, one of the most beautiful cities in the world.

We were honored to host 6 distinguished invited speakers, including Prof. Luis BOTANA, Prof. Orhan İNCE, Prof. Luisa CUSTODIO, Prof. Dean JERRY, Prof. Antonella LEONE and Kirsten BENKENDORFF. In the scientific program, which consisted of 8 sessions in total, we would like to express our gratitude to Prof. Günnur DENİZ and Prof. Reyhan AKÇAALAN, who chaired the sessions, in addition to our invited speakers. We would also like to thank our sponsors, the organizing committee and Istanbul University Faculty of Aquatic Sciences, for hosting the congress. Finally, we would like to extend our sincere thanks to our students who volunteered to contribute to the organization for their invaluable efforts. This congress was made possible thanks to their dedication. We hope that the knowledge and connections formed during the 3rd International Aquatic Biotechnology Symposium will continue to inspire innovation and collaboration in our field.

Sincerely,
The Organizing Committee
3rd International Aquatic Biotechnology Symposium (Aquabiotech2024)

INVITED SPEAKERS



Luis Botana, PhD
University of Santiago de Compostela, Spain



Orhan İNCE, PhD
İstanbul Technical University, Türkiye
ENGY Energy and Environmental Technologies R&D Ltd.Şti



Luísa Custódio, PhD
Centre of Marine Sciences (CCMAR), University of Algarve, Portugal



Dean Jerry, PhD
James Cook University & ARC Research Hub for Advanced Prawn Breeding, ARC Research Hub for Supercharging Tropical Aquaculture Through Genetic Solutions and the Tropical Futures Institute, Singapore



Antonella Leone, PhD
National Research Council, Institute of Sciences of Food Production of Lecce, Italy



Kirsten Benkendorff, PhD
National Marine Science Centre, Southern Cross University, Australia

Turkish Time GMT+03:00	WEDNESDAY 25/09/2024
09:30 10:30	**REGISTRATION**
10:30 11:15	**OPENING CEREMONY** **Prof. Dr. Meriç ALBAY (Co-Chair of the Sympoisum)** **Prof. Dr. Melek İŞİNİBİLİR OKYAR (Chair & Dean of Faculty of Aquatic Sciences)**
11:15 12:00	**[IL1]** **Luis BOTANA (Invited Speaker)** *University of Santiago de Compostela, SPAIN* **An overview of the current knowledge of the mode of action and toxicity of marine toxins**
12:00 13:15	**BREAK**
SESSION I (Chair: Luis BOTANA)	
13:15 13:30	**[OP1]** **Scale-up Development of Two-stage Microalgae Cultivation in Wastewater Under Mixotrophic Conditions with Biomass Recycling** Çiğdem Öz Yaşar, Louise Fletcher, Miller Alonso Camargo-Valero
13:30 13:45	**[OP2]** **The Role of Microalgae in Enhancing Anaerobic Digestion: A Bibliometric Review** İremsu Kayan, Nilgün Ayman Öz
13:45 14:00	**[OP3]** **Evaluating the Viability of Biogas Production from Aquatic Biomass in the Context of the Green Transition** E. Gözde Özbayram, Reyhan Akçaalan, Dilek Özyurt, Latife Köker, Zuhal Zengin, Ayça Oğuz Çam, Meriç Albay
14:00 14:15	**[OP4]** **The Seaweed Production in Circular Bioeconomy: Status and Future Perspectives** Kadriye Elif Maçin
14:15 14:30	**[OP5]** **Potential Food Packaging Films with Macroalgae-based Biopolymers** Esra Su, Dilek Özyurt, Ayça Oğuz Çam, Reyhan Akcaalan, Meriç Albay
14:30 14:45	**BREAK**
14:45 15:30	**[IL2]** **Orhan İNCE (Invited Speaker)** *Istanbul Technical University, TÜRKİYE* **Sustainable Land Use In The Arctic Region In The Light Of Global Changes: Effect of Climate Change A Case Study: Current State of Thermokarst Lakes In Western Siberia**
SESSION II (Chair: Orhan İNCE)	
15:30 15:45	**[OP6]** **Genomic Insights Into Newly Isolated Mycobacterium Strains Highlight the Potential of Reverse Vaccinology in Aquaculture** Panagiota Stathopoulou, Elias Asimakis, George Tsiamis
15:45 16:00	**[OP7]** **Comprehensive Mitotranscriptomics of Life Cycle Reversal Stages of Immortal Jellyfish Turritopsis dohrnii (Cnidaria: Hydrozoa)** Merve Nur Aydemir, Melek İşinibilir, Sümeyra Zeynep Çalıcı

16:00 **16:15**	**[OP8]** **eDNA Metabarcoding Use on Biomonitoring Along the Marine Coasts of İstanbul** Aydın Kaleli, E. Gözde Özbayram, Latife Köker, Zuhal Zengin, Reyhan Akcaalan
16:15 **16:30**	**[OP9]** **Sedimentary Ancient DNA: Cutting-edge Techniques and Their Applications in Biotechnology** Seher Elif Mekik, Buse Özden, Enes Bal
16:30 **16:45**	**[OP10]** **Different Molecular Approaches in Detection of Taste and Odour Problem in Water** Zuhal Zengin, Reyhan Akcaalan
16:45 **17:30**	**POSTER SESSION I** **[PP1] The Effect of Salinity Stress on The Utilization of Chlorella Vulgaris as Food and Biodiesel** *Arzum Nur Gürsoy, Zehra Güngör, Tunahan Özdemir, Ayça Oğuz, Reyhan Akçaalan* **[PP2] Does The Co-Exposure of Polymethyl Methacrylate Microplastics and Phthalates Increase Its Genotoxicity?** *Mahmut Fırat Kenanoğlu, Özge Sultan Zengin, Gül Özhan* **[PP3] Cyanobacteria Bloom in Artificial Ponds: Potential of Biodiesel Production** *Ayça Oğuz, Latife Köker, Gözde Özbayram, Reyhan Akçaalan, Meriç Albay* **[PP4] Comparison of Different Diagnostic Methods for The Identification of Citrobacter Freundii from Redtail Catfish (Phractocephalus Hemioliopterus) and Determination of Antibacterial Susceptibility** *Zeynep Sena Pınarbaşı, Çiğdem Ürkü* **[PP5] Preparation of Alginate-Based Ethyl Pyruvate Films for Combating Fungal Pathogens in Strawberries** *Ecem Başaran, Elif Kalkan, Eylül Dila Çarkci, Mehmet Murat Özmen, Azime Erarslan* **[PP6] Removal of Organic Compounds from Aquatic Solutions Using Environmentally And Eco-Friendly Synthesized Cerium Oxide Nanoparticles (CeO_{2-x} NP)** *Dilek Özyurt, Zuhal Zengin, Reyhan Akcaalan, Meriç Albay* **[PP7] The Genotoxicity Profile of Polystyrene Microplastics** *Özge Sultan Zengin, Mahmut Fırat Kenanoğlu, Mohamed Fathi Abdallah, Gül Özhan* **[PP8] Investigation of Pollutant Removal in Molasses Medium with Indigenous Bacteria Isolated from Water Sources of Türkiye** *Ayşe Selin Saygi, Seda Şen, Nur Koçberber Kiliç* **[PP9] Efficiency of Organisms with Different Trophic Levels as Living Biofilters in The Removal of Nutrients from Juvenile Rainbow Trout Rearing Tanks** *Muhammad H. Azhar, Devrim Memiş* **[PP10] Advancements in Plant Tissue Culture of Salt-Tolerant Plants** *Luisa Custódio, Gilbert Charles, Christian Magné, Gregório Barba-Espín, Abel Piqueras, José António Hernández, Karim Ben Hamed, Viana Castañeda-Loaiza, Eliana Fernandes, Maria João Rodrigues*
18:00 **19:00**	**BASILICA CISTERN VISIT**

Turkish Time GMT+03:00	THURSDAY 26/09/2024
09:30 10:15	**[IL3]** **Luísa CUSTÓDIO (Invited Speaker)** *Centre of Marine Sciences (CCMAR), University of Algarve, PORTUGAL* **Seas of Opportunity: Transforming Marine Invasive Algae into Sustainable sources of bioactive compounds**
10:15 10:30	**BREAK**
SESSION III (Chair: Luísa CUSTÓDIO)	
10:30 12:00	**[OP11]** **Microalgae Phycobiliproteins as Sustainable Textile Dyes: Optimization of Dyeing Parameters and Evaluation of Dyeing Performance** Tuğçe Mutaf Kılıç, Aslı Demir, Murat Elibol, Suphi S. Oncel
	[OP12] **Exploring the Marine Bioplastics for Food Packaging: Challenges and Emerging Trends** İdil Can Tunçelli, Nuray Erkan
	[OP13] **Physical, Microbiological, and Chemical Properties of Sea Bass Patties Containing Oleogel as A Substitute** Emine Bakır, Turgay Çetinkaya, Serhan Mantoğlu, Hasan Yalçın
12:00 13:15	**BREAK**
SESSION IV (Chair: Reyhan AKÇAALAN)	
13:15 14:30	**[OP14]** **Cell Cultures from the Oyster *Magallana bilineata* as A Platform for Toxicity Evaluation and Transgene Expression** Soumya Balakrishnan, Ambadi Kannan M. Sajeevan, Sreevidya C. Parvathi, Isaac Sarojini Bright Singh, Jayesh Puthumana
	[OP15] **Acute streptococcosis in *Oreochromis niloticus*: Development of Inactivated Whole-cell Vaccine from *Streptococcus agalactiae*** Ambadi Kannan M. Sajeevan, Soumya Balakrishnan, Jayesh Puthumana, Thapasimuthu Vijayamma Anilkumar, Isaac Sarojini Bright Singh
	[OP16] **Low Cost Scenedesmus aequicaudatus Hortobágyi Cultivation** Soner Atik, Ayşe Gül Tekbaba, Alican Bahadır Semerci, Tuğba Ongun Sevindik
	[OP17] **Probiotics Derived from Fish Gut Microbiota: Alternative Sources Supporting Fish Health and Sustainable Aquaculture** Hazal Kibar Demirhan, Emine Omeroglou, Fadime Kıran
	[OP18] **Effect of Different Nutrient Mediums on *Kamptonema formosum* (Bory ex Gomont) Strunecký, Komárek & J.Smarda** Alican Bahadır Semerci, Ayşe Gül Tekbaba, Tuğba Ongun Sevindik
14:30 14:45	**BREAK – PHOTO TIME**
14:45 15:30	**[IL4]** **Dean JERRY (Invited Speaker)** *James Cook University & ARC Research Hub for Advanced Prawn Breeding, ARC Research Hub for Supercharging Tropical Aquaculture Through Genetic Solutions and the*

	Tropical Futures Institute, SINGAPORE **Navigating the Seas of Innovation: Uniting Genomics, AI, and Pathogen Diagnostics for Sustainable Aquaculture**
SESSION V (Chair: Dean JERRY)	
15:30 17:00	**[OP19]** **Screening of Microalgal Isolates for The Production of Added-value Products** Dimitra Matziri, Nikolaus Remmas, Paraschos Melidis, Spyridon Ntougias
	[OP20] **A New Method for Determination of Total Antioxidant Capacity of Macroalgae and Cosmetic Products** Dilek Özyurt, Birsen Demirata, Ayça Oğuz Çam, Latife Köker, Gözde Özbayram, Reyhan Akçaalan, Meriç Albay
	[OP21] **Conversion of Ulva Bloom, Which Occurs in The Gulf of İzmir, Into High Value-added Product** Meltem Conk Dalay, Nuri Azbar, Şebnem Tavman, Tutku Didem Altun, Zeliha Demirel, Ayşegül Erdoğan, Burak Altınel, Ali Enes Cire, Elvan Gizem Ersoy, Ayşe Nur Dinç , Buse Özdere Yılmaz
	[OP22] **Determination of The Antibacterial Activity of Microalgae Isolated from Giresun Streams** Sibel Altürk Karaca, Elif Neyran Soylu
	[OP23] **Optimizing Pollutant Removal from Cheese Whey Wastewater Using Microalgae: A Comparative Study of Response Surface Methodology and Decision Tree** İremsu Kayan, Nilgün Ayman Öz
	[OP24] **Environmental, Economic and Social Sustainability of Microalgae Products: A Review** Büşra Atılgan Türkmen, Ecem Müge Andoğlu Coşkun, Serap Döken
17:00 17:30	**POSTER SESSION II**
	[PP12] CYANOFRESH- Environmental Friendly Management of Cyanobacteria Blooms in Freshwater Resources *E.Gözde Özbayram, Reyhan Akçaalan, Latife Köker, Ayça Oğuz Çam, Meriç Albay* **[PP13] Optimized Method for Extracting of Antioxidant and Bioactive Compounds from Macroalgae** *Dilek Özyurt, Sude Köksal, Ayça Oğuz, Latife Köker, E. Gözde Özbayram, Reyhan Akçaalan, Meriç Albay* **[PP14] Biotechnological Applications of Mussels in Aquatic Biotechnology** *Gökhan Tunçelli* **[PP15] Use of Living Organisms for Aquaculture Waste Removal** *Gökhan Tunçelli, Muhammad H. Azhar, Devrim Memiş* **[PP16] Nature-Based Usage of Bacterial Technology in Different Sectors: The Example of Turkish Marine Bacterial Isolates** *Gülşen Altuğ, Pelin Saliha Çiftçi Türetken* **[PP17] Heavy Metal Biosorption by A Novel Bacterium Isolated from Düden Waterfall** *Seda Şen, Nur Koçberber Kılıç*

	[PP18] Jellyfish as A Potential Source of Collagen *Esra Su, Melek İşinibilir* **[PP19] Metal-Organic Framework for Removal of Methyl Orange Dye From Water** *Behris Kılıç, Sevgi Polat* **[PP20] Investigation of Silver Nanoparticles Synthesized by a Bacterium in Photocatalytic Activity** *Esra Erkoç, A. İrem Gündüz, Nur Koçberber Kılıç*
18:00	**BHOSPHORUS TOUR**
20:00	**GALA DINNER**

Turkish Time GMT+03:00	FRIDAY 27/09/2024
09:30 10:15	**[IL5]** **Antonella LEONE (Invited Speaker)** *National Research Council, Institute of Sciences of Food Production of Lecce, ITALY* **Bioactive compounds from native and non-native Mediterranean jellyfish**
10:15 10:30	**BREAK**
SESSION VI (Chair: Antonella LEONE)	
10:30 12:00	**[OP25]** **Exploring The Antibacterial Properties of Mangrove-Derived Fungi** Bachtiar Rivai, Muhammad Nursid, Abd. Kakhar Umar, Ilham Ardhiansyah, Boonchoo Sritularak
	[OP26] **Isolation of Actinobacteria from Coastal Ecosystems of İzmir, Antimicrobial Potentials and Dereplication Studies of Crude Extracts** Mustafa Ünver Kurt, Özge Can, Burçin Karakuzu, Göklem Üner, Ahmet Ceyhan Gören, Ataç Uzel, Erdal Bedir
	[OP27] **Evaluation of *in vitro* Dipeptidyl Peptidase IV (DPP-IV) Inhibitory Effects of Limpet Protein Hydrolysates** Gürkan Bilir, Maria Cermeño, Mohammadreza Khalesi, Richard J. FitzGerald, Deniz Ekinci
	[OP28] **Impact of Selected Heavy Metals on Enriched Nitrifying Culture** Tuğçe Katipoglu-Yazan, Dilşad Soylu, Güçlü İnsel
12:00 13:15	**BREAK**
SESSION VII (Chair: Günnur DENİZ)	
13:15 14:30	**[OP29]** **Effect of Wastewater Supported Environment on Biochemical Content, Nutrient Removal Capacity, and Antioxidant Activity of *Chloroidium ellipsoideum* (Gerneck) Darienko & al.** Ayşe Gül Tekbaba, Nisanur Kutlu, Alican Bahadır Semerci, Soner Atik, Tuğba Ongun Sevindik
	[OP30] **High Resolution Acoustic Imaging for Detection and Mapping of *Posidonia oceanica* Meadow and Matte, and Analysis of Physical Parameters Affecting Meadow Distribution** Özkan Özel, Gökhan Kaboğlu, Barış Akçalı, Canan Eronat, Seda Okay Günaydın, Can Eytemiz, Denizhan Vardar, Tarık İlhan
	[OP31] **Proposal of Nitrogen Removal Technologies for Urban Wastewater Treatment in The Marmara Sea Basin: A Strategy for Mucilage Prevention** Güçlü Insel, Goksin Ozyildiz, Emine Cokgor, Melike Gurel, Gulsum Emel Zengin, Didem Guven, Alpaslan Ekdal, Ali Erturk, Nazik Artan
	[OP32] **Photocatalytic Performance of Ag-Humic Acid Magnetic Nanoparticles for Degradation of Methylene Blue in Aqueous Medium** Fatoş Ayça Özdemir Olgun, İbrahim Kaba
14:30 14:45	**BREAK**

15:00 15:45	**[IL6]** **Kirsten BENKENDORFF (Invited Speaker)** *National Marine Science Centre, Southern Cross University, AUSTRALIA* **Pesticide threats to estuarine seafood health and safety**
SESSION VIII (Chair: Kirsten BENKENDORFF)	
15:45 16:45	**[OP33]** **Evaluation of Nutrient Removal and Anti-Inflammatory Drugs Removal Using a Pilot-Scale Novel Hybrid Biofilm Process** Güçlü Insel, Emine Cokgor, Dilsad Soylu, Goksin Ozyildiz, Emel Topuz, Gülsüm Emel Zengin, Didem Güven, İlke Pala Özkök
	[OP34] **Larinier Fishway with Mild Bed Slope: A Pilot Project in Lake Sapanca Basin in Turkey** Gökay Gündüzalp, Özcan Gaygusuz, Serhat Küçükali, Latife Köker, Gülşah Saç, Zeynep Dorak, Meriç Albay, Sadi Cantürk, Çiğdem Gürsoy Gaygusuz, Sevan Ağdamar, Ahmet Alp
	[OP35] **A Promising Approach for Preventing Seabream Fillet Contamination: Inulin and Fructooligosaccharide** Hande Doğruyol, Şafak Ulusoy, Didem Üçok, Şehnaz Yasemin Tosun, Tenzile Nisa Öksüzömer, Deniz Uzun
16:45 17:30	**CLOSING CEREMONY** **Prof. Dr. Meriç ALBAY (Co-Chair)** **Prof. Dr. Melek İŞİNİBİLİR OKYAR (Chair & Dean of Faculty of Aquatic Sciences)**

[IL 1]

An Overview of the Current Knowledge of the Mode of Action and Toxicity of Marine Toxins

Luis M. BOTANA[1]

[1]*Department of Pharmacology, Faculty of Veterinary, University of Santiago de Compostela, Campus Lugo, Spain*

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The research performed so far on marine toxins is seriously biassed by some inicial papers that have weighted probabley too much on the outcome of legislation and lines of research. An inmense amount of resources were spent on detoxification and funcional methods, with close to zero success, while a very basic piece of information, which is the mechanism of toxicity of the toxins, was assumed to be known. Unfortunately, this is not the case for most of the toxin groups. In the presentation this will be discussed for diarrheic toxins, azaspiracids, brevetoxins, cyclic imines and ciguatoxins. My main conclussion is that this field needs urgently toxicological researchers. This is discussed using several examples: 1) Ciguatoxins, as their mode of action is not well known due to the lack of certified standards, and this questions from current legislations to many toxicological studies about their effects. Also we question that sodium channels are their only target. 2) Diarrheic toxins, as their mode of action is clearly unrelated to just phosphatase inhibition and therefore we propose several options, from an inflammation response to a neurological modulation of the enteric nervous system. 3) Neurotoxins (brevetoxins, saxitoxins, etc), that are not properly characterized toxicologically due to the lack of adequate certified calibrants. Most of the talk is shown from the standpoint of the lack of certified toxins suppliers.

[IL 2]

Sustainable Land Use in the Arctic Region in the Light of Global Changes: Effect of Climate Change: A Case Study: Current State of Thermokarst Lakes in Western Siberia

Orhan İNCE[1,2], Kulikova Maria[3], A.V. Soromotin[4]

[1]*Head of Microbial Ecology Group, ITU Environmental Engineering Department, Istanbul, Türkiye*

[2]*Scientific Director and Research Leader, TerrArctic Mega Grand Project, Research Institute of Ecology and Natural Rational Management, Center for Isotope Biogeochemistry Laboratory, Tyumen University, Russian Federation*

[3]*PhD Student, School of Natural Sciences, Tyumen University, Russian Federation*

[4]*Director of Research Institute of Ecology and Natural Rational Management, Center for Isotope Biogeochemistry Laboratory, Tyumen University, Russian Federation*

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The TerrArctic Mega Grant Project focuses on developing sustainable land management practices in the Arctic to mitigate the effects of climate change. This interdisciplinary research aims to explore the complex interactions between natural and human systems, enhancing opportunities for research and information exchange among Arctic stakeholders. The project seeks to elucidate the carbon cycle in the soils and vegetation of Western Siberia, providing scientific results that will inform policy decisions, guide land-use planning, support conservation efforts, and contribute to the advancement of scientific literature on Arctic ecology and environmental management.

The main objectives are to ensure sustainable land use in the Arctic amid global changes, explain the carbon cycle in Western Siberia, and develop restoration methods for damaged lands. Additionally, we aim to strengthen connections among scientists in Siberia and globally to address ecological challenges posed by climate change, produce valuable data to enhance the sustainability of Arctic ecosystems, and minimize the negative effects of climate change through international collaboration.

The specific objectives are to understand the impacts of climate change on Arctic ecosystems and communities, develop sustainable land management practices, assess the effects of human activities on Arctic landscapes and biodiversity, and identify adaptation strategies for environmental changes. Additionally, we aim to collaborate with local communities to integrate traditional knowledge with scientific research, support policy recommendations for sustainable development in the Arctic, engage in interdisciplinary research to explore interactions between natural and human systems, monitör environmental indicators to track changes over time and assess the effectiveness of interventions, build research capacity, and facilitate information exchange among Arctic stakeholders. Finally, we seek to contribute to global efforts to address climate change in sensitive regions.

Acknowledments: *The project is supported and founded by the Ministry of Science and Higher Education of the Russian Federation and the Government of the Tyumen Province of Russia.*

[IL 3]

Seas of Opportunity: Transforming Marine Invasive Algae into Sustainable Sources of Bioactive Compounds

Marisa MATOS[1], Catarina Pinto REIS[1, 2], Maria João RODRIGUES[3], Luísa CUSTÓDIO[3]

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The proliferation of invasive marine algae, such as Caulerpa taxifolia, Sargassum muticum, and Rugulopterix okamurae, presents not only ecological challenges but also opportunities for sustainable bioprospecting. This presentation explores how these species, often viewed as environmental threats, can be transformed into valuable sources of bioactive compounds for industries like pharmaceuticals, cosmetics, and agriculture. Utilizing various extraction techniques, bioactive metabolites such as polysaccharides, fatty acids, and phenolic compounds have been identified with potent antioxidant, antimicrobial, and anti-inflammatory properties. These compounds have the potential to be integrated into commercial products ranging from cosmetic formulations to biostimulants and biofertilizers, promoting a circular economy while mitigating the environmental impact of invasive species. This presentation also examines the regulatory frameworks surrounding the exploitation of invasive algae biomass, with a focus on EU and global policies that enable the sustainable use of these species for commercial purposes. This work highlights the dual benefits of controlling invasive species while fostering innovation and economic growth through the valorization of algal biomass.

Keywords: *Alien species, Blue Biotechnology, Bioprospecting, Sustainable Valorization, Biorefinery*

[IL 4]

Bioactive Compounds from Native and Non-Native Mediterranean Jellyfish

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The biotechnological potential of gelatinous zooplankton, as cnidarians, has begun to attract the attention of researchers since the discovery of the GFP protein and their well-documented ability to produce venom. However, further studies have shown that the biochemical diversity of cnidarians produces several other classes of bioactive compounds also as a result of their complex symbiotic biology.

The increase in the number of scyphozoan jellyfish blooms, individuals and duration of jellyfish outbreaks in the Mediterranean Sea, as well as the increase in the presence of non-native species, have prompted studies on their biology and composition that have contributed to a better understanding of these organisms. Bioprospection, as an interdisciplinary area including pharmaceutical and marine biology disciplines, explores the biodiversity of jellyfish, their bioactive compounds, chemical classes and modes of action. Results about scyphozoan jellyfish occurring in the Mediterranean Sea, such as the native *Rhizostoma pulmo* and *Cotylorhiza tuberculata*, and the non-native species *Cassiopea andromeda* and *Aurelia coerulea* are presented. Compositional analysis of jellyfish biomass and their content of bioactive compounds, with antioxidant, immunomodulatory, and antiproliferative activities on human cell cultures demonstrate their potential usefulness as nutraceuticals or pharmaceuticals. Structural proteins, including collagen, produce antioxidant and anti-inflammatory peptides by hydrolysis, while zooxanthellate jellyfish such as *C. tuberculata* and *C. andromeda* holobionts, represent a source of potent antioxidant and cancer-preventive compounds originating mainly from endosymbiotic zooxanthellae.

Jellyfish-related bioprospecting sources are also vital for the stability of marine food webs. Furthermore, the complex relationships between marine life and climate should be thoroughly understood for sustainable bioprospecting and conservation of valuable marine resources. Bioprospecting strategies should therefore also be an opportunity to study marine biodiversity and expand the dialogue on sustainability in marine resource exploitation.

Keywords: *Scyphozoan medusae, zooxanthellae; antioxidant activity; anti-proliferative activity; GJIC.*

[IL 5]

Navigating the Seas of Innovation: Uniting Genomics, AI, and Pathogen Diagnostics for Sustainable Aquaculture

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The integration of genomic and artificial intelligence (AI) technologies is transforming aquaculture by enhancing production efficiency, sustainability, and disease resilience. Aquaculture, which meets over half of global seafood demand, faces challenges like disease outbreaks, slow growth due to limited genetic improvement, and environmental stresses. Genomic and AI technologies offer molecular and computational tools to address these issues, enabling precise breeding decisions, industrial-scale phenotyping and a better understanding of species-environment interactions.

Utilisation of genomic information and how it links to phenotypic performance is the gold standard for aquaculture breeding programs. Genomic prediction, which uses DNA markers across the genome to predict the genetic merit of individuals allows for increased accuracy in the selection of breeding stock with superior traits such as faster growth, disease resistance, and improved feed efficiency, even before these traits are expressed. Genomic prediction accelerates the breeding cycle, leading to faster genetic gains and improvements in commercial performance. When integrated with AI assisted phenotyping it allows industrial-scale collection of phenotypes that gives unprecedented precision in estimating genetic merit of individuals.

Epigenetics, which studies how environmental factors affect gene expression, is opening new avenues for understanding reproduction and sex determination, nutrition and productivity enhancement, although it presents challenges in application.

Microbiomes in aquaculture, particularly gut microbiomes, are crucial for digestion, immunity, and overall health. Genomic tools allow for detailed characterisation of these communities. Understanding the impacts of microbiomes and how to manipulate are currently providing new options to manage disease and enhance growth performance of aquaculture species.

In this presentation, how these various technologies are being utilised in aquaculture and being bought together will be highlighted, with a focus on how they will transform productivity, product quality and sustainability of this rapidly growing food production sector.

Keywords: *aquaculture, genomics, selective breeding, precision aquaculture, microbiomes*

[IL 6]

Pesticide Threats to Estuarine Seafood Health and Safety

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You can't find what you are not looking for. Diffuse source water pollution is a major threat to coastal ecosystems. But in many countries, including Australia, routine water quality and seafood safety monitoring programs do not screen for pesticides or other contaminants of emerging concern. However, chemical contaminants can result in a range of lethal and sublethal impacts that affect the health and productivity of seafood species. Furthermore, chemical residues in the flesh of seafood can generate risks for consumer health and safety. The diversity of potential contaminants entering our waterways at low concentrations creates further complications, requiring low level detection, multi-analyte mass spectrometry screening. Biological indicators, such as oysters and mud crabs, can act as passive samplers and thus increase the chance of detecting many pesticides. I will present several case studies demonstrating the detection of a range of harmful chemicals in estuaries and their impacts on seafood species at environmentally relevant concentrations. Our ecotoxicology studies on prawns and oysters confirm lethal or sublethal impacts using a wide range of biological endpoints, including gene expression, immune defense, fatty acid composition and allergenic proteins. Some pesticides that are uptaken and bioaccumulate in the flesh can be depurated in clean seawater, however, the synergistic interactions from multiple pesticides on seafood health and safety must be considered in future studies. We also need improved management to reduce the chance of agriculture pesticides entering the marine food chain. A preliminary study testing the use of a bioreactor for mitigating pesticide run-off from hothouses was found to be successful for some but not all the pesticides that were detected. Overall, there is a strong need to expand the monitoring, mitigation and regulation of multiple environmental contaminants, to improve water quality and ensure future seafood security.

[OP 1]

Scale-up Development of Two-stage Microalgae Cultivation in Wastewater under Mixotrophic Conditions with Biomass Recycling

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Microalgae cultivation at sewage treatment works (STWs) has the potential to contribute to net-zero carbon emission targets in the wastewater industry by achieving simultaneous nutrient control and recovery via biological algal uptake. During photosynthesis, microalgae use CO2 as a carbon source to support biomass growth and take up nitrogen and phosphorus from culture media; the typical content of Carbon (C), Nitrogen (N), and Phosphorus (P) in dry algal biomass is approximately 50%, 10%, and 1%, respectively. Microalgae cultivation in wastewaters could reduce energy consumption (fossil fuels) and greenhouse gas emissions (N2O) at STWs by replacing current nutrient control processes (nitrification-denitrification and advanced bacterial phosphorus removal - PAO) while producing nutrient-rich algal biomass that can be safely reused in agriculture. Microalga-based processes used in sewage treatment are mainly extensive outdoor systems (wastewater stabilization ponds), that heavily rely on natural environmental conditions to support algae growth (daylight hours), which limits their application in temperate climate countries. In order to overcome current challenges impeding the intensive cultivation of microalgae in wastewater, we need to uncouple the dependency of photosynthesis and respiration from daylight and independently optimize key process variables such as cell retention time, hydraulic retention time, and nutrient loading rates. Therefore, this study aims to assess the potential to develop intensive microalgae cultivation in wastewater and scale up processes from lab- to pilot-scale systems. We cultivated Chlamydomonas reinhardtii in a two-stage biological process combining phototrophic and heterotrophic conditions with algal biomass recycling under continuous flow. Process design and operation parameters were developed based on empirical data and used to propose a full-scale system as a case of study. The proposed system was designed to retrofit a conventional STW in the UK, with emphasis in achieving both nitrogen and phosphorus discharge consents, with the benefit of producing valuable nutrient-rich algal biomass.

Keywords: *Chlamydomonas reinhardtii, wastewater treatment, mixotrophic microalgae growth, scale up, nutrient recovery*

[OP 2]

The Role of Microalgae in Enhancing Anaerobic Digestion: A Bibliometric Review

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Anaerobic digestion (AD) is a well-established and extensively explored technology for waste management. However, the literature review related to the effect of microalgae in anaerobic co-digestion of different substrates on methane production is limited. Using scientometric tools can offer valuable insights into research gaps and emerging trends, facilitating the updating of scientific datasets and expanding knowledge in this field. Therefore, this bibliometric review will focus on the investigation of the advancements, trends, and recent updates in the co-digestion of microalgae with different substrates. The Web of Science database was used for document selection, and the bibliometric analysis was conducted using the VOSviewer software tool. The findings of this study reveal that, up until 2024, the major focus areas in the field are environmental studies related to biogas production emphasizing microbiological and engineering aspects. Key opportunities and trends identified include the integration of feedstock pretreatment before anaerobic digestion to enhance biogas yield and quality. The use of microalgae as a co-substrate in anaerobic reactors has emerged as a promising strategy to boost AD process efficiency. Microalgae contribute additional organic matter and nutrients for anaerobic digestion and provide environmental benefits such as carbon sequestration and wastewater treatment, aligning with Sustainable Development Goals (SDGs). Gaining a deeper understanding of the role of microalgae in the systems is essential to establishing AD as a profitable and sustainable waste management solution, offering substantial economic and environmental advantages.

Keywords: *anaerobic, biogas, co-digestion, microalgae, SDGs*

[OP 3]

Evaluating the Viability of Biogas Production from Aquatic Biomass in the Context of the Green Transition

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The concept of circular bioeconomy has recently gained prominence as a crucial component of a sustainable society recently which aims to transform renewable biological resources and their wastes into bio-based products and value-added products such as bioenergy. In line with these objectives, alternative carbon sources and the use of different biomass are being evaluated in the production of energy and value-added products to reduce dependence on fossil resources. Within the scope of biorefinery, the use of third-generation biomass holds significant importance, as it does not compete with food in energy production and can be grown without the need for arable land. In this direction, macrophytes emerge as key raw materials to be integrated into biorefineries. This study aims to assess the efficiency of utilizing aquatic biomass, which is abundant in freshwater ecosystems and investigates various strategies to enhance system performance. The biomethane potentials of different macrophyte were examined using the Automatic Methane Potential Test System (AMPTS) II (Bioprocess Control, Sweden, Lund) and the reactors were operated for 30 days at 37°C with an inoculum/substrate ratio of 2 based on volatile solids (VS). Each reactor configuration was run in triplicates. The biomethane yields of four different macrophytes were calculated on the basis of VS content of each substrate. The digesters operated with Phragmites exhibited the highest methane yield, calculated as 238 mLN CH4gVS-1 followed by Scirpus (226 mLN CH4gVS-1). Subsequently, lower biomethane yields were observed for the submerged macrophytes Ceratophyllum (165 mLN CH4gVS-1 and Potamogeton (193 mLN CH4gVS-1) and the methane production was almost completed within the first 10 days of the operation period. Through the utilization of non-competitive feedstock capable of cultivation in aquatic environments, this study could play a role in advancing the creation of eco-friendly and effective biorefinery systems.

Keywords: *Aquatic biomass, Biogas, Biomethange, Green Transition, Macrophytes*

[OP 4]

The Seaweed Production in Circular Bioeconomy: Status and Future Perspectives

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Seaweed has the potential to improve the sustainability and security of food and feed systems, while also reducing climate change and environmental pollution. Seaweed is also used in non-food applications such as pharmaceuticals and nutraceuticals, biofertilizers, biostimulants, biofuels, and bioremediation. The purpose of this study is to investigate the current status and future prospects of seaweed production, which has the potential to contribute to the circular bioeconomy. The research was conducted by reviewing literature related to seaweed growth and carbon sequestration model results. The unique aspect of the study is the mapping and review of the distribution of comprehensive projection models using the circular bioeconomy approach on seaweed. Seaweed is being intensively cultivated and used for food. About 2% of diets include seaweed. Seaweed production will go up from 34 Mt/yr to 252 Mt/yr and 10 to 15% of it will be used for non-food purposes in 2050. Models predict that seaweeds will account for 10% of global diets in energy content by 2050. Seaweed plays a role in photosynthesis and carbon sequestration, which results in climate benefits. Seaweed production could absorb 135 Mt tons of CO2 annually relieve pressure on the land and 30% of all nitrogen entering the oceans from land-based pollution by 2050. The rise in seaweed production has the potential to support decarbonization, biodiversity preservation, circular bioeconomy objectives and biophysical limitations for global seaweed aquaculture will not be met by 2050 according to models. The seaweed has the potential to expand rapidly, but more careful analysis and forward-thinking policies will be needed to design effective and efficient use and protection of the environment. The growth of the seaweed sector could be hindered by significant barriers, such as social, regulatory, market, knowledge gaps, research and innovation (R&I) gaps.

Keywords*: circular bioeconomy, carbon sequestration, marine aquaculture, macroalgae, seaweed*

[OP 5]

Potential Food Packaging Films with Macroalgae-Based Biopolymers

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Every year, millions of tons of plastic mix into the seas and oceans, harming the ecosystem and causing the death of thousands of living organisms. The uncontrollable growth of the problem has led researchers to seek alternative products that are compatible with nature. For this reason, research on the use of biodegradable polymers produced from natural sources instead of petroleum-based products is increasing day by day. Alginate is a biopolymer with countless application areas due to its ability to form hydrogels, the presence of hydroxyl and carboxylate groups in its structure, biocompatibility, biodegradability and water solubility. In addition, the fact that alginates can be easily modified makes this relatively cheap biopolymer very important for both the environment and the ecosystem. Sodium alginate is a highly preferred polymer, especially in food applications, and is used both as a thin film in food packaging and for coating fresh foods to extend their shelf life.

In this study, alginate, which is a sustainable source and needed by many sectors, especially paper, textile, food and cosmetics, from macroalgae, was isolated according to the Haug and Larsen method and characterized comparatively with the commercial product. Physical (water swelling, solubility, light transmittance, rheological and mechanical properties) and chemical structure characterizations (Fourier Transform Infrared Spectroscopy and UV-Visible Spectroscopy) of thin films prepared with extracted sodium alginate and easily accessible and biodegradable polymers obtained from natural sources (carboxymethyl cellulose, hydroxy propyl guar, gelatin, etc.) were performed and their potential for use as food packaging was discussed.

Keywords: *macroalgae, alginate, thin film, package, biopolymer*

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[OP 6]

Genomic Insights into Newly Isolated Mycobacterium Strains Highlight the Potential of Reverse Vaccinology in Aquaculture

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Non-tuberculous mycobacteria (NTM) are bacteria widely distributed in aquatic environments, including freshwater, seawater, and soil. Mycobacteriosis caused by NTM is a chronic, progressive disease that affects various fish species and can lead to significant economic losses in aquaculture operations. Early diagnosis is critical; however, clinical diagnoses and laboratory detection are still challenging, and the available literature is scarce. Currently, there are no widely accepted treatments, making prevention and control measures, such as good biosecurity practices, crucial for managing NTM infections.

The development of vaccines for NTM has been challenging due to the diversity of NTM species, the lack of understanding of their pathogenic mechanisms, their extremely slow growth, and the complexity of their cell wall. In this study, we report the isolation and characterization of two NTM strains from meagre and European sea bass from aquaculture farms in Western Greece. Reverse vaccinology was deployed to explore the antigenic diversity of the newly isolated strains. In this way, the selection of candidate genes was based on a series of different *in silico* predictions using publicly available or newly sequenced genomic and proteomic data. These genes were cloned into the pcDNA3.1 vector and their immunogenicity was tested in zebrafish upon vaccination. Genes associated with MHC antigen processing were analyzed by qPCR and the results revealed activated MHC-I and MHC-II pathways even during the early stage of vaccine immunization. The strongest gene target candidates will be prioritized in future efforts to prevent Mycobacteriosis outbreaks.

Keywords: *Nontuberculous mycobacteria (NTM), fish disease, sea bass, meagre*

[OP 7]

Comprehensive Mitotranscriptomics of Life Cycle Reversal Stages of Immortal Jellyfish Turritopsis dohrnii (Cnidaria: Hydrozoa)

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Turritopsis dohrnii was popularized as "the immortal jellyfish" due to its unique character of life cycle reversal from the adult medusa stage to the juvenile polyp stage. This immortality is suggested to shed light on processes such as aging, cell cycle and repeated rejuvenation; therefore, *T. dohrnii* is being studied with great interest. RNA sequencing studies representing different life cycle reversal stages have revealed variations in the expression profiles of genes involved in pathways including replication and DNA repair in *T. dohrnii.* On the other hand, the expansion of genes associated with apoptosis and OXPHOS (oxidative phosphorylation), the most studied mitochondrial processes, has been determined. Therefore, in the present study, it is aimed to examine the mitochondrial gene expression profiles comprehensively. For this purpose, sequential and pairwise DGE analysis for mitochondrial PCG, tRNA and rRNA genes were performed in silico on 44 RNA-seq datasets representing different developmental stages, and compared with *T. ruba* mitochondrial gene expression profiles. To do this, RNA-seq data were assembled to reference *T. dohrnii* mitogenome, and RPKM values of each mitochondrial gene were calculated in Geneious R9 program. Correlation and Principal Component analyses were conducted and tested statistically for each developmental stage and mitochondrial gene using RStudio IDE.

As a result, similar to the total transcriptome analysis, significant differences were found between colonial polyp and reversed polyp gene expressions in the mitotranscriptome ($p \leq 0.0001$). Although the comparison of all stages with each other did not produce statistically significant results, it was observed that pre-cyst and post-cyst stages clustered differently from each other in PCA analyses. 14 of the 17 mitochondrial RNAs were also found to have significantly altered expression before and after cyst. *atp8*, *cox1* and trnW were the genes with no significant changes in expression difference. It is assumed to tolerate changes in expression levels of *atp8* due to its rapidly evolving pattern and *cox1* due to the presence of nuclear NUMT sequences as well as numerous sense and antisense transcripts. In pre-cyst levels, it is found that *nd2* and *nd5* genes were upregulated and *cox2*, *nd1*, *nd3*, *nd4L* and *nd6* genes were downregulated.

Keywords*: Mitotranscriptomics; differential gene expression; immortal jellyfish; life cycle reversal; cyst*

[OP 8]

eDNA Metabarcoding Use on Biomonitoring Along the Marine Coasts of Istanbul

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The importance of sustainable bioassessment and management of coasts to maintain good trophic status is increasing due to the high anthropogenic impact on marine ecosystems. While the identification of organisms is essential for biomonitoring, metabarcoding of environmental samples has been applied to various organisms along the coasts and open waters and important results have been obtained that reflect the biodiversity in marine ecosystems. This study aimed to investigate marine organisms using eDNA metabarcoding along the highly urbanized coasts of Istanbul as a case study and to test whether NGS can be used for marine biomonitoring. Phytoplankton and phytobenthos were sampled along the Sea of Marmara coasts of metropolitan Istanbul between 2021-2023. Two different markers including 18S V4 region and rbcL genes were used to detect phytoplankton, phytobenthos (Bacillariophyta) and eukaryotes. Organisms were collected from benthic habitats including artificial surfaces and coastal waters and the relationship between environmental variables was investigated. The results showed that for each target group of organisms, diverse assemblages were observed with temporal changes in composition rather than spatial differences. According to 18S rRNA metabarcoding, dinoflagellates and diatoms were abundant in phytoplankton and high numbers of HAB taxa were detected with confirmation of *Noctiluca* blooms, and Archaeplastida (Ulvophyceae) was dominant in eukaryotes. Bacillariophyta were examined with both 18S and rbcL, and significantly higher diversity was detected with rbcL. Among the environmental variables, pH, salinity, water temperature and TIN were the main environmental factors influencing the changes in the assemblages. Our results revealed more diverse organisms than expected compared to traditional methods, and spatiotemporal relationships with environmental variables were observed. The results showed the possibility of coastal biomonitoring based on metabarcoding in the long term, however, gaps and biases in our results indicated the need to expand the target genes to cover more organisms in the future.

Keywords: *Biomonitoring, Eukaryotes, Environmental DNA Metabarcoding, Microalgae, NGS*

[OP 9]

Sedimentary Ancient DNA: Cutting-edge Techniques and Their Applications in Biotechnology

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Sedimentary ancient DNA (*seda*DNA) analysis uncovers biological and geological processes of the distant past by collecting and investigating ancient DNA found in myriad environmental settings, especially marine ecosystems that withhold great potential for historical information considering their current vast biodiversity.

Advances in high-throughput DNA sequencing technologies and the development of more precise laboratory techniques to handle delicate ancient DNA spawned large amounts of higher-quality data over the last decade. Furthermore, the highly curated marine reference databases developed over time have paved the way for *seda*DNA studies and the accumulated large amounts of sequencing data required more automated analyzing techniques by computational tools. PCR-based amplification or more advanced techniques such as hybridization capture techniques and DNA metabarcoding that allow characterization and quantification of the biodiversity of environmental samples from a short sequence, can be shown among this various *seda*DNA analysis techniques, as well as the bioinformatics tools such as Kraken and Centrifuge for the rapid classification of short-read shotgun metagenomic data. In addition, new state-of-art methods are being developed, existing protocols are being improved with adjustments, or different protocols are being mixed-matched to find a more optimized version specifically for ancient DNA research.

*seda*DNA research allows us to reconstruct past ecosystems to have a glimpse at their then biodiversity and designate changes that occurred in their composition over time, such as species extinction. Extinct or undiscovered species are sources of novel genes and compounds that can be harnessed for biotechnological applications, such as new pharmaceutical or biofuel development. Moreover, sedaDNA can be utilized to predict ecosystem dynamics under varying conditions, such as climate change, and help mitigate potential adverse effects of global warming. This review highlights the techniques to conduct sedaDNA research in aquatic ecosystems and touches on the possible application of the data obtained from such studies in biotechnology.

Keywords: *Sedimentary ancient DNA, Biotechnology, Ecology*

[OP 10]

Different Molecular Approaches in Detection of Taste and Odour Problem in Water

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Taste and odour are among the most important aesthetic characteristics of water. They directly affect the perception of water quality and influence the decision of water users to drink or not to drink the water. However, tracing an unpleasant odour in water is a complex process. Geosmin and MIB, which cause earthy and mouldy odour, are the most common taste and odour compounds in water and mainly produced by cyano- and/or actinobacteria. Together with analytical methods, molecular tools have been successfully used to the efficient detection of geosmin and MIB in water. The presence of odour-producing bacteria can be detected by PCR and the responsible organism could be identified by sequencing. Moreover, qPCR could be used routinely in monitoring studies and as an early detection of problem. The main issue is to have an universal primers to detect these genes in a wide array of cyanobacteria. Therefore, a new primer sets were designed by the data mining of all available cyanobacteria genomes in databases and used successfully in environmental samples. However, in aquatic ecosystems, there are both abiotic and biotic factors that can affect odour production. Next-generation sequencing method plays an important role in providing rapid and reliable results for the identification of bacterial communities in an environmental sample. A monitoring study in Sapanca Lake indicated that actinobacteria and cyanobacteria were responsible for the MIB and Geosmin production and also degraders could be found simultaneously in the environment. As a result, while analytical methods play an important role to measure the concentration of these metabolites, molecular methods are vital in determining the source of the odour and to understand the mechanism behind the production of these metabolites.

Keywords: *Taste and Odour, Geosmin, MIB, PCR, Next generation sequencing*

[OP 11]

Microalgae Phycobiliproteins as Sustainable Textile Dyes: Optimization of Dyeing Parameters and Evaluation of Dyeing Performance

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Concerns about the damage to the environment and human health by high volumes of synthetic dyes used in the textile industry is increasing day by day. On the other hand, the resulting awareness also increase the interest in eco-friendly, low-toxic and less allergenic dyes obtained from natural sources such as plants, fungi, bacteria and microalgae. Microalgae pigments that are known with their vibrant colors and functional activities, offer sustainable alternatives to synthetic textile dyes in recent years. Microalgae have been used as a natural dye in many application areas, especially in food and cosmetics, for many years, but there are very few studies on its use as a textile dye. The purpose of this study is to investigate the fabric dyeing potential of microalgae phycobiliproteins. Temperature, pH and dyeing duration were optimized as the main parameters that effect the dyeing performance. To determine optimum dyeing conditions, the colorant loss of dyeing bath was calculated. The dyed cotton, wool and polyester fabrics were evaluated for color properties using CIELAB (L*, a* and b*) and K/S values. Mordanting with alum and dyed with phycoerythrin provided cotton, wool and polyester fabrics with a rich natural pink shade. Wool, cotton and polyester fabrics absorbed 43%, 44% and 46% of the pigment from the dye bath respectively. After optimization, pH:4.5; 40 ˚C dyeing temperature and dyeing for 120 minutes gave the best dyeing performance for all fabrics. This study has shown that phycoerythrin pigment has the potential to dye wool, cotton and polyester fabrics and can be a sustainable alternative to synthetic textile dyes.

Keywords: *Textile, dye, sustainable, natural, microalgae pigment, phycobiliprotein, phycoerythrin*

[OP 12]

Exploring the Marine Bioplastics for Food Packaging: Challenges and Emerging Trends

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Environmental impacts of traditional plastics, particularly microplastic pollution, are a significant global concern. Due to these impacts, there is a growing shift towards the use of bioplastics in food packaging and products. Hence, the production of bioplastics from sustainable sources, such as marine sources, is gaining importance. These bioplastics offer significant advantages, including biodegradability, which helps mitigate pollution and reduce carbon dioxide emissions. Nevertheless, marine bioplastics made from biodegradable polymers should not be viewed as replacements for proper waste management practices, as their biodegradability is highly dependent on specific environmental conditions.

Recent developments attempt to make marine bioplastics more practical for industrial use by enabling them to match the mechanical and functional properties of traditional plastics, thus integrating into existing recycling systems and further increasing their sustainability. Compatibility with existing packaging technologies also remains an issue, necessitating further innovations to enhance the properties and integration of bioplastics in the food packaging industry. Their performance in barrier properties and mechanical strength often lags behind traditional plastics.

This review critically examines these advantages and limitations, emphasizing the need for ongoing research and development to fully realize the potential of marine bioplastics in sustainable food packaging solutions. Despite these limitations, marine bioplastics remain a sustainable alternative, offering substantial environmental advantages that align with the growing demand for eco-friendly food packaging solutions. To fully realize their potential, further research and development are necessary to address cost and performance issues, ensuring that marine bioplastics can effectively replace traditional plastics in the industry. By advancing these technologies, the shift towards marine bioplastics could significantly reduce the environmental footprint of plastic waste and further contribute to the circular economy.

Keywords: *Marine Bioplastics, Sustainable Packaging, Biodegradable Polymers, Microplastic Pollution, Circular Economy for Sustainable Ecosytems*

[OP 13]

Physical, Microbiological, and Chemical Properties of Sea Bass Patties Containing Oleogel as a Substitute

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Oleogels have recently become increasingly common due to their ability to replace other oils and fats while maintaining the desirable texture of food products. However, no study was found on using oleogel instead of sunflower oil in the fish patties mixture, so this study is the first in this field. This study aims to determine the effect of oleogels on the textural, microbiological, and chemical properties of raw sea bass patties during storage at 8 °C for 6 days. Cooking yield and textural parameters such as hardness, adhesiveness, and springness were also compared after grilling. Three groups of patties were prepared, the first group was prepared using 10% w/w sunflower oil as a control. For the second group, oleogels prepared with 2.5% w/w candelilla wax were added to ground sea bass meat. The third group contained the same oleogel formulation and also 0.01% lemon oil. Hardness showed an increasing trend for the control group throughout the shelf life which has the highest values, and oleogel addition decreased hardness. On the other hand, adhesiveness values in samples containing oleogel were higher compared to the control group. Oleogel group had the highest total mesophilic aerobic bacteria counts, followed by lemon+oleogel, and the control group after 2nd day during storage. Both total mesophilic aerobic and psychrophilic bacteria counts exceeded 8.6 log CFU/g for all samples in the last measurement. pH values decreased for all treatments during storage and showed significant differences compared to control ($p<0.05$). Although peroxide value (PV) and total volatile basic nitrogen (TVBN) results were under the limits of the regulations, they were increased for all groups. Except day 4, lemon-added oleogel group had lower TVBN values on all storage periods, compared to the sample without lemon. During storage, PV and free fatty acid (FFA) values were higher for oleogel-added groups.

Keywords: *oleogel, oil substitute, sea bass patties, texture, oxidation*

[OP 14]

Cell Cultures from The Oyster, Magallana Bilineata As A Platform for Toxicity Evaluation and Transgene Expression

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Bivalves, being sedentary filter feeders, accumulate contaminants in their bodies. This makes them suitable bioindicators, and ecotoxicologists use them for investigations into marine pollution. Due to this and many other application prospects, efforts to develop a bivalve cell line have been ongoing for many years without success. Primary cell cultures, although strenuous to prepare, offer the advantage of being closer to the in vivo state of the animals when compared to cell lines. Therefore, primary cell cultures also serve as useful tools for such investigations. However, the filter-feeding behaviour of bivalves makes establishing aseptic primary cell cultures even more difficult. In this study, aseptic primary cell cultures developed from the marine oyster, *Magallana bilineata*, through a series of disinfection techniques (including sodium hypochlorite and antibiotic treatments), were tested further for their usefulness in different applications. The toxicity of triclosan (an emerging marine pollutant) at various concentrations was assessed by a 24-hour exposure to gill and heart cell cultures, with cell viability determined by an XTT assay. The expression of a transgene (green fluorescent protein, GFP) using a synthetic promoter sequence from ostreid herpesvirus 1 in heart cell culture was examined by fluorescent microscopy. Our results demonstrated that triclosan exhibited toxicity in *M. bilineata* cell culture with an IC_{50} dose of 2.76 mg L^{-1} in gill cell culture and 3.38 mg L^{-1} in heart cell culture. Also, GFP expression was achieved in heart cell culture using the viral promoter construct. With our developed primary cell culture, further investigations are possible for a detailed understanding of the cellular-level impacts of triclosan on the organism. Furthermore, advanced studies using different transgenes are possible by employing the developed cell cultures from *M. bilineata*, making it a useful tool for diverse applications.

Keywords: *cell culture, bivalve, Magallana bilineata, toxicity, transgene*

[OP 15]

Acute Streptococcosis in Oreochromis Niloticus: Development of Inactivated Whole-Cell Vaccine from Streptococcus Agalactiae

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Tilapia is a widely cultured fish species, and its unscientific intensive culture practices have caused pathogens to spread, resulting in frequent mass mortality. One such bacterial pathogen, *Streptococcus* sp. (in particular, *S. agalactiae*), is of concern, accounting for its zoonotic characteristics and the evidence of vertical transmission. This signifies the need for research to prevent and treat the disease. In this study, fish specimens (*Oreochromis niloticus*) exhibiting clinical signs were collected from a recirculating aquaculture system (RAS) in Kerala, India. The bacteria isolated from kidneys were grown in tryptic soy agar and confirmed as *S. agalactiae* after morphological, biochemical, and molecular characterization (16S rRNA gene sequencing). On histopathological analysis, the kidney tissues showed severe degeneration and necrosis of tubules with diffuse infiltration of mononuclear inflammatory cells and congestion. A whole-cell inactivated vaccine for *S. agalactiae* was prepared using 0.5% formalin. Experimental fish vaccination was conducted intraperitoneally twice in two weeks with 1 x 10^7 cells/20 g animal in 100 µL of PBS. The presence of the antibody against the pathogen was identified by latex bead agglutination test and further quantified using a latex bead agglutination assay (measurement wavelength at 430nm) wherein significantly higher antibody titer was obtained in the test compared to control ($p < 0.05$). This is the first report of *Streptococcus agalactiae* from a recirculating aquaculture system in Kerala, India. Detection of pathogens in a closed-loop aquaculture system indicates the loopholes in quality control regulations in the hatcheries and the culture facility. This calls for stringent quarantine policies and quality assessment of seed being distributed to farmers at the government and corporate levels. This study shows the potential of the whole-cell inactivated vaccine as a preventive healthcare strategy against streptococcosis and offers scope for further research to validate the technology.

Keywords: *fish disease, Streptococcus agalactiae, vaccine, Oreochromis niloticus*

[OP 16]

Low Cost Scenedesmus Aequicaudatus Hortobágyi Cultivation

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Algae are the most productive photosynthetic organisms on Earth, and they are very efficient at converting CO_2 and nutrients into biomass. The use of wastewater is an effective alternative to conserve natural resources used for the cultivation of algal biomass. In this study, wastewater from the Karaman Wastewater Facility in Sakarya was used to obtain different experimental groups with supplement of Bg11 medium observing the growth, nutrient removal effect, and biochemical content of *Scenedesmus aequicaudatus* isolated from Lake Sapanca. Experimental groups were performed as 100% Bg11 medium (control group), diluted with Bg11 medium (Bg11%:Ww%) (80:20, 60:40, 40:60, 20:80) and 100% wastewater (Ww). Growth (OD680, chlorophyll-*a*, pH) parameters were monitored for 10 days. The percentage removal effects of NO_2-N, NO_3-N and PO_4-P in the growth media were determined. Total protein, total carbohydrate and total carotenoid values were detected from the dry biomass obtained at the 10th day. The highest growth of *S. aequicaudatus* was observed in the 80:20 environment. Although they were lower than the control group, among the wastewater environments, higher total carotenoid and total carbohydrate contents were obtained in the 60:40 environment. The % total protein of *S. aequicaudatus* grown in the 60:40 environment was higher than the dry biomass in Bg11 medium. Among the wastewater environments, maximum orthophosphate (PO_4-P) removal was determined in the 60:40 environment. In conclusion, this study shows that wastewater-assisted cultivation can be used as a potential candidate to reduce the cost of algae production.

Keywords: *Biochemical content, Growth parameters, Nutrient removal, Wastewater*

[OP 17]

Probiotics Derived from Fish Gut Microbiota: Alternative Sources Supporting Fish Health and Sustainable Aquaculture

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In recent decades, the application of probiotics as a nutritional supplement in aquafarming aquaculture has been one of the modern advancements that could combat fish pathogens and control emerging fish diseases. The incorporation of probiotics in aquaculture aquafeeds can also modulate the gut microbiota, improve the immune system, and promote the growth parameters of aquatic organisms. Furthermore, they probiotics can help contribute to maintain the water quality parameters. The main objective of this study is to evaluate the probiotic potential of bacteria isolated from fish gut microbiota. The cultivable isolates from the randomly chosen *Dicentrarchus labrax*, *Salmo trutta trutta*, and *Sparus aurata* (n=6), from various local farms and sea in different regions of Turkey, Türkiye were investigated. The entire intestines were enriched, serially diluted, and then spread on MRS agar for the enumeration of commensal isolates. Following the incubation, 87 morphologically different colonies were randomly selected. Among them, four isolates exhibited significant antimicrobial activity against at least four out of five tested pathogenic strains, including *Streptococcus agalactiae*, *Pseudomonas aeruginosa*, *Aeromonas salmonicida*, *Vibrio anguillarum*, and *Yersinia ruckeri*. These potent isolates were genotyped by RAPD profiling, and then identified by 16S rRNA gene sequencingas *Carnobacterium divergens* EIR/FG1, *Carnobacterium divergens* EIR/FG2, *Carnobacterium maltaromaticum* EIR/FG3, and *Enterococcus gallinarum* EIR/FG4. According to the safety criteria of the European Food Safety Authority, all strains displayed non-hemolysis and no antibiotic resistance except streptomycin and clindamycin. Their tolerance to gastrointestinal conditions was evaluated using stimulated gastric fluid (3mg/mL pepsin, pH:3), and intestinal fluid (0.1% pancreatin, 0.03% bile salt, pH:8). Our results showed that all strains maintained their viability in simulated conditions. These findings indicate that isolates from the gut microbiota of fish have promising probiotic properties and may be suitable candidates for improving fish health. Our studies are still in progress to analyze their interaction with fish intestine and liver cells.

Keywords: *Probiotic, fish, gut microbiota,safety, aquaculture*

[OP 18]

Effect of Different Nutrient Mediums on Kamptonema Formosum (Bory Ex Gomont) Strunecký, Komárek & J.Smarda

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Although many microorganisms have been used for the bio-industrial production of important metabolites, the production potential of Cyanobacterial species is just being investigated. In this study, the effects of different culture mediums (Spirulina, BG11 and F/2) on Kamptonema formosum strain were evaluated in terms of morphological characters and colonial structure, growth parameters (OD, chlorophyll-a, pH), dry biomass, biochemical content (total proteins, total carbohydrates, total lipids, and total phenolic contents) and biological activities (antioxidant and antibacterial activity). Based on the light and electron microscope observations, variations were detected in the morphological characters and colonial structures of the Cyanobacteria grown in the three culture mediums. K. formosum grown in Spirulina medium developed more than those grown in BG11 and F/2 mediums according to OD560, chlorophyll-a, and pH. The dry biomass, total protein, and total lipid content of the strain produced in the Spirulina medium were found to be significantly higher ($p < 0.05$) compared to other mediums. Biomass grown in Spirulina medium was found to show high-potency antibacterial activity on Staphylococcus aureus (16.5 mm) and Enterecoccus faecalis (15 mm). Additionally, similar to the biochemical content, the highest DPPH scavenging activity and total phenolic content were seen in the culture grown in Spirulina medium. As a result, K. formosum developed in Spirulina medium proved to be more effective in obtaining biomass, revealing biochemical contents and pharmacological activities.

Keywords*: Kamptonema formosum, morphological characterization, medium, biological activity, biochemical content*

[OP 19]

Screening of Microalgal Isolates for the Production of Added-Value Products

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The European Union has set strong climate change targets, including the reduction of greenhouse gas emissions by at least 40% below 1990 levels by 2030, whereas the EU has set a target of at least 32% renewable energy consumption by 2030. In that direction, mitigation of carbon dioxide (CO2) emissions through microalgae growth appears as a promising route to address the environmental challenges of our era. These microorganisms can be used to produce high added-value products, such as carotenoids, polyunsaturated fatty acids, and proteins, for the production of pharmaceuticals and animal feed from the exploitation of their photosynthetic biomass, for wastewater treatment, and for the production of biofuels and bio-fertilizers through mainly the use of microalgal extracts and/or their processed biomass. Microalgae are photosynthetic eukaryotic microorganisms. They are mainly found in aquatic environments, such as rivers, streams, lakes, and marine ecosystems. They are distinguished for their photosynthetic capacity, converting light (solar and/or artificial), carbon dioxide, and nutrients into biomass. Thus, in the context of circular economy, microalgae are considered ideal for biotechnological applications. Photosynthetic bioreactors of total and working volume of 1,7 and 1,85 L each, respectively, were installed and operated under continuous illumination conditions to assess the biomass content of autochthonous microalgae isolated from various aquatic environments. Their carbohydrate, protein and chlorophyll content was estimated under bioreactor-growing conditions. The estimated content of these valuable biomolecules highlighted the importance of uncovering the biotechnological potential of unexplored microalgal diversity.

Keywords: *indigenous microalgae, microbial ecology, biomass valorization, aquatic ecosystems*

[OP 20]

A New Method for Determination of Total Antioxidant Capacity of Macroalgae and Cosmetic Products

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Growing demand for additive-free natural products and innovative production techniques has heightened interest in natural additives. Among these, antioxidants are crucial as they can prevent or delay oxidation even in trace amounts. Natural antioxidants, including tocopherols, ascorbic acid, carotenoids, flavonoids, amino acids, phospholipids, and sterols, are widely used in food and cosmetic products. Consequently, numerous methods exist to determine the antioxidant capacity of foods, plants, and similar products. Macroalgae, which are vital in the food chain, are used in various sectors such as cosmetics, food, agriculture, and medicine. They contain secondary metabolites like antioxidants, phenolics, flavonoids, and fatty acids.

This study developed a simple, fast, and inexpensive method using a fiber optic reflectance spectrophotometer (FORS) to determine the total antioxidant capacity of antioxidant-poor samples like marine macroalgae extracts and cosmetic products. The developed optical sensor can assess the total antioxidant capacity of macroalgae without pre-concentration. The chemical optical sensor, based on fiber optic reflection spectroscopy, utilizes the quantitative absorption of the magenta-colored anionic Fe(II)-FZ complex on Sephadex QAE A-25 resin. Increased sensitivity with resin allowed for the measurement of the total antioxidant capacity (TAC) of antioxidant-poor samples and complex systems.

Reflectance changes due to the formation of the highly colored Fe(II)-FZ chelate on the Sephadex QAE A-25 resin, resulting from the reaction with antioxidants, were measured at 562 nm using a reflectance spectrometer. The molar absorptivity, linear concentration range, and trolox equivalent antioxidant capacity (TEAC) of various antioxidants were determined. The TEAC values obtained with the proposed method were comparable to those of the spectrophotometric Ferrozine assay.

Keywords: *Macroalgae, Total antioxidant capacity, Fiber optic reflectance, Cosmetic, Phenolics*

Acknowledgements: *This study was supported by the Istanbul University Research Foundation (Project No 3FBA-2022-38518).*

[OP 21]

Conversion of Ulva Bloom, Which Occurs in the Gulf of Izmir, into High Value-Added Products

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Ulva sp. macroalgae, commonly known as "sea lettuce," grows uncontrollably in the Gulf of Izmir, negatively affecting the marine ecosystem and the surrounding community. For years, *Ulva* biomass has been collected to clean the bay, but it is disposed of without being utilized. There is significant potential to produce high-value products from this waste biomass. This interdisciplinary study aims to harness *Ulva* biomass for food applications, biogas production, and bioplastics, along with a zero-waste biorefinery approach to maximize product yield.

Chemical and taxonomic analyses will be conducted on *Ulva*, collected from the Gulf of Izmir at bloom periods. In the extraction work package, bioactive compounds will be obtained from prepared *Ulva* biomass using ultrasound-assisted extraction with ethanol, an environmentally friendly solvent. These extracts will be analyzed for antioxidant activity, heavy metals, and microbiological properties, with optimization to identify the best extraction conditions. For food applications, *Ulva* extracts will be incorporated into fondant to examine changes in its physical, chemical, and sensory properties. In the biogas production work package, both washed and unwashed samples will be tested in Biochemical Methane Potential (BMP) setups and continuous gas production in a Continuous Stirred Tank Reactor (CSTR). Gas content will be analyzed using gas chromatography to compare the biogas potential of different samples. In the bioplastic work package, bioplastics will be produced by combining *Ulva* biomass with olive mill wastewater, starch, and glycerine. The study will also explore the potential of these bioplastics in architectural design and as surface materials. The final work package focuses on the biorefinery concept and zero-waste approach, aiming to derive multiple products from the same biomass through successive processes.

This comprehensive approach not only addresses the environmental issues caused by the excessive growth of *Ulva* sp. but also turns a waste problem into an opportunity for sustainable product development.

Keywords: *Gulf of İzmir, Ulva bloom, biogas, bioplastic, food additive.*

Acknowledgements: *This study has been related to Cost action (CA20106) and supported by TUBITAK under the Grant Number 123Y090. The authors thank to TUBITAK for their supports.*

[OP 22]

Determination of the Antibacterial Activity of Microalgae Isolated from Giresun Streams

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This study was conducted to investigate the antibacterial activity of five different green algae species isolated from Aksu, Batlama, and Büyük Güre streams in the central district of Giresun, Türkiye. Five pure algae species (A1, A2, A3, B3 and BG2) were examined according to their microscopic morphology and molecular characterizations were performed. When the sequence data of 5 algal species were analyzed, identification could be made for 4 species. It has been determined that the isolated species are *Chlorococcum hypnosporum*, *Chlorella vulgaris*, *Chlorolilaea pamvotia*, *Desmodesmus opoliensis*, and *Stichococcus bacillaris.* The isolated algae species were cultured under appropriate conditions, and the antibacterial activity of extracts prepared at different doses of acetone, ethanol, and methanol against *Staphylococcus aureus* (ATCC 25923), *Bacillus subtilis* (ATCC 6051), *Escherichia coli* (ATCC 25922), *Enterococcus faecalis* (ATCC 29212), and *Salmonella typhimurium* (ATCC 14028) was determined using the well diffusion agar method. It was found that extracts obtained from different solvents using the five different algae species exhibited varying degrees of antimicrobial effects against the tested bacteria. Evaluation of the algae species based on zone diameters revealed that *Chlorella vulgaris* exhibited the most potent antibacterial activity against *B. subtilis* with 40 µl/petri acetone extract. Consequently, it is suggested that green microalgae could serve as alternatives to antibiotics for preventing zoonotic diseases and ensuring microbial safety in the animal products within the human food chain.

Keywords: *Microalgae, freshwater, molecular characterisation, antibacterial activity*

[OP 23]

Optimizing Pollutant Removal from Cheese Whey Wastewater Using Microalgae: A Comparative Study of Response Surface Methodology and Decision Tree

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The treatment of cheese whey wastewater (CWW) is associated with challenges in the treatment processes due to its complex nature including high organic load and nutrient content. Recent advancements in biotechnology have highlighted the potential of microalgae, particularly *Nannochloropsis sp.* species, in effectively removing pollutants from wastewater. This study evaluates and compares the effectiveness of two analytical approaches—Response Surface Methodology (RSM) and Decision Tree Analysis—in optimizing the removal of pollutants from cheese whey wastewater using *Nannochloropsis sp.* microalgae. RSM is a statistical technique used for developing, improving, and optimizing processes. It provides a comprehensive understanding of the interactions between multiple variables and their combined effects on pollutant removal efficiency. On the other hand, Decision Tree Analysis, a machine learning technique, offers a non-parametric approach to modeling complex relationships between input variables and pollutant removal outcomes. The findings suggest that integrating both methodologies can offer a robust framework for enhancing the efficiency of pollutant removal from CWW using *Nannochloropsis sp.* microalgae. The combined approach leverages the strengths of each method, facilitating a more comprehensive and practical application of microalgae-based bioremediation in wastewater treatment.

Keywords: *cheese whey, machine learning, microalgae, optimization, Response Surface Methodology (RSM)*

[OP 24]

Environmental, Economic and Social Sustainability of Microalgae Products: A Review

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Microalgae, which are a group of autotrophic microorganisms that live in freshwater, marine, and soil ecosystems, have a high growth rate and are environmentally sensitive, so their use in the manufacturing of biofuels, fish feed, and fertilizers is growing quickly. Research on the sustainability of microalgae systems has become more important in recent years due to the increased interest in these systems. One essential tool for evaluating sustainability is life cycle analysis. In the context of choices and policies in this area, life cycle analysis is becoming a more significant technique for evaluating the environmental sustainability of systems, from raw material extraction, production, and product use, until the end of its life. In this study, a literatüre review was conducted to compile scientific studies on the assessment of the environmental, economic, and social impacts of microalgae-derived products using the life cycle analysis method. The studies reviewed generally compare microalgae products with conventional products. The studies evaluate the environmental impacts of microalgae-based products at all stages of the life cycle to reduce the products' negative environmental impact. The majority of these studies found that the carbon footprint was the most significant environmental impact assessed. In general, environmental impact categories cover a wide range. It has been determined that few studies examine economic and social sustainability. The collection and analysis of studies on the environmental, economic, and social sustainability of microalgae products is critical for determining the future vision of microalgae-based products.

Keywords: *Environmental impact; life cycle assessment; microalgae; sustainability; social and economic sustainability*

[OP 25]

Exploring the Antibacterial Properties of Mangrove-Derived Fungi

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Mangrove ecosystems are widely recognized for their diverse range of species and ecological significance, drawing substantial interest in pharmaceutical research. Fungi, among the various organisms inhabiting mangroves, have emerged as promising reservoirs of bioactive compounds with diverse pharmacological properties. This investigation employs a method involving the identification of primary literature from Pubmed, Scopus, and Google Scholar, resulting in 216 articles initially, of which 155 are excluded, yielding 61 pertinent articles. Predominantly studied mangrove species include Bruguiera, Rhizophora, Kandelia, Acanthus, Xylocarpus, and Ceriops, while Penicillium and Aspergillus stand out as significant fungi isolated. The compounds derived from these fungi are classified into Polyketides, nitrogen-containing compounds, steroids, and terpenoids. Noteworthy antibacterial activity is observed in Bacillisporin A and Bacillosporin B, demonstrating MIC values of 0.13 μM against B. subtilis. Similarly, alkaloid compounds such as penicibrocazines B, penicibrocazines C, and penicibrocazines E exhibit potent activity with MIC values of 0.25 μg/mL against G. graminis, S. aureus, and G. graminis, respectively. These findings underscore the promising potential of fungi associated with mangroves as a valuable source of antibacterial agents for further exploration in pharmaceutical contexts.

Keyword: *bioactive compounds, antibacterial, mangrove-derived fungi*

[OP 26]

Isolation of Actinobacteria from Coastal Ecosystems of İzmir, Antimicrobial Potentials and Dereplication Studies of Crude Extracts

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Actinobacteria are the most prolific antimicrobial producers. Although many drugs were obtained from soil-derived actinobacteria, marine ecosystems have challenging ecological conditions, affecting secondary metabolite profiles. Hence, we aimed to isolate actinobacteria from coastal sediments and investigate their antimicrobial activities and chemical diversity. The sediment samples were collected from Çeşme and Karaburun Peninsula in İzmir. Diluted samples were incubated at 28°C for four weeks. Isolates were characterized by colony morphology and microscopy. After fermentation, EtOAc extracts were obtained. The antimicrobial effects of extracts were evaluated by disk diffusion test against Staphylococcus aureus ATCC25923, *Escherichia coli ATCC10798*, and *Candida albicans ATCC64548*. Based on the TLC profile and prevailed activity results, fifteen potent extracts were selected for LC-MS/MS-guided dereplication studies. Studies were conducted together with Dereplicator+ and Molecular Network tools in GNPS.

Consequently, 975 actinobacteria were isolated, predominantly the member of Streptomyces, Micromonospora and Saccharopolyspora genera. Considering screening data, compared to kanamycin, 39 extracts were highly active against S. aureus (zone diameter≥20 mm); 159 extracts demonstrated moderate activity (10 mm≤zone diameter<20 mm), while 120 extracts showed milder activity (zone diameter<10 mm). Moreover, one isolate was quite active versus E. coli (13 moderate, 29 mild). Furthermore, the antifungal potentials of extracts were prominent (6 strong, 47 moderate, and 26 mild) compared to nystatin. Besides, metabolomics profiling of crude extracts led to the identification of a large number of secondary metabolites, including chromopeptide, macrolide, oxylipin, pyrone, ansamycin, tetracycline and terpene skeletons based on MS and MS2 data. This study, as one of the pioneer ones in Türkiye, provided significant results for the field. Further studies are in progress to isolate the active principles of the chemically diverse and highly active actinobacteria extracts.

Keywords: *Actinobacteria, Coastal ecosystems, Antimicrobial, LC-MS/MS, Dereplication*
Acknowledgment: *This study was funded by TÜBİTAK (Project No: 122R077).*

[OP 27]

Evaluation of in vitro Dipeptidyl Peptidase IV (DPP-IV) Inhibitory Effects of Limpet Protein Hydrolysates

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Protein hydrolysates are mixtures of peptides with diverse properties, produced by the enzymatic breakdown of proteins, and exhibit various potentials regarding their biological activities. This study investigated the potential of protein hydrolysates derived from limpet (*Patella vulgata*), a marine gastropod, in inhibiting dipeptidyl peptidase IV (DPP-IV), an enzyme crucial for the degradation of incretin hormones, which play a significant role in glucose metabolism and Type 2 diabetes management. Protein hydrolysates were produced from limpet protein concentrate using enzymatic hydrolysis with food-grade enzymes, namely Flavourzyme and Alcalase, at various intervals (0, 30, 60, 120, 180, and 240 minutes). The DPP-IV inhibition activity was assessed, using Diprotin A as a positive control. Results revealed that Flavourzyme hydrolysates exhibited the highest inhibition activity at 240 minutes, with an average inhibition rate of 19.95 ± 7.55%. Similarly, Alcalase hydrolysates displayed maximum inhibition at 240 minutes, achieving an average rate of 54.19 ± 12.74%. The control samples, which did not undergo enzymatic hydrolysis, demonstrated significantly lower inhibition activity, emphasizing the importance of enzymatic hydrolysis in enhancing the bioactivity of the protein hydrolysates. The study underscores the influence of hydrolysis duration and enzyme selection on the bioactivity of the hydrolysates. Flavourzyme and Alcalase both effectively produced bioactive peptides, but Alcalase-treated hydrolysates showed superior DPP-IV inhibitory properties. These findings suggest that limpet-derived protein hydrolysates, particularly those treated with Alcalase, hold promise as a source of bioactive peptides with potential therapeutic applications in managing Type 2 diabetes. By highlighting the effectiveness of enzymatic hydrolysis, this research paves the way for further exploration of marine-derived protein hydrolysates in developing functional foods and nutraceuticals to improve health outcomes related to glucose metabolism and diabetes management.

Keywords: *Enzymatic hydrolysis, Protein hydrolysate, Limpet, Patella vulgata, DPP-IV inhibition*

[OP 28]

Impact of Selected Heavy Metals on Enriched Nitrifying Culture

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Heavy metal pollution has been an emerging issue in recent years originating from anthropogenic activities including industrial/domestic wastewater discharges, landfill leachates and agricultural applications which threaten marine ecosystems and human health through food chain. Nitrifiers play a crucial role in nitrogen cycle in ecosystems, aquatic life and wastewater treatment systems having susceptibility to environmental conditions and contaminants. Determination and understanding of inhibitory effects of heavy metals on those key microorganisms is essential to prevent and mitigate heavy metal pollution in both wastewater treatment systems and ecosystems. This study investigated nitrifying fraction of activated sludge under acute exposure to the selected concentrations of heavy metals. A mixed nitrifying enriched culture was sustained and used to generate oxygen uptake rates (OUR), ammonia utilization and nitrite oxidation profiles. Ammonia was supplied as the sole substrate together with different concentrations of Nickel (Ni) and Chromium (Cr(III)). The results indicated slight ammonia oxidation rate decrease on nitritation but no observable impact on nitratation steps of nitrification for 1 and 2 mg/L Nickel addition. 10 mg/L Ni addition yielded 8 mg/L NO2-N accumulation and oxidation of only 60% of initial ammonia to NO3-N. OUR profiles supported observed changes in corresponding experimental sets and ammonia oxidation rate dropped from 0,05 to 0,03 mg NH4-N/VSS.day at 7h. 5, 10, 20 mg/L Cr(III) dosages resulted in ammonia oxidation rates of 0,05-0,06 mg NH4-N/VSS.day range. However, characteristic shape of OUR profiles changed especially at high dosage of Cr(III). The observations underline that modelling of OUR profiles together with nitrogen utilization data is required for proper evaluation and determination of adverse effects of heavy metals on nitrification kinetics.

Keywords: *nitrification, activated sludge, nickel, chromium, enriched nitrifying culture*

[OP 29]

Effect of Wastewater Supported Environment on Biochemical Content, Nutrient Removal Capacity, and Antioxidant Activity of Chloroidium Ellipsoideum (Gerneck) Darienko & Al.

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From an ecological and economical perspective, the cultivation of microalgae in wastewater has attracted the attention of researchers in recent years. This practice facilitates water reclamation by enabling biological treatment of sewage as well as low-cost valuable algal biomass produced in wastewater. In this study, the biochemical content, nutrient removal capacity, and antioxidant activity of *Chloroidium ellipsoideum* isolated from Lake Sapanca was investigated, using the wastewater as a culture medium taken from the Karaman Wastewater Treatment Facility, located within the borders of Sakarya province. While Bg11 medium was used as a control in the study, the growth of *C. ellipsoideum* was followed for 7 days in wastewater as diluted (50%:50%) (Bg11:Ww) and undiluted (Ww) environments with Bg11 medium. Algae grown in the Bg11:Ww had the highest dry biomass amount, and total protein and total carbohydrate percentages. While the most effective removal of nitrate-nitrogen (NO_3-N) was observed in the Ww environment, the most effective removal of orthophosphate (PO_4-P) was observed in Bg11:Ww. Although biochemical content was higher in Bg11:Ww, DPPH scavenging activity and total phenolic content of *C. ellipsoideum* grown in Bg11 were higher. As a result, this study has demonstrated its usability in algae production by supporting the wastewater environment with standard nutrient medium in attempts to improve the high costs of algae cultivation.

Keywords: *Biomass, DPPH scavenging activity, Nutrient removal, Wastewater*

[OP 30]

High Resolution Acoustic Imaging for Detection and Mapping of Posidonia Oceanica Meadow and Matte, and Analysis of Physical Parameters Affecting Meadow Distribution

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Considering the growing evidence that the adverse effects of climate change are increasingly evident in marine ecosystems, the Mediterranean endemic seagrass *P. oceanica*, which has a crucial role as nature-based climate solutions is gaining recognition, primarily attributed to their efficient carbon sequestration capabilities. In addition, *P. oceanica* beds are distinguished by high shoot densities and a root-rhizome layer comprising resilient, lignified roots and rhizomes intermingled with sediment (called "matte") that can reach several meters in thickness has also become the subject of new research. In the context of the TÜBİTAK 123Y368 project, which commenced in 2024, CMAX CM2 side scan sonar data were gathered with the objective of determining the distribution of *Posidonia oceanica* on the seabed. High-discrimination marine seismic (CHIRP) data were collected by Syqwest Bathy 2010P to determine the possible matte structure of *P. oceanica* in the study area within the Karaburun-Ildır Special Environmental Protection Area. Furthermore, seawater temperature and salinity data were recorded with a Microcat CTD at predetermined locations within the study area. To corroborate the potential presence of Posidonia meadows, confirmation was conducted through scuba diving, underwater drone and video imaging, in addition to the Side scan sonar data. The primitive data obtained indicates that the matte structure observed in the seismic data is differentiated by the high acoustic impedance difference it creates with the stratigraphic unit below it. The internal reflection exhibits a semi-parallel reflection with an amplitude that is moderate to low. In the side scan sonar data, seagrasses were identified as a continuous strong texture reflection with isolated bright areas in dense areas and a continuous strong texture reflection with abundant isolated bright areas in sparse areas. The video imaging conducted with an underwater drone along a transect line south of the study area revealed that the current Posidonia was sparse at 25 meters and ceased at 27 meters. At a depth of 32 meters, where the Posidonia meadow matte ends, there is no evidence of the meadow on the seabed. It can be posited that the matte observed in this area is a remnant of the past *P. oceanica* meadow. In the physical oceanography studies, seawater temperature values measured at the selected points exhibited a range of 19.23°C to 25.07°C, while salinity values spanned a range of 39.08 psu to 39.99 psu. Additionally, the expected two-layer structure and thermocline were observed in the vertical temperature distributions throughout the study, particularly during the summer months. The objective of this

study is to assess and map the distribution of *P. oceanica* meadows using Side Scan Sonar data. Subsequently, an estimation of the approximate volume will be conducted through the analysis of mat thickness and meadow distribution based on shallow engineering seismic data. Lastly, the study will aim to identify the overarching values of physical parameters (such as temperature, salinity, conductivity, etc.) that impact these areas.

Keywords: *Posidonia oceanica, Side Scan Sonar, Shallow Seismic, Underwater Visualization, Physical Parameters*

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[OP 31]

Proposal of Nitrogen Removal Technologies for Urban Wastewater Treatment in the Marmara Sea Basin: A Strategy for Mucilage Prevention

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There has been mucilage problem in the Marmara Sea, mainly caused by nutrient loads from point and diffuse sources. Total nitrogen from point sources accounts for 62.7% of the nutrient load, while total phosphorus contributes 66.1%. At present, Marmara Sea receives a total discharge of 5,853,000 m3/day, with 86% of this volume consisting of urban wastewater and there is partial industrial contribution. Of this wastewater, 50% is discharged through deep marine outfall after mechanical pretreatment. However, only 46% of the flow is treated in advanced biological wastewater treatment plants. Regarding compliance with discharge limits, it has been found that only 23% of the treatment facilities meet the standards without requiring further investment. Preventing nitrogen loads from urban wastewater is particularly important for the Marmara Sea. Studies have shown that the nitrification rate in urban wastewater treatment plants in the Marmara Sea Basin is low (nearly half that of Europe). Additionally, nitrogen concentration and loads in the influent of urban wastewaters are high in Türkiye. As a result, achieving discharge limits is largely due to the current choices in processes and technologies. More than half of the existing advanced biological wastewater treatment plants use the anaerobic-anoxic-oxic (A2O) process configuration. On the other hand, considering that EU is reducing the existing total nitrogen (TN) limits from 10 to 6 mg/L and phosphorus limits from 1 to 0.5 mg/L in line with EU Urban Wastewater Treatment Directive (26.10.2022), it will be necessary to revise the existing wastewater treatment plants and apply different process configurations/technologies for the planned wastewater treatment plants. In this study, applicable technologies will be evaluated and a design strategy will be discussed to meet the desired limits and ensure reliable effluent quality.

Keywords: *Nitrification, point source pollution, treatment technology, nutrient*

[OP 32]

Photocatalytic Performance of Ag-Humic Acid Magnetic Nanoparticles for Degradation of Methylene Blue in Aqueous Medium

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The discharge of organic dyes from industrial plants processing pharmaceuticals, textile fabrics, leather, and petrochemicals is a great concern in terms of water contamination. Even in small amounts less than 1 mgL^{-1}, dyes have serious effects on the water quality of the aquatic environment. In this study, methylene blue was chosen as a model to represent the azo-dye class that is non-biodegradable, toxic and mutagenic. Photocatalytic degradation is a sustainable and eco-friendly remediation process to eliminate the undesired effects of dye contamination. The morphology of the catalyst highly influences the properties and the efficiency of the catalytic reaction. A novel composite magnetic nanoparticle was synthesized in core-shell structure and characterized with the aid of Scanning Electron Microscope (SEM) images combined with an elemental distribution image (EDX mapping), Zeta Potential, Dynamic Light Scattering (DLS) analyses and Raman Spectrometer. The electronic properties of the fabricated material were enlightened by Mott Schottky measurements. In optical studies, direct band-gap energies were calculated with the aid of Ultraviolet-Visible Diffuse Reflectance Spectroscopy (UV-DRS). The effective photocatalytic degradation of methylene blue in aqueous medium was maintained with optimum parameters defined within the study. The results support the applicability of the proposed novel magnetic nanoparticle as a catalyst for the degradation of methylene blue in aquatic environment.

Keywords: *photocatalytic activity, remediation, magnetic nanoparticles, degradation*

[OP 33]

Evaluation of Nutrient Removal and Anti-Inflammatory Drugs Removal Using a Pilot-Scale Novel Hybrid Biofilm Process

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Moving bed biofilm (MBBR) technology is a promising biological treatment process for an effective nutrient removal and cost-efficient wastewater management. Non-steroidal antienflammatory drugs (NSAID) are sold without prescription in most countries including our country and most frequently observed micropollutants in wastewater treatment plants. A pilot scale novel hybrid system was designed and operated using original domestic wastewater and fate of micropollutants as well as nutrient removal was investigated. Wastewater fed to the hybrid pilot plant was supplied from the grit chamber of ISKI, Baltalimanı Wastewater Treatment Plant. The plant consists of Bio-P tank, reactive pre-sedimentation, MBBR-1 reactor, anoxic reactor (contact denitrification) and aerobic (MBBR-2) reactor. The biofilm (MBBR) reactors were aerated with a dissolved oxygen concentration above 4 mg/L. The Aerobic Biofilm Tank (MBBR) of the pilot plant was 30% filled with biofilm material. During 6 months of operation, according to the results obtained on the basis of conventional parameters, the influent average total chemical oxygen demand (COD), suspended solids (SS), volatile suspended solids (VSS), ammonia (NH_4-N), total Kjeldahl nitrogen (TKN), pH, total phosphorus (TP) and phosphate (PO_4-P) values measured at the pilot plant were 405 mg/L, 450 mg/L, 280 mg/L, 35 mg N/L, 55 mg N/L, pH 7.44, 5 mg P/L and 3 mg P/L, respectively. VSS/SS ratio was 0.73 and standard deviation was 0.11 in influent wastewater. COD removal efficiency was determined as 79%. Total nitrogen and phosphorus concentrations in the effluent decreased to 9 mg N/L and 0.55 mg P/L. Naproxen, ibuprofen, diclofenac, ketoprofen and, mefenamic acid removal efficiency in the pilot plant were found as 70%, 96%, 32%, 70%, 75%, respectively. Indomethacin concentration was under the measurement limit in influent wastewater.

Keywords: *Antienflammatory drugs, hybrid systems, micropollutants, domestic sewage*

[OP 34]

Larinier Fishway with Mild Bed Slope: A Pilot Project in Lake Sapanca Basin in Turkey

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Hydraulic barriers negatively affect the ecological continuity of streams and those barriers can restrict or even block the movements of aquatic biota in stream-wise and lateral directions. A field study has been carried out in the Lake Sapanca basin, which is situated between the Gulf of İzmit and the Sakarya River in the Marmara Region of Turkey. The catchment area of Lake Sapanca is about 251 km² and it is surrounded by mountains and small hills. In the basin, there are 28 freshwater fish species 6 of which are endemic. Several barriers (i.e., weir, desilting barrage, culvert) cut the connections between up- and down-streams and prevent the movements of fish at short distances of 150-500 meters. This situation threatens the fish populations and 9 fish species became extinct in the basin. Kurtköy Stream the Sapanca basin was selected as a pilot study and a Larinier fish passage was installed on one of the concrete weirs. Larinier fish passage is generally installed at steep bed slopes of more than 12% and it is particularly well-suited for salmonids due to its highly developed and far-reaching attracting current. However, in this study, Larinier fish pass was installed at a mild slope of 4% as an innovative approach to provide passage for multiple fish species. Accordingly, the fish upstream migration characteristics and flow structure of the Larinier fish pass were monitored simultaneously. Local velocities in the fish passage were measured using a 2D Acoustic Doppler Velocimeter under different inflow conditions. From those velocity measurements, the spatial distributions of velocity and Froude number were obtained. The monitoring data showed that the modified low-slope Larinier fishway provides favorable hydraulic conditions and different migration corridors for multiple fish species including small-bodied fish.

Keywords: *Barrier, Fish Upstream Migration, Larinier Fish Pass, Small-bodied fish*

Acknowledgment: *This work was supported by the TÜBİTAK-1001 (Project Number 122Y318).*

[OP 35]

A Promising Approach for Preventing Seabream Fillet Contamination: Inulin and Fructooligosaccharide

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The most well-known prebiotics that have beneficial effects on human health include inulin (IN) and fructooligosaccharides (FOS). Their advantages include promoting gut bacteria, preventing colon cancer and cardiovascular diseases, regulating mineral uptake and immune system. Pathogenic bacteria such as *Staphylococcus aureus* can be present in raw, undercooked or ready-to-eat foods due to contamination from a food processor, leading to food intoxications. Therefore, preventive biotechnological approaches are emphasized in food preservation. In this study, equal amounts of IN and FOS (INFOS) were dissolved in sterile water with a ratio of 1:1. Seabream fillets were treated with two different concentrations of prebiotics, thereby forming three groups: 5% INFOS-added (P5), 10% INFOS-added (P10), and untreated (C). To evaluate the antimicrobial activity, total mesophilic aerobic bacteria and lactic acid bacteria were investigated. Moreover, low dose (3.3 log cfu/g) *S. aureus* was inoculated into seabream fillets, followed by INFOS addition to fish. Moisture content was also examined by measuring water activity. Sensory analysis was carried out using a ten-point hedonic scale. After the treatments, each analysis was performed on both the 1st and the 25th hour. At the 1st hour, a significant decline was observed in *S. aureus* loads that were 4.19, 3.46, and 3.17 in C, P5, and P10 groups, respectively. There were no significant differences in mesophilic and lactic acid bacteria counts at the 1st hour. However, at the 25th hour bacteria loads increased and fluctuated. Due to the binding properties of the prebiotics, water activity gradually decreased in comparison to untreated fillets. Both C and P5 samples had the best sensory scores at the 1st hour, while only P5 was preferred at the end of storing. Consequently, INFOS can be successfully applied to seabream fillets in order to prevent possible initial *S. aureus* contamination and to provide a better sensory quality.

Keywords: *Prebiotics, Staphylococcus aureus, antimicrobial, food safety, contamination*

[PP 1]

The Effect of Salinity Stress on the Utilization of Chlorella Vulgaris as Food and Biodiesel

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The increasing human population and the associated increase in food and energy demand together with rapid industrialization have led to a need for sustainable, economical, and environmentally friendly alternatives. Microalgae are photosynthetic organisms that can play a significant role in the production of bio-products containing valuable bioactive compounds such as PUFA, carotenoids, chlorophylls, phycobiliproteins, and amino acids. Factors such as the species of microalgae and cultivation conditions can influence the production of valuable compounds by these microorganisms. It has been observed in studies conducted so far that microalgae can tolerate salinity stress and optimize their growth. This study investigates the growth, pigment content, total protein amount, lipid, and fatty acid composition of *Chlorella vulgaris* under different salinity concentrations. *Chlorella vulgaris* was cultured in BG11 medium containing NaCl at concentrations of 0 M, 0.03 M, 0.1M, and 0.3 M. During the experiment, cell counting and pigment analysis performed to monitor the growth of the species. The Lowry [1951] method was used for protein analysis, the modified Bligh and Dyer [1959] method for total lipid analysis, and the Lepage and Roy [1984] method for FAME profiling. The addition of low concentrations of NaCl increased growth and pigment content. At high salinity concentrations, both lipid and FAME yields increased, and there was a shift in fatty acid composition from SFAs to PUFAs. This alteration positively influenced its potential as a human food source. However, the high PUFA content negatively impacted biodiesel quality by raising CFPP values, an important biodiesel quality parameter. These findings are expected to contribute to future studies by determining sustainable and economically viable production conditions in the food and biofuel sectors.

Keywords: *Microalgae, Chlorella vulgaris, Salinity Stress, Biodiesel, Funcitonal Nutrition*

[PP 2]

Does the Co-Exposure of Polymethyl Methacrylate Microplastics and Phthalates Increase Its Genotoxicity?

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Plastics are ubiquitous due to their unique physico-chemical properties, but improper disposal leads to their accumulation in ecosystems. Plastics degrade into microplastics (diameter <5 mm) and nanoplastics (diameter <1000 nm) through various processes. These microplastics can bioaccumulate in the food chain and absorb toxic chemicals, posing significant risks to living organisms. Notably, microplastics have been detected in human placenta and other biological samples, as well as in animals.

Polymethyl methacrylate (PMMA), or acrylic/plexiglass, is a commonly used thermoplastic known for its lightweight and durability. Microplastics and nanoplastics, including PMMA, have been linked to toxic effects such as cell death, DNA damage, and oxidative stress. PMMA specifically can disrupt lipid metabolism in the liver and cause reproductive and developmental toxicity in aquatic organisms. These toxic effects may stem from plastic particles, persistent organic pollutants, or leaching plastic additives like phthalates.

Phthalates, widely used as plastic additives, exhibit cytotoxicity, genotoxicity, and endocrine disruption. Despite their prevalent use, research on the effects of microplastics and phthalates on human cells and systems is limited. This study aimed to evaluate the potential genotoxic effects of PMMA microplastics, Di-2-ethylhexyl phthalate (DEHP), and their combined exposure on the male reproductive system using in vitro methods with TM3 and TM4 cell lines. Our results indicated DNA damage in the cells exposed to 100 µg/mL (2.47 folds), 1 µg/mL (3.19 folds) PMMA; similarly DEHP an increase in the DNA damages in 1,5 mM (2 folds), 0,15 mM (2.12 folds) and 0,015 mM DEHP (2.37 folds). The co-exposure to DEHP together with PMMA increases the DNA damage in the cells. These results indicate the reproductive toxicity of PMMA and emphasize that the co-exposure for fatalate as DEHP increases these effects.

Keywords: *Polymethyl methacrylate, phthalates, genotoxicity*

[PP 3]

Cyanobacteria Bloom in Artificial Ponds: Potential of Biodiesel Production

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Cyanobacterial blooms have adverse impacts on aquatic ecosystems However, those bulk biomass hold a great potential to produce economically viable products such as biodiesel as well serving as a promising source of bioactive natural products. Thus, utilizing algal blooms could be both environmentally and economically beneficial. In this study, it was aimed to assess the the biodiesel potential of cyanobacterial blooms. For this purpose, samples were collected from artificial ponds constructed for rainwater harvesting in Gümüşyaka and Çakıl Ponds (İstanbul, Türkiye) during summer 2024 (July 2024 and August 2024). Phytoplankton counts were performed to identify the dominant species. Biodiesel yield and quality were then analyzed, focusing on the FAME content. It was found that cyanobacteria represented more than 80% of the total algal groups in both ponds. The dominant cyanobacteria were identified as *Woronichinia* sp. and *Microcystis* sp. in Çakıl Pond, and *Aphanizomenon* sp. and *Planktothrix agardhii* in Gümüşyaka Pond. Analysis of biodiesel yields revealed that the FAME content was above 40% in Çakıl and 50% in Gümüşyaka Ponds These results were higher than those obtained from studies conducted in cultures on a lab scale suggesting that higher stress conditions in natural environments increase the FAME content of these species. The results showed that there is a great potential of utilizing the biomass from algal blooms for sustainable and economically viable biodiesel production, contributing positively to the bioenergy sector while mitigating the environmental impact of algal blooms.

Keywords*: Microalgae, Cyanobacteria, Bloom, Biodiesel, Rainwater Harvesting Ponds*

[PP 4]

Comparison of Different Diagnostic Methods for the Identification of Citrobacter Catfish (Phractocephalus

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Citrobacter freundii is a fish pathogen known for its ability to cause injury and high mortality. This study aimed to investigate the efficiency of three different diagnostic methods in the identification of *C. freundii* from infected redtail catfish. Routine microbiological method rapid diagnostic kit API 20E, and MALDI-TOF MS (matrix-assisted laser desorption/ionization time-of-flight mass spectrometry) were used to identify bacteria grown in the medium after incubation. The comparison was made based on the time and cost of the methods. Bacteriological inoculation from internal organs was made onto Brain Heart Infusion Agar (BHIA). The isolated bacteria were identified as *C. freundii* according to their physiological, morphological, and biochemical characteristics by conventional method. Isolates demonstrated 53.6% similarity to *C. freundii* according to apiweb results. The recorded MALDI-TOF MS Biotyper scores were between 2.2-2.1 indicating highly probable to secure species identification for *C. freundii* isolated from diseased redtail catfish. The isolates were resistant to eight different antibiotics (flumequine, erythromycin, sulfamethoxazole, ampicillin, enrofloxacin, oxytetracycline, ciprofloxacin, and streptomycin). The overuse and misuse of antibiotics speed up the resistance development of pathogenic bacteria and thus the fight against diseases becomes difficult. It was demonstrated that the MALDI-TOF MS provides better results than other methods in terms of cost and identification time, and it could be used as an alternative to the conventional method for the identification of *C. freundii* isolated from diseased fish.

Keywords: *Citrobacter ferundii, MADI-TOF MS, API 20E, antibiotic*

[PP 5]

Preparation of Alginate-Based Ethyl Pyruvate Films for Combating Fungal Pathogens in Strawberries

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Pathogens emerging on strawberry fruit lead to post-harvest product loss and consequently cause significant economic damage. *Aspergillus niger* and *Botrytis cinerea* are the leading fungi in strawberries that damage the fruit, affect its quality, and reduce its shelf life. Ethyl pyruvate (EP) is a new agent developed to naturally combat these fungal pathogens. In this context, alginate-based ethyl pyruvate incorporated films capable of exhibiting antifungal effects were prepared using alginate obtained from seaweed. Films without EP were also prepared as control. The characterization of the films were carried out using FTIR, light miscroscopy, SEM, balance inflatable rate tests as well as antifungal tests against *Aspergillus niger* and *Botrytis cinerea* species.

The FTIR results indicated that the EP included film exhibited a peak in the wavelength range of the EP sample, which was different from the control film. In the light microscope analysis, while the control film provided a transparent image, the EP films appeared translucent due to the light transmittance of EP. These results confirms the presence of EP in the prepared alginate-based films. When investigating the swelling behavior of the films in water, a swelling ratio of 354% was observed after 60 minutes. The *in-vitro* antifungal tests revealed that the highest inhibition rate was observed for samples prepared with a 2% concentration. These antifungal tests also showed the best results about growth diameter blocking on *Aspergillus niger* with %28 and *Botrytis cinerea* with %50 on the 5th day in an incubator. It was concluded that the prepared EP films prevented fungal diseases caused by *Aspergillus niger* and *Botrytis cinerea* in strawberries and thus have potential in food packaging to extend the shelf life of the products.

Keywords: *Alginate, Antifungal Film, Ethyl pyruvate, A. Niger, B. Cinerea*

Acknowledgement: *This study was supported by the Scientific and Technological Research Council of Turkey (TÜBİTAK) under the 2209 program. We gratefully acknowledge TÜBİTAK for their invaluable funding, which made this research possible.*

[PP 6]

Removal of Organic Compounds from Aquatic Solutions Using Environmentally and Eco-Friendly Synthesized Cerium Oxide Nanoparticles (CeO_{2-x} NP)

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Water is vital for life and essential for human socio-economic development, necessitating its protection for future generations. However, natural and human-induced activities, including climate change, have polluted our limited water sources. This study aims to develop a novel oxidation-reduction method to eliminate Geosmin and 2-Methylisoborneol (MIB), compounds responsible for unpleasant odours and tastes in freshwater. The method utilizes cerium oxide nanoparticles (nanoceria, CeO_{2-x}NP) with surface modifications obtained through green synthesis by exploiting their oxidant properties and surface redox potentials. Cerium oxide nanoparticles were synthesized from macroalgae (*Cystoceria sp*.) extract by taking advantage of its abundance, rapid growth, easy cultivation, biocompatibility and rich secondary metabolites suitable for green nanoparticle synthesis. Chemical and physical properties of the nanoparticles were analysed using Fourier transform infrared spectrometry (FT-IR), X-ray diffraction (XRD), scanning electron microscopy (SEM), Zetasizer, and UV-VIS spectroscopy. The batch process is used to calculate the removal efficacy of Geosmin and MIB from the aqueous solution at different pH, contact duration, and initial Geosmin and MIB concentration. This removal was 55-20% in the first hour and 75-60% after 24 hours at pH 8.5 for Geosmin and MIB, respectively. The removal efficacy was reached over 95% and 85% for Geosmin and 2-MIB, respectively by changing the pH of the reaction medium to increase the oxidizing properties of the nanoparticles. These findings highlight the potential of cerium oxide nanoparticles synthesized from macroalgae extract to enhance the effective removing of odor-causing contaminants.

Keywords: *Green synthesis, CeO_2 nanoparticle, geosmin, 2-metilisoborneol (MIB), freshwater treatment*

[PP 7]

The Genotoxicity Profile of Polystyrene Microplastics

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Plastics, whose large-scale production began in the 1950s, are widely utilized across various products due to their ease of production, low cost, and resistance to water, chemicals, temperature, and light. However, their excessive and uncontrolled use has become a significant environmental problem, seriously threatening natural ecosystems and human and animal health.

Research has shown that microplastics are present in oceans, lakes, and even at the poles. A study projected that by 2050, there could be more plastics in the oceans than fish by weight, with recycling rates of plastic packaging remaining meager. Studies have detected different types and levels of microplastics in human and animal biological samples, including placenta and fetus tissues. This heightened the concerns about fetal and reproductive health and promoted the researchers and authorities to focus on reproductive and developmental toxicity studies to protect future generations. Polystyrene commonly used in products such as yogurt containers, egg cartons, disposable food packaging, and low-cost fragile toys. This study investigated the genotoxic effects of polystyrene microplastics on TM4 Sertoli and TM3 Leydig cells from the male reproductive system. The genotoxic potential was examined using the comet test at low cytotoxic concentrations. Our results indicate that the increase in DNA density in the tails in 50 µM (4.93 folds) and 20 (3.65 folds) concentrations compared to the non-exposed cells. These results emphasize the role of DNA damage in polystyrene-induced toxicity and improve the risk of reproductive toxicity due to exposure to microplastics. As a part of ongoing projects, further parameters will add to the present finding to analyze the genetic effects of microplastics, however, other in vivo and in vitro studies should be carried out to better understand polystyrene microplastic toxicity, in order to provide the community with data help in the risk assessment of these chemicals.

Keywords: *polystyrene, male reproductive system, genotoxicity*

[PP 8]

Investigation of Pollutant Removal in Molasses Medium With Indigenous Bacteria Isolated from Water Sources of Türkiye

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Wastewater from numerous industrial establishments poses a significant threat. Organic pollutants (textile dyes, detergents, phenolic compounds, PAHs) and inorganic pollutants [Cu(II), Ni(II), Cr(VI), Pb(II), etc.] present in industrial wastewater cause environmental threats. When organic pollutants like textile dyes are discharged into rivers and streams without treatment, they adversely affect aquatic life. Heavy metals, which are inorganic pollutants, are substantially toxic, mutagenic, and carcinogenic. Therefore, the treatment of such wastewater is critically important. In this context, biological treatment is one of the most critical requirements.

In the study conducted within this context, samples were collected from various water sources from Türkiye. The water samples were inoculated into culture media containing heavy metals and dyes. The obtained mixed culture was inoculated onto solid culture media containing heavy metals and dyes. At the end of the incubation period, colonies with different morphologies (Isolate S1, Isolate S2, Isolate S3) were isolated. Subsequently, their purity controls were provided by culturing them on the same medium. Isolate S1 was obtained from Kıbrıs Köyü Kanyonu (Ankara); Isolate S2 from Küçükçekmece (İstanbul); and Isolate S3 from Sarısu (Antalya). These bacteria were cultivated in a molasses medium containing Cu(II) heavy metal and Setazol Blue BRF-X dye. After the incubation period, their capacities for heavy metal and dye removal were determined spectrophotometrically. The efficient bacterium for dye removal was the Isolate S3.

Keywords*: bioremediation, molasses, bacteria, heavy metal, textile dye*

[PP 9]

Efficiency of Organisms with Different Trophic Levels as Living Biofilters in the Removal of Nutrients from Juvenile Rainbow Trout Rearing Tanks

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The accumulation of organic and inorganic materials from cultivation activities directly affects water quality in cultivation media, fish health, and the resulting production. Using biofilters in intensive cultivation activities is one solution to improve water quality in cultivation media. The use of biofilters by living organisms has the potential to be developed because effectively manage wastewater from aquaculture. In this experiment was used duckweed (*Lemna minor*) with different fresh biomass weights (T1: 270g and T2: 360g) in two experimental groups (three parallels) and was integrated with 30 freshwater mussels (*Anodonta cygnea*) each treatments. At the end of the study, the highest average percentage of NH_4 nutrient removal was found in the T1 group, which amounted to 7.30 ± 1.90%. Meanwhile, the highest percentage of NO_2, NO_3 and T. phosphorus removal was found in the T2 group, which amounted to 35.13 ± 1.95%, 7.50 ± 1.75% and 30.25 ± 2.15%. The low water temperature in trout-rearing tanks (13-14 °C) and the biomass weight of duckweed plants directly affect plant biomass growth and decrease the efficiency of nutrient removal by duckweed plants. The result shows that using duckweed as a living organism biofilter can reduce the nutrients from rainbow trout tanks. Still, the efficiency depends on the temperature and the availability of nutrients.

Keywords: *Rainbow trout juveniles, living organism, biofilter, nutrient removal, flow-through systems*

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[PP 10]

Advancements in Plant Tissue Culture of Salt-Tolerant Plants

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Halophytes, plants that thrive in high salinity and extreme environmental conditions, hold significant promise for biotechnology, particularly in sustainable agriculture and the production of bioactive compounds. This review explores the application of in vitro plant tissue culture (PTC) techniques to halophyte species, highlighting their contributions to commercial crop development, conservation, and biotechnological advancements. PTC techniques have proven invaluable for the micropropagation of halophytes, enabling the controlled multiplication of species with limited sexual and vegetative propagation capabilities. Various explant types, including basal shoots, nodes, cotyledons, and leaves, have been used in different micropropagation methods such as direct and indirect shoot neoformation, somatic embryogenesis, and rooting. These methods have successfully optimized the production of bioactive compounds and enhanced the genetic diversity and resilience of halophytes. In addition to their agricultural applications, in vitro systems have been used to study physiological, biochemical, and molecular processes in halophytes, such as salt tolerance mechanisms. These insights are crucial for developing crops that can withstand environmental stresses, ensuring food security, and promoting sustainable agricultural practices. Moreover, PTC techniques facilitate the conservation of endangered halophyte species through ex-situ germplasm conservation and cryopreservation. This approach supports biodiversity by preserving genetic material for future restoration and cultivation efforts. Overall, the application of PTC to halophytes not only improves their controlled multiplication and selection of desirable traits but also enhances our understanding of their adaptive mechanisms. This review underscores the potential of in vitro models to drive innovation in halophyte biotechnology, contributing to environmental sustainability and the development of high-value commercial products.

Keywords*: Halophytes, Micropropagation, Plant biotechnology, Biochemical applications*

[PP 11]

CYANOFRESH- Environmental Friendly Management of Cyanobacteria Blooms in Freshwater Resources

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The rapid increase in population, urbanization, industrialization, as well as climate change put great pressure on water resources in the world and in Turkey. One of the most important effects of climate change on water resources is the increase in cyanobacterial blooms and the deterioration of water quality due to the decrease in water level. The excessive increase of cyanobacteria affects the water quality besides visual pollution, clogs the filters in drinking water treatment plants, and causes many environmental, social and economic problems such as taste and odor problems. It is necessary to use methods that will not disrupt the ecosystem, especially in coping with cyanobacterial blooms, which negatively affect public health with their potential to produce toxins. During the management of cyanobacterial blooms, selectivity of the chemicals is the main issue targeting one organism group and not harming the others such as hydrogen peroxide (H_2O_2). This project aims to evaluate the feasibility of H_2O_2 application as a rapid and environmentally friendly method to control cyanobacterial blooms in rainwater harvesting ponds used for irrigation purposes.

Keywords: *Cyanobacteria, Hydrogen peroxide, Rainwater harvesting pond, Sustainability*

[PP 12]

Optimized Method for Extracting of Antioxidant and Bioactive Compounds from Macroalgae

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Macroalgae are a valuable source of bioactive compounds, suitable for various applications in food, cosmetics, and pharmaceuticals. These algae contain antioxidants, polyphenols, proteins, carotenoids, flavonoids, and ω-3 fatty acids. Ultrasound-assisted extraction (UAE) has been employed to extract these compounds efficiently, offering advantages over traditional methods. Non-conventional extraction techniques provide sustainable alternatives to maintain the potency of antioxidants and bioactive compounds from macroalgae.

In this study, we analyzed the bioactive components in three classes of macroalgae: Phaeophyceae, Rhodophyceae, and Chlorophyceae, comparing their total phenolic contents, antioxidant capacities, protein contents, and fatty acid profiles. Each extraction method's parameters were optimized to target specific bioactive compounds. Various extraction techniques were utilized to assess the differences in the biologically active compounds in the macroalgal extracts. We examined the fatty acids, proteins, phenolics, flavonoids, and total antioxidant capacity/activity in macroalgae species, namely *Ulva lactuca, Ceramium sp., Cystoseira sp., Dictyota sp., and Scytosiphon sp.*

Water and hydroethanolic extracts from Marmara Sea macroalgae were tested for antioxidant activity and capacity using ABTS/TEAC and CUPRAC methods, with results ranging from 0.83 mg to 2.12 mg Trolox/g FW and 0.64 mg to 1.58 mg Trolox/g FW, respectively. The total protein content ranged between 70 mg and 130 mg BSA/g FW, total phenolic content between 0.93 mg and 1.88 mg Gallic acid/g FW, and total flavonoid content between 0.97 mg and 2.15 mg Quercetin/g FW.

Cystoseira sp. had high unsaturated fatty acid (PUFA) and Omega-6 content, followed by Ulva lactuca, while *Ceramium sp.* had a favorable omega-6/omega-3 ratio. *Dictyota sp.* was less suitable for human consumption due to its higher saturated fatty acid (SFA) and lower PUFA content. These macroalgae species have significant nutritional values and bioactivities. Additionally, they could serve as a source of compounds for the nutraceutical, cosmetic, and pharmaceutical industries.

Keywords: *Macroalgae, Antioxidant properties, Bioactive compounds, Fatty acids, Polyphenols,Ultrasound-assisted extraction*

Acknowledgements: *This study was supported by the Istanbul University Research Foundation (Project No 3FBA-2022-38518).*

[PP 13]

Biotechnological Applications of Mussels in Aquatic Biotechnology

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Today, the world faces significant challenges, including climate change, population growth, rising food and energy demands, and environmental pollution. In response to these issues, the field of aquatic biotechnology has emerged as a promising avenue for sustainable solutions, with mussels offering particularly intriguing potential.

Mussels are highly adaptive organisms that thrive in diverse aquatic environments, making them valuable subjects for biotechnological applications. Their unique biological properties, such as robust adhesion mechanisms, efficient filtration capabilities, and resilience to environmental stresses, make them ideal candidates for innovations in multiple sectors.

In the realm of food production, mussels contribute to sustainable aquaculture practices. Their ability to filter large volumes of water improves water quality, which enhances the health and growth rates of other aquaculture species. Moreover, mussels themselves are a nutritious food source rich in proteins and essential nutrients, thus supporting global food security.

Mussels also play a role in environmental biotechnology. Their filtration efficiency enables them to act as natural biofilters, removing pollutants and excess nutrients from water bodies, thereby contributing to ecosystem restoration efforts. Additionally, their shells, composed mainly of calcium carbonate, are being explored as a renewable resource for producing biopolymers and other environmentally friendly materials.

In the industrial sector, the adhesive proteins produced by mussels are inspiring the development of new non-toxic adhesives that perform well in wet environments. These bio-inspired adhesives have potential applications in medical, marine, and construction industries, offering an eco-friendly alternative to traditional synthetic adhesives.

The biotechnological exploration of mussels continues to reveal their vast potential across various fields, from sustainable aquaculture to environmental remediation and industrial innovation. The integration of mussel-based technologies into broader aquatic biotechnology efforts holds great promise for addressing some of the most pressing challenges of our time.

The purpose of this presentation is to highlight the latest advancements in mussel-based biotechnologies and to foster discussion on their potential applications in addressing global environmental and industrial challenges.

Keywords*: Mussels, aquatic biotechnology, sustainable aquaculture, biofiltration, environmental remediation, biopolymers, bio-inspired adhesives, ecosystem restoration.*

[PP 14]

Use of Living Organisms for Aquaculture Waste Removal

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Aquaculture activities generate significant organic and inorganic waste, affecting water quality and fish health while increasing operational costs. An emerging solution to these challenges is the use of biofilters which employ living organisms to improve water quality economically and sustainably. This review explores the application of various living organisms, including filter-feeding aquatic organisms and plants, in aquaculture waste management.

Biological filtration systems utilize living organisms to mitigate waste by removing excess nutrients and particulates from the water. These systems include filter-feeding animals, which play a vital role in consuming suspended particulates and assimilating nutrients, thereby maintaining water clarity and reducing harmful compounds like ammonia and nitrite. Aquatic plants absorb nutrients directly from the water, particularly nitrogen and phosphorus, and grow rapidly, providing a renewable resource that can be harvested and repurposed.

Integrated biofilters combine filter-feeding organisms and aquatic plants to maximize waste removal efficiency, creating a balanced ecosystem that enhances the overall health and stability of the aquaculture environment. Studies have shown that integrated biofilters can effectively manage nutrient loads, reduce harmful waste buildup, and improve the survival and growth rates of cultured species.

The advantages of using biological filtration systems in aquaculture include cost-effectiveness, reduced need for chemical treatments, and the promotion of nutrient recycling within the ecosystem. Additionally, these systems support the production of additional biomass with economic value. Continued research and development will enhance the efficiency and applicability of biological filtration systems, contributing to the sustainable growth of the aquaculture industry.

Keywords: *Aquaculture, waste management, biofilter, living organisms, sustainability.*

[PP 15]

Nature-Based Usage of Bacterial Technology in Different Sectors: The Example of Turkish Marine Bacterial Isolates

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Current international guidelines addressing global climate change emphasize the development of future methods using environmentally friendly tools. Marine bacteria, integral to marine ecosystems, are also crucial to the blue economy in industrial and medical applications. Their robust metabolic capabilities underpin nature-based bacterial technology, promoting sustainability aligned with the green deal. The evolving global focus includes biodiversity, "one health," and food security within the blue growth and blue economy frameworks. This study presents examples of using bacteria isolated from Turkish Seas for various purposes. It highlights biological solutions developed using bacterial technology and the outcomes of applications and field studies across different fields. Marine bacterial isolates have been applied in diverse areas, such as microbial fertilizers reducing chemical use in agriculture, eliminating oil pollution in seawater and soil, cleaning historical building surfaces, developing antibacterial compounds and raw materials, and removing marine mucilage biotechnologically.

Patented bacterial formulas enhancing plant growth and soil microflora, developed from marine bacteria isolated from Turkish seas, have undergone field trials and begun production within Istanbul University Technocity (ENTERTECH). These have been licensed and registered by the Ministry of Agriculture and Forestry. Antibacterial raw materials have been created from bacterial isolates from sea sponges. Patented eco-friendly bacteriological products using marine bacterial isolates for oil pollution elimination have also commenced production at Istanbul University Technocity. Biological cleaning of building surfaces with marine bacterial isolates offers advantages over traditional methods and has been patented. Solutions for marine mucilage disposal and prevention using enzymatic properties of marine bacteria have been patented and commercialized. TÜBİTAK-supported projects confirmed these formulas do not negatively impact the marine ecosystem or its inhabitants.

Turkey's marine resources present significant opportunities for identifying and leveraging biotechnological potential to benefit the national economy. Expanding research on marine bacteria's biotechnological potential is essential for developing solutions that support environmental, economic, and social sustainability.

Keywords: *Marine bacterial isolates, bacterial enzymes, marine biotechnology*

[PP 16]

Heavy Metal Biosorption by a Novel Bacterium Isolated from Düden Waterfall

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Heavy metal pollution poses a serious threat to environmental sustainability. The acceleration of urbanization and the increase in industrial activities lead to the direct and indirect penetrating of heavy metals into the soil, water, and air ecosystems. This situation causes significant problems for living health. The effective removal of these pollutants from the environment contaminated with heavy metals carries great importance. Biosorption is a rapid and effective biological method that primarily preferred. Biosorption utilizes dead or inactive microorganisms for the removal of these pollutants.

In this study, the bacterium was isolated from the Düden Waterfall (Antalya, Turkey). It was identified by 16S rDNA analysis as *Leclercia adecarboxylata*. The bacterium was cultivated in a molasses medium, biomass was dried through a heating process, and it was used as a biosorbent. Subsequently, the biosorption capacity of dead *L. adecarboxylata* against Cu(II), Cr(VI), and Ni(II) heavy metals was investigated. For this purpose, experiments were conducted at a pollutant concentration of 25 mg/L, at pH 3.0, and a biosorbent dose of 0.25 g/L. The residual concentrations of metal were determined by spectrophotometrically. The highest biosorption capacity was found to be 38.6% after 30 minute of incubation time in the presence of 25.2 mg/L Cu(II).

Keywords: *biosorption, heavy metal, molasses, wastewater, Leclercia adecarboxylata*

[PP 17]

Jellyfish as a Potential Source of Collagen

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The number and distribution of jellyfish on the Turkish coasts are increasing due to both global warming and domestic-industrial pollution. The intense increase in jellyfish, especially in the Marmara Sea, in the last 30 years, is causing serious damage to both tourism and the fishing economy. The potential of jellyfish to be used as a collagen source is very important both to benefit from these problematic creatures and to develop a national product in the field of biomaterials, for which we are largely dependent on foreign sources. Collagen has a very wide range of applications, including pharmaceutical, biomedical, cosmetic, leather and film industries, thanks to its high biocompatibility, bioactivity and weak antigenicity, and is the most studied protein. Although there is an abundant source of collagen, the use of collagen produced from land animals poses a threat, especially due to the allergenic response it creates. For this reason, research on the use of marine animals is increasing day by day. Within the scope of this study, the potential of jellyfish, which cause net clogging in fishing and pose a threat to some fish species and whose number is increasing day by day, as a sustainable collagen source was examined.

In this study, collagen isolation was carried out from jellyfish species *Aurelia aurita* and *Rhizostoma pulmo*, which are particularly abundant in the Marmara Sea. After the isolation process, the collagen obtained was analyzed for characteristics such as color, pH, isoelectric point, amino acid composition, particle size and molecular weight, and the collagen type was determined by Fourier Transform Infrared (FT-IR) Spectroscopy, and the potential areas of use of the obtained isolate as food, cosmetics and biomedical materials were discussed.

Keywords: *collagen, jellyfish, isolation, characterization, biomaterial*

Acknowledgments: *This work was supported by the Scientific and Technical Research Council of Turkey (TUBITAK), 1005 - National New Ideas And New Products Research Funding Program (123Z195).*

[PP 18]

Metal-Organic Framework for Removal of Methyl Orange Dye from Water

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Water is crucial for all life on earth and sustaining access to water has been a daily concern for humans for thousands of years. The great majority of evident water-related health problems is the result of contamination of water resources with dyes. Among the different types of dyes, methyl orange, azo anionic water-soluble organic synthetic dye, causes serious water pollution problems. The increasing population plus the growing complexity of municipal, agricultural and industrial activity originated the need for a systematic approach for treating water. To provide safe and accessible fresh water, water treatment methods have been applied since ancient times. The means of treating water have improved to keep up with increasing freshwater quality standards. In this study, electrochemical separation technique was used to remove methyl orange from aqueous solution. Zirconium-based metal-organic frameworks represented by UiO-66 were synthesized successfully for electrode preparation. The electrosorption cell in which the dye wastewater flows between two electrodes was designed in this study. 1.0 V was applied to these electrodes, ions in the wastewater were attracted to move towards the porous electrodes where they are adsorbed within the electrical double layer. The result showed the adsorption efficiency of methyl orange was higher than 90%.

***Keywords:** Water treatment, sustainability, separation technology, adsorption, dye removal.*

[PP 19]

Investigation of Silver Nanoparticles Synthesized by a Bacterium in Photocatalytic Activity

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Industrialization, increasing population, unconscious water consumption, and discharging waste into the environment without adequate treatment cause negative effects on the environment as well as human health. Wastewaters have to be treated before releasing into the environment. Nanoremediation is becoming a leading application in wastewater treatment with the low cost, fast production, and high efficiency of green-synthesized nanoparticles. The use of biogenic nanoparticles, which are both economical and environmentally friendly, represent an attractive candidate in nanoremediation. The efficacy of nanoparticles in the remediation of pollutants has made their use in treatment processes more attractive in recent years. Various nanoparticles are used to remove pollutants in wastewater. One of the most common and effective of these nanoparticles is silver nanoparticles.

In this study, silver nanoparticles (AgNPs) produced by *Stenotrophomonas maltophilia* were used to investigate for their photocatalytic activity in dye removal. To find the photocatalytic activity of the tested AgNPs, 10 mg of nanoparticles were added to an aqueous solution containing 10 mg/L dye. Continuous UV irradiation was used to carry out the experiments. The concentration of dye remaining in the medium was determined spectrophotometrically. The result of the study showed that silver nanoparticles synthesized by the bacterium *S. maltophilia* have a potential in photocatalytic activity.

Keywords: *photocatalytic activity, silver nanoparticle, green synthesis, Stenotrophomonas malto*

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