

PROCEEDINGS OF THE INTERNATIONAL SOPOT YOUTH CONFERENCE 2022



**10 JUNE 2022
SOPOT, POLAND**

<http://oceanofchanges/en/odn/isyc2022>

Proceedings of the International Sopot Youth Conference 2022: Where the World is Heading

Edited by

Paulina Pakszys

IO PAN/SSA; pakszys@iopan.pl

ISBN

978-83-946541-6-0

Published by

Sopot Science Association

Powstancow Warszawy 55

81-712 Sopot

www.stn.edu.pl

Today We Have

Powstancow Warszawy 71/1

81-712 Sopot

www.todaywehave.com



CONTENTS

PATRONAGE.....	5
SCIENTIFIC COMMITTEES.....	6
ORGANIZING COMMITTEE.....	7
FOREWORD.....	8
AGENDA.....	9
LIST OF POSTERS.....	12
ORAL PRESENTATION ABSTRACTS.....	13
Morphological, genomic and phylogenetic characterization of two <i>Pseudomonas aeruginosa</i> bacteriophages belonging to Litunavirus genus; A. Zalewska, A. Jurczak-Kurek, M. Gorniak ...	13
Seasonal changes in structure and functionality of benthic communities in the coastal zone of the Puck Bay; K. Styrz-Olesiak, U. Janas, H. Kendzierska.....	14
The coastal zone of the Gulf of Gdansk 30 years later; M. Gintowt.....	15
The role of small RNAs molecules in the regulation of repression-antirepression system of Φ 24B phage in <i>E. coli</i> bacteria; A. Lukasiak, N. Lewandowska, W. Wesolowski, P. Mach, A. Necel, S. Bloch, M. Ferenc, G. Wegrzyn, B. Nejman-Falencyk.....	16
Influence of non-native species on macrozoobenthic community structure – case of <i>Rangia cuneata</i> (Sowerby, 1832) in the Wisla Smiala River; Z. Czenczek.....	17
An empirical study on Critical Success Factors (CSF) of Indian social entrepreneurship considering community development, healthcare, and sustainable energy sectors; R. Dhani...	18
Implementation of Sustainable Development Goals in a School of Engineering and Architecture; A. Consejo, M. M. Bartuzel, P. Sevillano.....	19
Lifestyle and diet changes related to lockdowns - a comprehensive review; M. Gorska.....	20
The meaning of stress coping strategies and decision-making styles in the study of procrastination; W. Kujawa.....	21
A Sensing comparison of PZT and FBG sensors for applications in Structural Health Monitoring; S. Ahamad, T. Wandowski, R. Soman.....	22
Analysis of the elastic waves propagation in thin-walled structures; D. Mindykowski.....	23
Mucilaginous blooms in deep gorgonian forests of Tavolara Punta Coda Cavallo Marine Protected Area: involved species determination and mortality assessments; S. Sarbaz.....	24
New Insights from the Structure and Biodiversity Seasonality of the Airborne Eukaryotic Community in PM10 Samples over South-Eastern Italy; W. Hepert, B. Adamaszwili.....	25
Challenges of dating old cratons: an example from the Eoarchean Isukasia terrane, Itsaq Gneiss, SW Greenland; M. J. Mieszczak, D. J. Dunkley, M. A. Kusiak.....	26
Importance of 3.3 Ga magmatism in the Saglek block, Labrador; T. Keluskar, M. A. Kusiak, D. J. Dunkley.....	27
Past and future land use/land cover changes in the Ethiopian Fincha basin; M. Shiferaw Regasa, M. Nones.....	28

Potential impacts of historical and future land use land cover changes on hydrological responses of Nashe watershed; M. Kebede Leta, T. Adugna Demissie, J. Tränckner	29
Predicting a pattern of DEM modelled stick-slip events in faults using Machine Learning; P. Klejment.....	30
Halocline as an environmental barrier for animals. Variability of zooplankton community along the Kongsfjord (Svalbard Archipelago) W. Patula, M. Ronowicz, P. Kuklinski, A. Weydmann-Zwolicka.....	31
State of knowledge about the environmental pollution in South Shetland Island and Antarctic Peninsula; J. K. Buch.....	32
Variability of hydrological regimes of non-glaciated polar catchment in a changing climate; M. Majerska, T. Wawrzyniak, M. Osuch	33
The linkage between Atlantic Water intrusion and environmental changes in the northwestern Greenland Sea during the Late Glacial and Holocene; D. Devendra, M. Lacka, M. M. Telesinski, T. L. Rasmussen, K. Szybor, M. Zajaczkowski	34
POSTER PRESENTATION ABSTRACTS	35
Effect of citalopram (an anxiolytic drug) on selected haematological parameters in rats with induced amygdala hyperactivation; M. Dostani, J. Rucinski, E. Kurowska-Rucinska, S. Romanis, F. Olszanski, M. Bernard, D. Myslinska, I. Majkutewicz	35
The usage of Artificial Inteligence in biology and medicine; K. Gorlikowska.....	36
Characterization, Antifungal, and Antibacterial Activity of Bacteria Isolated from the Szczelina Chocholowska Cave Moonmilk Deposits (Tatra Mountains, Poland); W. Jaroszewicz, K. Kosznik-Kwasnicka, D. Lubomska, A. Wegrzyn.....	37
Mercury in the marine environment of the polar regions; E. Korejwo, J. Beldowski.....	38
Impact of the largest storm events during 1981-2021 period on the sediment transport in the Gulf of Gdansk; K. Kusek	39
Can small non-coding RNAs molecules regulate the phage switch from lysogeny to lytic development and its virulence? P. Mach, W. Wesolowski, N. Lewandowska, A. Lukasiak, S. Bloch, A. Necel, M. Ferenc, G. Wegrzyn, B. Nejman-Falencyk.....	40
How can diet improve our health? Nutriepigenetics as a target of novel therapies; S. Romanis, M. Dostatni, J. Rucinski, E. Kurowska-Rucinska	41
Micropollutants in the aquatic environment – impact and challenges; L. Sharma	42
Clinical significance of circulating heat shock protein 90 (Hsp90) and autoantibodies to Hsp90 in patients with atopic dermatitis; K. Sitko, M. Bednarek, J. Mantej, M. Trzeciak, S. Tukaj	43
The importance of riverine organic matter for macrozoobenthic food web and community structure in the Vistula River prodelta; M. Szczepanek, M. J. Silberberger, K. Kozirowska-Makuch, M. Kedra.....	44
S/S Stuttgart shipwreck as a source of mercury to surface sediments of the Gulf of Gdansk; A. Zarzeczanska, P. Plonska, A. Poplawska, J. Beldowski, L. Leczynski, M. Beldowska	45

PATRONAGE



Sopot Science Association

<http://www.stn.edu.pl>

Institute of Oceanology
Polish Academy of Sciences

<http://www.iopan.pl>

Ocean of Changes

<http://www.oceanofchanges.com>

SCIENTIFIC COMMITTEES

NATURAL SCIENCES

Ezio Bolzachini, University of Milano-Bicocca, Italy
Joanna Calkiewicz, SSA/NMFRI, Poland
Joachim Dengg, GEOMAR, Germany
Luca Ferrero, University of Milano-Bicocca, Italy
Carlos Garcia-Soto, University of the Basque Country, Spain
Urszula Janas, University of Gdansk, Poland
Maria Carmen García Martínez, IEO-CSIC, Spain
Michael Nones, IGF PAN/GeoPlanet, Poland
Paulina Pakszys, SSA/IO PAN, Poland
Karolina Pierzynowska, University of Gdansk, Poland
Szymon Smolinski, SSA/NMFRI, Poland
Rohan Soman, Institute of Fluid Flow Machinery, PAS, Poland
Grzegorz Wegrzyn, University of Gdansk, Poland
Marta Wojewodka-Przybyl, ING PAN/GeoPlanet, Poland
Tymon Zielinski, SSA/IO PAN, Poland

HUMANITIES AND SOCIAL SCIENCES

Mehrdad Ahmadian, Co-Managing for EDSA/General Director for Iranian Branch of EDSA
Adam Cameron Batmanghlich, EDSA (Eurasian Doctoral Student Academy)
Colin Campbell, University of Reading, United Kingdom
Adam Jagiello-Rusilowski, ISEF, The Netherlands/University of Gdansk/Ashoka, Poland
Izabela Kotynska-Zielinska, SSA/Today We Have, Poland
Katarzyna Kukowicz-Zarska, Ateneum/University in Gdansk, Poland
Dorota Majewicz, SSA/Co-Managing Director for EDSA, Poland
Grazyna Niedoszytko, NMFRI-Gdynia Aquarium, Poland

Joseph G. Sapienza, Royal Academy, Mongolian International University

Natalia Treder-Rochna, SSA/University of Gdansk, Poland

YOUNG SCIENTIFIC COMMITTEE

Marta Konik, SSA/IO PAN, Poland

Niccolò Losi, University of Milano-Bicocca, Italy

Natalia Szymanska, SSA/IO PAN, Poland

Aleksandra Koroza, SSA/IO PAN, Poland

ORGANIZING COMMITTEE

Paulina Pakszys, SSA/IO PAN, Poland; Email: pakszys@iopan.pl

Izabela Kotynska-Zielinska, SSA/TWH, Poland; Email: kotynska-zielinska@todaywehave.com

Tomasz Kijewski, SSA/IO PAN, Poland

Aleksandra Koroza, SSA/IO PAN, Poland

Anna Miler, Inkubator STARTER, Poland

Katarzyna Romancewicz, SSA/IO PAN, Poland

Marta Wojewodka-Przybyl, ING PAN/GeoPlanet, Poland; Email: m.wojed@twarda.pan.pl

Anna Zdunek, IGF PAN/GeoPlanet, Poland

FOREWORD

Climate change and associated modification of every aspect of our planet's reality is a fact, however, it seems to be still very undervalued and little understood challenge of our times. We live in a world where information and knowledge are increasingly being amassed and often inaccessible, incomprehensible and misunderstood by society. Given that society has access to many levels of information through various forms of media, it is of a crucial importance to find most effective ways to better share this knowledge, and improve understanding of how society is impacting their immediate and remote surroundings and what behavioral changes are needed for reducing those impacts.

Through our conference we create a platform for improving societal knowledge on various aspects of different fields of science that takes advantage of the technological abilities for data collection and processing, global and regional research, as well as good practices in every field of science, including aspects of modern education.



Tymon Zielinski

Chairman of the Sopot Science Association

AGENDA

10 JUNE 2022

- 9:00 **Conference start**
- 9:00 – 9:10 **Welcome by Jan Marcin Weslawski, IO PAN Director
and Tymon Zielinski, IO PAN, Sopot Science Association Chair**
- 9:10 – 9:45 **Where the world is headed: The future is female.
Joachim Dengg, GEOMAR**
- 9:45 – 10:00 **Break**
- 10:00 – 11:15 **Session 1**
**Session Chair: Aleksandra Koroza, Institute of Oceanology Polish Academy
of Sciences**
- 10:00 – 10:15 **Morphological, genomic and phylogenetic characterization of two
Pseudomonas aeruginosa bacteriophages belonging to Litunavirus genus
Aleksandra Zalewska, University of Gdansk**
- 10:15 – 10:30 **Seasonal changes in structure and functionality of benthic communities in the
coastal zone of the Puck Bay
Kamila Styrzcz-Olesiak, University of Gdansk**
- 10:30 – 10:45 **The coastal zone of the Gulf of Gdansk 30 years later
Michal Gintowt, Institute of Oceanology Polish Academy of Sciences**
- 10:45 – 11:00 **The role of small RNAs molecules in the regulation of repression-
antirepression system of Φ 24B phage in E. coli bacteria
Aleksandra Lukasiak, University of Gdansk**
- 11:15 – 11:15 **The role of small RNAs molecules in the regulation of repression-
antirepression system of Φ 24B phage in E. coli bacteria
Zuzanna Czenczek, University of Gdansk**
- 11:15 – 11:20 **Coffee break**
- 11:20 – 12:15 **Session 2**
Session Chair: Grazyna Niedoszytko, NMFRI-Gdynia Aquarium
- 11:20 – 11:35 **An empirical study on Critical Success Factors (CSF) of Indian social
entrepreneurship considering community development, healthcare, and
sustainable energy sectors
Rupam Dhani, School of Management Studies Techno India**

11:35 – 11:50 Implementation of Sustainable Development Goals in a School of Engineering and Architecture

Alejandra Consejo, University of Zaragoza

11:50 – 12:05 Lifestyle and diet changes related to lockdowns - a comprehensive review

Marta Gorska, University of Wrocław

11:55 – 12:20 The meaning of stress coping strategies and decision-making styles in the study of procrastination

Wiktoria Kujawa, University of Gdańsk

12:20 – 12:25 Coffee break

12:25 – 13:10 Session 3

Session Chair: Luca Ferrero, University of Milano-Bicocca

12:25 – 12:40 A Sensing comparison of PZT and FBG sensors for applications in Structural Health Monitoring

Sultan Ahamad, Institute of Fluid-Flow Machinery Polish Academy of Sciences

12:40 – 12:55 Analysis of the elastic waves propagation in thin-walled structures

Damian Mindykowski, Institute of Fluid-Flow Machinery Polish Academy of Sciences

12:55 – 13:10 Reference free damage detection based on instantaneous base line using FBG sensors

Sara Sarbaz, Institute of Fluid-Flow Machinery Polish Academy of Sciences

13:10 – 13:25 Lunch Break

13:25 – 13:35 Poster session summary (Posters will be available on Padlet from 9 June)

13:35 – 15:05 Session 4

Session Chair: Marta Wojewodka-Przybyl, ING PAN/GeoPlanet & **Michael Nones**, IGF PAN/GeoPlanet

13:35 – 13:50 Aerosols PM10 and PM2.5; variability of concentration and air quality in Tricity agglomeration throughout the years

Wirginia Hepert, University of Gdańsk

13:50 – 14:05 Challenges of dating old cratons: an example from the eoproterozoic Isukasia terrane, Itsaq gneiss, SW Greenland

Marcin J. Mieszczyk, Institute of Geophysics Polish Academy of Sciences

14:05 – 14:20 Importance of 3.3 Ga magmatism in the Saglek block, Labrador

Tanmay Keluskar, Institute of Geophysics Polish Academy of Sciences

14:20 – 14:35 Past and future land use/land cover changes in the Ethiopian Fincha basin
Motuma Shiferaw Regasa, Institute of Geophysics Polish Academy of Sciences

14:35 – 14:50 Potential impacts of historical and future land use land cover changes on hydrological responses of Nashe watershed

Megersa Kebede Leta, University of Rostock

14:50 – 15:05 Predicting a pattern of DEM modelled stick-slip events in faults using Machine Learning

Piotr Klejment, Institute of Geophysics Polish Academy of Sciences

15:05 – 15:10 Coffee break

15:10 – 16:10 Session 5

Session Chair: Paulina Pakszys, Institute of Oceanology Polish Academy of Sciences

15:10– 15:25 Halocline as an environmental barrier for animals. Variability of zooplankton community along the Kongsfjord (Svalbard Archipelago)

Weronika Patula, Institute of Oceanology Polish Academy of Sciences

15:25 – 15:40 State of knowledge about the environmental pollution in South Shetland Island and Antarctic Peninsula

Joanna Buch, University of Gdansk

15:40 – 15:55 Variability of hydrological regimes of non-glaciated polar catchment in a changing climate

Marta Majerska, Institute of Geophysics Polish Academy of Sciences

15:55 – 16:10 The linkage between Atlantic Water intrusion and environmental changes in the northwestern Greenland Sea during the Late Glacial and Holocene

Dhanushka Devendra, Institute of Oceanology Polish Academy of Sciences

16:10 – 16:30 Coffee break

16:30 – 17:30 Women and Girls in Science Panel

Session Chair: Tymon Zielinski, Institute of Oceanology Polish Academy of Sciences

17:30– 17:40 Announcements of the winners

17:40 Closing of the conference

LIST OF POSTERS

- 1. Effect of citalopram (an anxiolytic drug) on selected haematological parameters in rats with induced amygdala hyperactivation.**
Dostatni Malgorzata, et al., University of Gdansk
- 2. The usage of Artificial Intelligence in biology and medicine.**
Gorlikowska Kamila, University of Gdansk
- 3. Characterization, Antifungal, and Antibacterial Activity of Bacteria Isolated from the Szczelina Chocholowska Cave Moonmilk Deposits (Tatra Mountains, Poland).**
Jaroszewicz Weronika, et al., University of Gdansk
- 4. Mercury in the marine environment of the polar regions.**
Korejwo Ewa and Jacek Beldowski, Institute of Oceanology Polish Academy of Sciences
- 5. Impact of the largest storm events during 1981-2021 period on the sediment transport in the Gulf of Gdansk.**
Kusek Klaudia, Institute of Meteorology and Water Management-National Research Institute
- 6. Can small non-coding RNAs molecules regulate the phage switch from lysogeny to lytic development and its virulence?**
Mach Paulina, et al., University of Gdansk
- 7. How can diet improve our health? Nutriepigenetics as a target of novel therapies.**
Romanis Sandra et al., University of Gdansk
- 8. Micropollutants in the aquatic environment – impact and challenges.**
Sharma Lilliana, Institute of Oceanology Polish Academy of Sciences
- 9. Clinical significance of circulating heat shock protein 90 (Hsp90) and autoantibodies to Hsp90 in patients with atopic dermatitis.**
Sitko Krzysztof et al., University of Gdansk
- 10. The importance of riverine organic matter for macrozoobenthic food web and community structure in the Vistula River prodelta.**
Szczepanek Marta et al., Institute of Oceanology Polish Academy of Sciences
- 11. S/S Stuttgart shipwreck as a source of mercury to surface sediments of the Gulf of Gdansk.**
Agnieszka Zarzeczanska et al., University of Gdansk

ORAL PRESENTATION ABSTRACTS

Morphological, genomic and phylogenetic characterization of two Pseudomonas aeruginosa bacteriophages belonging to Litunavirus genus

A. Zalewska, A. Jurczak-Kurek, M. Gorniak

Faculty of Biology, University of Gdansk, Jana Bazynskiego 8, 80-309 Gdansk, Poland.

Gdansk Wastewater Treatment Plant collects urban sewage from metropolitan area of Tricity. It is also a rich source of bacteria and bacteriophages. Water treatment significantly reduces the amount of microorganisms in sewage. However, some of them, owing to adaptation, are capable of surviving the process and end up in Gdansk Bay waters.

In this research we have carried out genomic, phylogenetic and biological analysis of two bacteriophages, isolated from raw urban sewage. Phages were propagated using clinical strains of *Pseudomonas aeruginosa* – ubiquitous species that is one of the most relevant pathogens of humans.

The electron microscopy analysis has revealed that both phages have icosahedral capsids 60 nm and to short 30 nm tails. Both form clear plaques on the lawns of their hosts. Interestingly the differences in plaque morphology were observed between phages when propagated on different bacterial strains.

Comparing two genomes has shown no difference in nucleotide sequences, suggesting that the phages belong to the same *Litunavirus* species. The analysis has also revealed recombinations in tail protein genes, engaged in binding to the receptors on bacteria during infection and linked to the host range extension. Due to recombinant nature of phages' genomes, establishing their phylogenetic position remains difficult.

The release of such bacteriophages with treated sewage to waters of Gdansk Bay may influence the natural microbiome present in the new environment.

Seasonal changes in structure and functionality of benthic communities in the coastal zone of the Puck Bay

K. Styrz-Olesiak, U. Janas, H. Kendzierska

Faculty of Oceanography and Geography, University of Gdansk, Pilsudskiego Av. 46,
81-378 Gdynia, Poland

Coastal zone is very important for the marine ecosystem. It is a filter which limits the transport of nutrients into an open sea. Benthic macrofauna performs various roles which are crucial for entire ecosystem e.g.: as a food for fishes and birds or bioturbator of sediment. The term bioturbator describe living benthic organism whose activity influence the sediment in which it lives. Thanks to this activity sediment is more oxygenated and biogeochemical process could be changed. In Puck Bay there is little research coming from the coastal zone. The main aim of the study was to determine the distribution of macrozoobenthos, as well as seasonal changes in taxonomic composition, structure and functionality of benthic communities in various habitats in the Puck Bay. Samples were collected with a van Veen grab in March, June and September 2015 in the outer Puck Bay at three stations at the depth of 2, 6 and 23 meters. Both shallow stations are characterized by high biodiversity which totals above 25 taxa of macrozoobenthos. The presence of the engineering species *Zostera marina* and *Mytilus trossulus* results in an increase of the benthic taxa biodiversity as well as their abundance and biomass. At the deepest station, with the lowest number of taxa (17), there was also the lowest abundance and biomass of macrozoobenthos. Values of bioturbation potential index at each analysed research station where the highest in June and the lowest in March.

The coastal zone of the Gulf of Gdansk 30 years later

M. Gintowt

Institute of Oceanology Polish Academy of Sciences, Powstancow Warszawy 55, 81-712 Sopot, Poland

The Gulf of Gdańsk is a unique reservoir in the southern part of the Baltic Sea. Specific hydrological and geomorphological conditions influence the development of diversified and relatively rich plant and animal communities, multi-species underwater meadows shape the richness of benthic and pelagic fauna assemblages. A wide range of habitat types are found in this area, from the dominant sandy substrate, through coastal reed beds and regenerating *Zostera marina* underwater meadows, to stony reefs at the foot of the Orłowo cliff, known as oases of biodiversity. Benthic habitats in the coastal zone are under anthropogenic pressure resulting from the tourist attractiveness of the region. The anthropogenic pressure is especially evident in summer due to the increased number of tourists, and its effects are visible throughout the year. The proximity of the Tricity agglomeration and smaller towns makes the area easily accessible all year round. Despite this, a decrease in the amount of municipal pollutants and a biogenic substances reaching the waters of the Gulf of Gdańsk via surface waters is observed. This may indicate a significant improvement in coastal habitats quality and the possibility of the return of species currently no longer recorded in natural monitoring.

Comparison of the obtained results with previous surveys carried out in the coastal area will be crucial in determining the present condition of zoobenthic habitats and understanding the direction of ongoing changes.

The role of small RNAs molecules in the regulation of repression-antirepression system of Φ 24B phage in *E. coli* bacteria

A. Lukasiak¹, N. Lewandowska¹, W. Wesolowski¹, P. Mach¹,
A. Necel¹, S. Bloch¹, M. Ferenc², G. Wegrzyn¹, B. Nejman-Falenczyk¹

¹Department of Molecular Biology, University of Gdansk, Wita Stwosza 59, 80-308 Gdansk, Poland

²The Nalecz Institute of Biocybernetics and Biomedical Engineering, Polish Academy of Sciences (IBBE PAS), Ksiecia Trojdena 4, 02-109 Warsaw, Poland

Shiga-toxin converting bacteriophages (Stx phages) are bacterial viruses that infect *Escherichia coli* strains. As a result of infection, bacteria gain the ability to produce dangerous to human toxin Shiga as toxin genes (stx) are located in the phage genome. Importantly, mature toxin only appears during the lytic cycle of the phage, and its production is suppressed during the lysogenic cycle. In this light, stopping the phage switch from lysogenic to the lytic cycle seems to be an essential way to counteract infection and prevent the negative effects of the toxin on the human body. A few new molecules of microRNA-size, have been identified during the Φ 24B phage development in *E. coli*. Sequences of these molecules are located in the phage genome in the regions of antirepressor genes and are highly conserved in the group of Stx phages. Moreover, bioinformatics analysis indicated the presence of many potential binding sites for these molecules in both, phage and bacterial genomes, including genes encoding crucial for lytic development antirepressors.

Experiments performed under overexpression or deletion conditions of these molecules confirmed that they may regulate different aspects of phage development in bacterial cells. The preliminary results showed that some of them favor the lysogenic state, whereas others seem to stimulate the lytic pathway. Based on the obtained results we speculate a significant role of these molecules in the phage life cycle switching process.

Influence of non-native species on macrozoobenthic community structure – case of *Rangia cuneata* (Sowerby, 1832) in the Wisła Śmiala River

Z. Czenczek

Faculty of Oceanography and Geography, University of Gdansk, Pilsudskiego Av. 46,
81-378 Gdynia, Poland

The mouth of Wisła Śmiala River is a unique ecosystem combining brackish sea environment with freshwater river. This area is particularly exposed to the introduction of alien species due to the proximity of the Port of Gdansk and high exploitation. One of the new alien species introduced into the Baltic Sea in recent years is *Rangia cuneata* (Sowerby, 1832). This species native to the Gulf of Mexico was transported to Europe from North America in the early 2000s. In August 2014, during the macrozoobenthos research in Wisła Śmiala, the first individuals of this species, both young and adults, were recorded.

The aim of the research was to determine the diversity of benthic communities at the mouth of the Wisła Śmiala, with particular emphasis on *R. cuneata* and structure of Bivalvia taxa in the area. For this purpose, in 2015 samples were collected from several stations near the mouth and into the river. The obtained biological material was analyzed in terms of density, biomass and indicators of biodiversity and biological equality.

The conducted analyzes showed the presence of 23 taxa, including 5 species of clams. At one of the stations where *R. cuneata* was recorded, this species made more than half of the macrozoobenthos biomass. On this station, the highest values of Margaleff and Shannon-Wiener indices were obtained. In terms of biomass, *Mya arenaria* and *Macoma balthica* usually dominated at stations where *R. cuneata* was not recorded.

An empirical study on Critical Success Factors (CSF) of Indian social entrepreneurship considering community development, healthcare, and sustainable energy sectors

R. Dhani

School of Management Studies Techno India. EM 4/1 Salt Lake, Sector V, Kolkata – 700091 West Bengal, India

In the second most populated country like India, large portions of the population are from low-income groups. So, there is a huge gap between the few high-income communities and larger low-income communities in terms of economic and social conditions. Hence government cannot do everything to uplift the livelihood of this large population. This is the scenario of developing countries where social entrepreneurs are needed to take care of these community in terms of providing solutions of various societal issues in sustainable manner with innovative way especially during pandemics and its consequences. The main purpose of this research paper is to assessing the impacts of social entrepreneurship in respect of their contribution during Pandemic Times. A practical scenario will be highlighted in Indian perspectives through from different sectors. Also, to identify their critical success factors for involvement. The secondary data-based research will be conducted by analyzing various company's and government's reports and other articles. The outcome of this research work will encourage the young population of India and other countries to come forward and contribute towards social needs through social entrepreneurship in this volatile environment across the globe during pandemic.

Implementation of Sustainable Development Goals in a School of Engineering and Architecture

A. Consejo¹, M. M. Bartuzel², P. Sevillano³

¹University of Zaragoza, Maria de Luna 3, 50018, Zaragoza, Spain

²Nicolaus Copernicus University, Grudziadzka 5, 87-100, Torun, Poland

³University of Zaragoza, Pedro Cerbuna 12, 50009, Zaragoza, Spain

The Sustainable Development Goals (SDGs) are the world's shared plan to end extreme poverty, reduce inequality, and protect the planet by 2030. SDGs are supported by United Nations Foundation. The aim of this work is twofold: (1) Discuss how The School of Engineering and Architecture at the University of Zaragoza (Spain) has implemented the SDGs in the institution (i.e., related activities, syllabus modifications, publicity on campus, student's and personnel engagement) and (2) Describe the opinion a group of first-year students of the Degree in Mechanical Engineering has about the SDGs. Among all the students who replied to the distributed anonymous questionnaire, 45% declared they were aware of the existence of SDGs and their meaning while the rest didn't have clear ideas. However, over 60% of students confirmed they know what the 2030 Agenda consists of. Overall, students declared they were happy with the manner SDGs are being implemented in their school. As engineering students, they acknowledged SDG 3 (good health and well-being) and SDG 9 (industry, innovation, and infrastructure) as those SDGs to which they can actively contribute more with their academic work.

Lifestyle and diet changes related to lockdowns - a comprehensive review

M. Gorska

Faculty of Biological Sciences, University of Wrocław, Stanisława Przybyszewskiego
63, 51-148 Wrocław, Poland

The research aimed to identify how the lockdowns related to the COVID-19 pandemic affected eating habits and lifestyles nationwide. The obligatory isolation resulted in two opposite change patterns – a healthy and an unhealthy one. On one hand, staying home has risen positive habits of working out and cooking at home, which led to weight loss and an improvement in sleep quality as well as overall mood. On the other hand, the pandemic has also influenced the consumption of unhealthy food and the amount of snacking, simultaneously limiting the access to fresh food or the ability to workout outdoors. Remote work and online classes significantly increased screen time, which triggered major changes in daily habits, including beneficial ones like getting the proper amount of sleep, but also unfavorable ones, such as limiting physical activity, potentially causing obesity. This study tries to summarize different outcomes of dietary and lifestyle changes during the COVID-19 pandemic and explain the reason for such diverse results between prohealthy and poor adjustments to lockdowns.

The meaning of stress coping strategies and decision-making styles in the study of procrastination

W. Kujawa

University of Gdansk, Jana Bazynskiego 8, 80-309, Gdansk, Poland

Procrastination - defined as the chronic, voluntary postponement of issues - is an increasingly common and widespread phenomenon. Previous research indicates that procrastination is related mainly to age, impulsivity, perfectionism, perceived stress level and overall life satisfaction. However, a literature review identified other possible factors associated with procrastination. The purpose of this study was to determine whether respondents' preferred coping strategies and decision-making styles is associated with the individual's procrastination propensity. There were 109 respondents examined. The data was collected via questionnaires. The analyses revealed that individuals with higher procrastination propensities, in comparison to those with lower procrastination tendency, differed with two (out of seven) coping strategies: active coping and helplessness. Also, participants who tended to procrastinate were more avoidant, spontaneous, and less rational in terms of decision-making styles. In addition, the conducted regression analyses identified variables that have explained more than 40% of the variance in behavioral procrastination. Specifically, procrastination was accounted for by younger age, lower propensity to cope with stress actively, and an avoidant decision-making style.

A Sensing comparison of PZT and FBG sensors for applications in Structural Health Monitoring

S. Ahamad, T. Wandowski, R. Soman

Institute of Fluid-Flow Machinery Polish Academy of Sciences, Stanislawa Fiszerka 14,
80-231 Gdansk, Poland

Structures such as bridges, tunnels, large dams, and other infrastructures have a finite lifespan and are liable to structural defects such as corrosion, fatigue, wear, delamination, etc. Continuous damage assessment realized by Structural Health Monitoring (SHM) approach increases the structure's safety and reliability and also provides important information about these. For SHM, different sensors, such as piezoelectric transducers (PZT), Fiber Bragg Grating strain sensors (FBG), accelerometers, and others, are used to sense the elastic waves generated in structures, then these elastic waves are analyzed to identify the defects. PZT transducers are low-cost, and low weight but due to electrical connections are prone to electromagnetic interferences which produce noise in the signals.

In this research, to overcome these issues optical FBG strain sensors were used for sensing the elastic waves because they use fiber optic instead of cables and are not prone to electromagnetic interferences. The research was related to the aluminum plate, in which elastic waves were generated by the PZT actuator and were sensed by PZT and FBG sensors for the comparative study of sensing sensitivity. FBG sensor-based SHM technique can be used in a large number of application which will give high accuracy and it is very lightweight also.

Analysis of the elastic waves propagation in thin-walled structures

D. Mindykowski

Institute of Fluid-Flow Machinery Polish Academy of Sciences, Stanislawa Fiszer 14,
80-231 Gdansk

Non-destructive testing (NDT) of metal and composite structures is getting still rising meaning during the last few decades. An efficient method of NDT is the method related to the elastic (guided) waves propagation. During the waves propagation material particles experience local displacements. While the waves propagation is analysed, locations with disturbances in local displacements of the particles are desired to be found. Such locations may suggest potential defects of the structure. Such issues are undertaken in the presentation with the closer insight into guided waves propagation analysis. Different results related to the waves propagation are specified, including point-wise measurements, measurements along line and full wavefield measurements in case of carbon fiber-reinforced polymer (CFRP) plate-like structure. Additionally, full wavefield measurement results in case of aluminum (Al) plate-like structure are presented. Indication of factors influencing elastic waves propagation is made. Some effort is put on the issue of the impact of optimal transducer slope angle θ on the waves propagation efficiency. The results of the waves analysis are commented and relevant conclusions are formed.

***Mucilaginous blooms in deep gorgonian forests of Tavolara
Punta Coda Cavallo Marine Protected Area: involved species
determination and mortality assessments***

S. Sarbaz

Institute of Fluid-Flow Machinery Polish Academy of Sciences, Stanislawa Fiszerka 14,
80-231 Gdansk, Poland

The baseline free damage detection method of Lamb waves detect some features in the signal which are present due to the presence of the damage. This approach overcomes the need of a pre-measured baseline which provides a wider applicability of the method to existing structures suspected to have deteriorated. Among all present base-line free methods, the instantaneous baseline techniques are inherently more robust to ambient condition changes which allows application to a structure in different ambient conditions. In this study an experiment has been conducted to investigate the theory of instantaneous baseline approach using pairs of actuators and an FBG sensors in a circular pattern. Comparison of signals obtained from each pairs of actuators and determination of instantaneous baseline will provide us with the information of the existent damages.

New Insights from the Structure and Biodiversity Seasonality of the Airborne Eukaryotic Community in PM10 Samples over South-Eastern Italy

W. Hepert, B. Adamaszwili

Faculty of Oceanography and Geography, University of Gdansk, Jana Bazynskiego 8,
80-309 Gdansk, Poland

For years, the ARMAAG Foundation has been providing information about air quality in Tri-city, Poland. Continuous measurement analysis results in annual reports, informing about atmosphere quality and air components concentration. On the basis of these data, detailed analysis of particulate matter concentration was developed looking for trends and dependencies. The fact is, that particulate matter is considered one of the most significant, potential risks to human health, related to air pollution. Those particulates refer to the solid and liquid particles dispersed and suspended in the atmosphere. Hazardous for humanity and environment, as a frequent product of combustion process and daily transport. All these particles contained in the atmosphere come under chemical and physical processes which have an impact on their concentration and propagation. Due to obvious harmfulness, we have to respect particular restrictions as for pollution emission. In the result, it does have an effect in daily, seasonal and annual pollution variability. Is it still possible for humanity, to achieve approvable air quality in big cities and agglomerations? We observe changes throughout the years, particularly over areas desperately exposed to high pollution concentration. To this end, measurements from the ARMAAG Foundation operating in Gdansk, Sopot and Gdynia (concentration of PM10, PM2.5) have been analyzed. It is shown that PM's concentration is constantly changing due to human efforts.

Challenges of dating old cratons: an example from the Eoarchean Isukasia terrane, Itsaq Gneiss, SW Greenland

M. J. Mieszczyk, D. J. Dunkley, M. A. Kusiak

Department of Polar and Marine Research, Institute of Geophysics Polish Academy of Sciences, Ksiecia Janusza 64, 01-452 Warsaw, Poland

Studying early Earth is challenging because of poor preservation of geological evidence that pre-dates metamorphism and deformation. This is especially the case in the Eoarchean (4000-3600 million years ago, Ma), where most rocks have been converted into amphibolite or granulite-facies gneisses. Studying such rocks is possible thanks to a few minerals and their exceptional properties. Microbeam dating of zircon, a mineral that is most likely to survive metamorphism and deformation, can tell us the original age of the host rock and the events that affected it.

The western edge of the North Atlantic Craton (NAC) contains domains of Eoarchean crust. The best known is in the Itsaq Gneiss of SW Greenland, which includes the Isukasia terrane [1] with preserved Eoarchean field relationships. New Secondary Ion Mass Spectrometry (SIMS) zircon dating from Isukasia reveals ages of ca. 3705 Ma from the northern sub-terrane and ca. 3786 Ma in the southern sub-terrane for the intrusions of granitoids. Despite the complexity in both isotopic data and internal textures in zircon grains, these can be interpreted to obtain reliable ages for geological events in old cratons.

Reference

[1] Nutman A.P and Bennett V.C. (2018). In: M.J. van Kranendonk, V.C. Bennett and J.E. Hoffmann (Eds). *Earth's Oldest Rocks* (2nd edition), pp. 375-399.

This research was funded by NCN grant UMO2019/34/H/ST10/00619 to MAK.

Importance of 3.3 Ga magmatism in the Saglek block, Labrador

T. Keluskar, M. A. Kusiak, D. J. Dunkley

Institute of Geophysics Polish Academy of Sciences, Ksiecia Janusza 64, 01-452
Warsaw, Poland

Reliable interpretation of field relationships is crucial for understanding the evolution of areas with complex geological histories. The Saglek Block of the Labrador coast, Canada, has a complex magmatic and deformation history spanning from 3.85 Ga to 2.5 Ga. The dominant lithology of the Saglek Block is the Uivak Gneiss, which includes tonalite-trondhjemite- granodiorite (TTG) gneisses. This has been subdivided into Uivak I and Uivak II, with the former being mostly fine-grained TTG gneiss with variable composition, while later is mostly Fe-rich augen gneiss (Bridgwater et al., 1976). The estimated age for Uivak II varies from 3.6 to 3.3 Ga, and the term Uivak II was recently replaced by Maidmonts Gneiss with an estimated age of 3.3 Ga (Sałacińska et al. 2019). We present new 3.3 Ga ages for augen gneiss from Mentzel Island, previously mapped as Uivak II Gneiss. This matches with the augen gneiss from Maidmonts Island. If the Uivak II Gneiss elsewhere, which has enclaves of supracrustal rocks that were assumed to be Eoarchean (4.0 to 3.6 Ga), are in fact only 3.3 Ga, then such supracrustal rocks may be much younger than previously thought.

References:

Bridgwater et al. (1976). *Contrib Mineral Petrol*, 54:43–59

Sałacińska et al. (2019). *Int J Earth Sci*, 108, 753–778

This research was funded by NCN grant UMO2019/34/H/ST10/00619 to MAK.

Past and future land use/land cover changes in the Ethiopian Fincha basin

M. Shiferaw Regasa, M. Nones

Institute of Geophysics Polish Academy of Sciences, Ksiecia Janusza 64, 01-452
Warsaw, Poland

The increasing human pressure on African regions is recognizable from land use land cover (LULC) changes maps, as derived from satellite imagery. Using the Ethiopian Fincha watershed as a case study, the present work focuses on i) identifying historical LULC change in the period 1989-2019; ii) estimating LULC in the next thirty years, combining Geographical Information Systems with Land Change Modelling (LCM). The Fincha watershed was classified into six classes: water body, grass/swamp, built-up, agriculture; forest and shrub. Landsat 5/8 satellite images were combined with field evidence to map LULC in three reference years (1989, 2004, 2019), while the Multi-Layer Markov Chain (MPL-MC) model of LCM was applied to forecast LULC in 2030, 2040 and 2050. The results show that, in the past 30 years, the Fincha watershed experienced a reduction of forest and shrubs due to ever-increasing agricultural activities, and such a trend is also expected in the future if not contrasted by different land use policies. In addition, the decrease in areas covered by natural forests can drive to an increase in soil erosion, fostering the siltation in the water reservoirs located in the basin. The preliminary results of this study point out the urgency of taking actions in the basin to counteract such changes, which can eventually drive to a less sustainable environment.

This research was funded by NCN National Science Centre Poland–call PRELUDIUM BIS-1, Grant Number 2019/35/O/ST10/00167.

Potential impacts of historical and future land use land cover changes on hydrological responses of Nashe watershed

M. Kebede Leta^{1,2}, T. Adugna Demissie², J. Tränckner¹

¹Faculty of Agriculture and Environmental Sciences, University of Rostock, Satower Str. 48, 18051 Rostock, Germany

²Faculty of Civil and Environmental Engineering, Jimma Institute of Technology, Jimma University, Jimma 378, Ethiopia

The changes of LULC have an important influence and are the main factor for monitoring the water balances. Water balance variables are essential in planning and management. Five LULC scenarios that represent baseline, current, and future periods corresponding to the map of 1990, 2005, 2019, 2035, and 2050 have been established. The hybrid land use classification technique for classifying Landsat images (1990, 2005 and 2019). Land Change Modeler (LCM) integrated in TerrSet assimilated with Multi-Layer Perceptron neural networks and Cellular Automata-Markov Chain for prediction of the 2030 and 2045 LULC states. The Soil and Water Assessment Tool (SWAT) is one of the most widely used hydrological models were also employed in these analyses. The contribution of each of the LULC classes was examined with the Partial Least Squares Regression (PLSR) model. The applied combination of LULC prognosis with process-based hydrologic modelling provide valuable data about the current and future understanding of variation in hydrological parameter.

Predicting a pattern of DEM modelled stick-slip events in faults using Machine Learning

P. Klejment

Institute of Geophysics Polish Academy of Sciences, Ksiecica Janusza 64, 01-452
Warsaw, Poland

Scientists have long wondered how to understand the mechanisms that lead to earthquakes. Despite all efforts, there was a consensus that earthquakes were simply unpredictable and the timing and magnitude of the next event could not be predicted. However, in recent years, a new method has gained popularity, giving a glimmer of hope for a new approach to this problem. This method is machine learning, which is revolutionizing basically all branches of science. Machine learning offers solutions where classic approach do not work well, and it is difficult to find out explicit rules because there are too many variables that potentially affect the result.

A well-known fact in seismology is that fault fracture mechanisms are similar to stick-slip phenomena, where earthquakes are associated with a slip phase. This study proposes the use of supervised machine learning to search for precursors that precede the slip event within the fault. The fault was modeled numerically by the Discrete Element Method (DEM). Data collected during the simulation were divided into segments, and different statistical parameters were calculated for each segment (mean, variability of this mean and others). This data was used to train the machine learning models with a try to predict the time of subsequent slips with adequate accuracy.

Halocline as an environmental barrier for animals. Variability of zooplankton community along the Kongsfjord (Svalbard Archipelago)

W. Patula¹, M. Ronowicz¹, P. Kuklinski¹, A. Weydmann-Zwolicka²

¹Department of Ecology, Institute of Oceanology Polish Academy of Sciences, Powstancow Warszawy 55, 81-712 Sopot, Poland

²Institute of Oceanography, University of Gdansk, Marszalka Pilsudskiego Av. 46, 81-378 Gdynia, Poland

The Arctic is recognized as the fastest-warming area of the world. Also, the increasing inflow of warmer and saltier Atlantic water further north into the Arctic ocean is observed. These affect the depth of the halocline in the Arctic which is one of the key factors deciding about the stability of the Arctic ecosystem. In this study, we investigated the composition of zooplankton from above and under halocline in the Kongsfjord, West Spitsbergen. Located in the Atlantic Arctic, Kongsfjord is a glacial fjord influenced by warmer and saltier Atlantic waters. Thus, it enables to observe the impact of changing environmental conditions on pelagic animals. We hypothesized that the halocline, as an environmental barrier, will differentiate the taxonomic composition of zooplankton in the water column of the fjord. To test this hypothesis, we collected zooplankton samples from above and under the halocline at 8 sampling stations located along the Kongsfjord (from outer to inner part). For samples collection, the "Juday" plankton net (mesh size 56 µm) was used. At each station, the halocline depth was distinguished based on salinity measurements from the CTD probe. The depth of the halocline differed along the study transect (from 10 to 55 m). Our results showed a clear clustering of the zooplankton composition and abundance into above and under the halocline groups, which suggest the halocline might be an important factor driving zooplankton community structure in the Kongsfjord.

State of knowledge about the environmental pollution in South Shetland Island and Antarctic Peninsula

J. K. Buch

Institute of Oceanography, University of Gdansk, Marszalka Pilsudskiego Av. 46, 81–378 Gdynia, Poland

Antarctica is the coldest and most isolated area of the Earth, which is the only one not permanently inhabited by humans and has been the subject of scientific interest for many decades. The first research expeditions took place in the nineteenth century. From the middle of the last century, research centers began to be built which a large part is still in operation today. Currently, there are over 75 polar stations (40 year-round) operated by 29 countries and researchers from around the world. Most of them are located in the area of the Antarctic Peninsula and South Shetland Islands. The aim of this study is to characterize the most popular research directions in terms of environmental pollution in the West Antarctic and South Shetlands region.

Variability of hydrological regimes of non-glaciated polar catchment in a changing climate

M. Majerska, T. Wawrzyniak, M. Osuch

Institute of Geophysics Polish Academy of Sciences, Ksiecia Janusza 64, 01-452
Warsaw, Poland

The study comprises the estimation of changes in the hydrological regime in the non-glaciated Fuglebekken catchment in SW Spitsbergen (Svalbard). It focuses on the applicability of the 50 rainfall-runoff models calibrated using hydrometeorological observations. Validation of simulations was based on archival flow observations, time-lapse imagery and SWE observations. Results of six models (FLEX-IS, GSM-SOCONT, PRMS, HBV, Nordic HBV, and GR4J) were selected to be used in the analysis, as they achieved the best performance based on Kling-Gupta Efficiency. Application of those simulations resulted in reconstruction of the past hydrological conditions and determination of the trends in flow regime in the period 1979–2020. Statistically significant changes in the flow regime indicators were detected, including the number of days with the active flow during the calendar year (10.8 d per decade); during the mid-May–November period (9.8 d per decade); the date of the first day with the flow (−4.7 d per decade); and the last day with the flow during mid-May–November (8.4 d per decade). Estimated runoff shifts correspond to a significant changes in precipitation and in the increases in air temperature and earlier disappearance of snow. The present hydrological regime differs significantly from that observed in the past. The magnitude of the changes is larger compared to lower latitudes and Norwegian Arctic may be considered as the one of the fastest-warming regions on Earth.

The linkage between Atlantic Water intrusion and environmental changes in the northwestern Greenland Sea during the Late Glacial and Holocene

D. Devendra¹, M. Lacka¹, M. M. Telesinski¹, T. L. Rasmussen², K. Szybor³, M. Zajackowski¹

¹Department of Paleoceanography, Institute of Oceanology Polish Academy of Sciences, Sopot 81-712, Poland

²CAGE-Centre for Arctic Gas Hydrate, Environment and Climate, Department of Geosciences, UiT The Arctic University of Norway, Tromsø, Norway

³Akvaplan-Niva AS, Framsenderet, 9296 Tromsø, Norway

The recirculation of the Atlantic Water (AW) via Return Atlantic Current (RAC) in the western Fram Strait regulates the oceanography in the NW Greenland Sea and beyond. As the intensity of the RAC has a significant influence on both deep-water formation in the area and on the stability of the Greenland Ice Sheet (GIS), knowledge of its variability in the past is important. Here we present a reconstruction of the paleoceanographic forcing of the AW on climatic conditions and associated environmental changes in the NW Greenland Sea by means of foraminiferal assemblages, stable (oxygen and carbon) isotopes, and various sedimentological parameters from sediment core GR02-GC retrieved from NE Greenland continental slope (1170 m water depth). Our data show the continuous presence of AW in the NW Greenland Sea during the last 35 kyr BP. Between 32 and 29 kyr BP, GIS extended, resulting in reduced meltwater influx to the NW Greenland Sea. After 29 kyr BP, increased iceberg calving and melting increased sediment input, most likely due to surface warming and glacier advance to shelf-break, which lasted until 26 kyr BP. The unstable oceanographic conditions that prevailed during the Bølling–Allerød (B/A, ~ 14.6-12.7 kyr BP) may be influenced by glaciers and sea ice melting as a combined effect of B/A warming and AW induced melting. We propose that a permanent major inflow of warm AW via RAC to NW Greenland Sea began after the B/A (from ~ 13 kyr BP). During the Younger Dryas (~ 12.8-11.7 kyr BP), the RAC was weakened, reducing the advection of AW to the NW Greenland Sea. After, RAC reached its modern strength, whereas, during the Holocene Thermal Maximum, it reached its maximum strength during the studied period. The research was financially supported by the Norwegian Financial Mechanism for 2014-2021, project no 2019/34/H/ST10/00682 and by National Science Centre in Poland through project 2019/33/B/ST10/00297.

POSTER PRESENTATION ABSTRACTS

Effect of citalopram (an anxiolytic drug) on selected haematological parameters in rats with induced amygdala hyperactivation

M. Dostani, J. Rucinski, E. Kurowska-Rucinska, S. Romanis, F. Olszanski, M. Bernard, D. Myslinska, I. Majkutewicz

Faculty of Biology, University of Gdansk, Jana Bazynskiego 8, 80-309 Gdansk, Poland

The amygdala hyperactivity is one of the key features of anxiety and stress related disorders, e.g. post-traumatic stress disorder, anxiety disorders and depression. A 14-day amygdala electrical stimulation (ES) in rats causes symptoms characteristic of anxiety disorders. Citalopram (CIT) is the selective serotonin reuptake inhibitor and one of the most widely used anxiolytic/antidepressant drugs. The aspect of the these drugs influence on hematological parameters is still poorly understood, and the published results are sometimes contradictory. The aim of this study is to verify whether citalopram affects the level of peripheral blood parameters in rats subjected to long-term amygdala ES. 46 male Wistar rats divided into 4 experimental groups were subjected to electrodes implantation stereotaxic surgery into the amygdala and to 14-day ES of the amygdala (or sham stimulation) and 21-day treatment with CIT (control rats received water). We found that in stimulated rats the number of white blood cells (WBC), including lymphocytes, monocytes and granulocytes, was significantly lower than in Sham+water animals. CIT therapy additionally contribute to reducing the number of WBC (in total and in all subtypes). Interestingly, CIT therapy also reduces the number of erythrocytes, thrombocytes and the hematocrit level, while the amygdala ES has no significant effect on these parameters. The work is the result of the research project 2019/35/N/NZ4/00908 funded by the National Science Center.

The usage of Artificial Inteligence in biology and medicine

K. Gorlikowska

Faculty of Biology, University of Gdansk, Wita Stwosza 59, 80-308 Gdansk, Poland

The usage of artificial intelligence is a relatively new concept in both biology and medicine. Despite this, there are many reports today about the potential and significant benefits of its use in research. One of the most commonly used techniques is machine learning, which uses huge data resources, combining computer studies, statistics and medical problems. Scientists supporting the development of artificial intelligence in the medical and natural fields outline the ability of self-learning algorithms to deal with large, complex and divergent data much faster than humans. Today, the results obtained by algorithms based on artificial intelligence often carry out analyses with an accuracy similar to the assessment carried out by specialists in a given field. The aim of the work is to present the theory of artificial intelligence and the tools used, its application in biology and medicine, as well as to discuss the potential future of combining computer science and mathematics with biology or medicine.

Characterization, Antifungal, and Antibacterial Activity of Bacteria Isolated from the Szczelina Chocholowska Cave Moonmilk Deposits (Tatra Mountains, Poland)

W. Jaroszewicz¹, K. Kosznik-Kwasnicka², D. Lubomska¹,
A. Wegrzyn³

¹Faculty of Biology, University of Gdansk, Wita Stwosza 59, 80-308 Gdansk, Poland

²Faculty of Medicine, Medical University of Gdansk, Debowa 25, 80-204 Gdansk, Poland; Laboratory of Phage Therapy, Institute of Biochemistry and Biophysics, Polish Academy of Sciences, Kladki 24, 80-822 Gdansk, Poland

³Laboratory of Phage Therapy, Institute of Biochemistry and Biophysics Polish Academy of Sciences, Kladki 24, 80-822 Gdansk, Poland

Due to resistance of bacteria and fungi to antibiotics, an important aspect of modern medicine is searching for novel biologically active compounds which have the ability to destruct the pathogenic cells or inhibit their growth. Hard-to-reach habitats remains unexplored sources of bacteria producing previously unknown antibiotics and other molecules with possible therapeutic features. Caves are the examples of such extreme habitats, moreover, the richest source of cave-derived bacteria seems to be the moonmilk deposits. Moonmilk is soft, creamy sediment, composed of various carbonate minerals. The moonmilk-forming process involves numerous microorganisms, in particular bacteria belonging to the genus *Bacillus* and *Streptomyces*.

In this study, we presented 9 newly isolated bacterial strains from Chochołowska Cave, located in the Tatra Mountains in Poland, including their characterisation, biofilm formation ability as well as antibacterial and antifungal activities. We found that the isolated bacteria form moonmilk deposits inhibited the growth of particular pathogenic strains that we tested.

Mercury in the marine environment of the polar regions

E. Korejwo, J. Beldowski

Institute of Oceanology of the Polish Academy of Sciences, Powstancow Warszawy
55, 81-712 Sopot, Poland

Mucopolysaccharidoses (MPS) belong to group of lysosomal storage diseases and are caused by the lack or reduced activity of lysosomal enzymes involved in the degradation of glycosaminoglycans (GAG). As a result, they accumulate in cells, gradually preventing the proper functioning the entire body. Until recently, it was believed that GAG accumulation is the primary and only cause of symptoms. Reports from recent years suggested that it is not accumulation of GAG itself, but cellular processes damaged by it, that is the basis of MPS pathogenesis. To date, no method has been developed that can eliminate all symptoms of MPS. The aim of this work was to determine the effectiveness of the substrate reduction therapy accompanied with stimulation of autophagy on the morphology and organization of the tubulin cytoskeleton. Transcriptomic analyses were followed by microscopic studies reflecting structure of the cytoskeleton. Levels of specific proteins were assessed by Western-blotting. We found significant disturbances in levels and morphology of tubulin cytoskeleton in some types of MPS. Genistein therapy largely improved organization of tubulin cytoskeleton, which may counteract the harmful effects of GAG accumulation. Our results suggest that MPS cells are defective in the cytoskeleton structure, and may exhibit deficiencies in mitotic division and/or vesicular transport. These defects can be alleviated by substrate reduction therapy and autophagy stimulation.

Impact of the largest storm events during 1981-2021 period on the sediment transport in the Gulf of Gdansk

K. Kusek

Institute of Meteorology and Water Management - National Research Institute,
Jerzego Waszyngtona 42, 81-342 Gdynia, Poland

The Baltic coast including the Gulf of Gdańsk is a specific area influenced mainly by wind waves. The impact of storm episodes is of particular importance here. One of the methods of estimating their impact on the coast in this region is the modeling of hydrodynamic processes in XBeach. It enables the forecasting of erosion and accumulation processes in the coastal zone in a relatively high resolution. ERA-5 reanalysis database contains, inter alia, the data on the height of significant wind waves, which can be used as input data in XBeach. This poster includes the results of analysis of the impact of the greatest storm events of 1981-2021 on the the Gulf of Gdańsk. In order to increase the accuracy of the results, this area was divided into smaller sub-areas. This allowed for the achievement of results with a resolution of 10 m and a more accurate selection of places where the transport of sediment material and shore erosion are the most rapid. Particular attention was paid to the cliff coasts, taking into account the advantage of erosion over accumulation processes there. Satellite images from Google Earth were used for additional analysis of their changes.

Can small non-coding RNAs molecules regulate the phage switch from lysogeny to lytic development and its virulence?

P. Mach¹, W. Wesolowski¹, N. Lewandowska¹, A. Lukasiak¹, S. Bloch¹, A. Necel¹, M. Ferenc², G. Wegrzyn¹, B. Nejman-Falenczyk¹

¹Faculty of Biology, University of Gdansk, Wita Stwosza 59, 80-308 Gdansk, Poland

²Nalecz Institute of Biocybernetics and Biomedical Engineering, Polish Academy of Sciences, Ksiecia Trojdena 4, 02-109 Warsaw, Poland

Small non-coding RNAs (sRNAs) are regulatory molecules that control important cellular processes by post-transcriptional gene regulation. The bacterial sRNAs vary in size (50-350 nt in length) and exhibit a few mechanisms of action. Recently, sRNAs have drawn notable attention due to their participation in various biological processes of bacteria, such as viral replication or toxin gene expression. Curiously, our research on enterohemorrhagic Escherichia coli (EHEC) allowed us to identify phage-derived sRNAs. Phages in which we found these particles carry genes of virulent factors (Shiga toxin) and thusly allow to convert non-pathogenic bacteria to virulent strains. Importantly, the expression of phage-encoded toxins is tightly linked to lytic development. In the light of only a few reports describing the significance of such molecules during the switch between lysogenic and lytic phage development, we have decided to delve into this topic. Several microRNA-size molecules of phage origin have been identified thanks to the results of RNA-Seq studies performed on the EHEC strain, carrying Shiga toxin-converting phage Φ 24B. Interestingly, bioinformatic analysis indicates that the potential target sites of the mentioned molecules' action may be located within anti-repressor genes participating in the lysogenic/lytic genetic switch. Additionally, results of preliminary experimental studies indicate that these sRNAs may play an important role in both phage and host development.

How can diet improve our health? Nutriepigenetics as a target of novel therapies

S. Romanis, M. Dostatni, J. Rucinski, E. Kurowska-Rucinska

University of Gdansk, Jana Bazynskiego 8, 80-309 Gdansk, Poland

Epigenetics studies the heritable traits resulting from biochemical modifications that affect gene expression, but which are not directly dependent on the underlying DNA nucleotide sequence. The most important epigenetic modifications are DNA methylation and histones post-translational modifications. The epigenome undergoes continual and reversible changes in response to both cellular signals and environmental factors. These changes are important for biological age and the development of many civilization diseases. One of the influencing epigenome factors is diet. Consuming balanced meals rich in bioactive compounds, such as polyphenols, vitamins, as well as pre- and probiotics, may affect epigenetic processes and protect against the development of diseases or support conventional pharmacological therapy. The relationship between the diet and response of our genes is the subject of nutriepigenetics, which studies the effect of nutrients on epigenetic modifications that change the structure of chromatin, functions and expression of genes, and therefore the functioning of our cells, tissues and organs. This study aims to present the mechanisms leading to changes at the molecular level induced by diet and to highlight their potential to prevent civilization diseases. It is highly likely that in the future, the use of epigenetic mechanisms through the development of personalized diets will enable the treatment of many diseases related to gene expression disorders.

Micropollutants in the aquatic environment – impact and challenges

L. Sharma

Department of Marine Chemistry and Biochemistry, Institute of Oceanology Polish Academy of Sciences, Powstancow Warszawy 55, 81-712 Sopot, Poland

The presence of micropollutants, including pharmaceutical residues, is a potential factor that contributes to the deterioration of aquatic ecosystems. Large loads of micropollutants enter coastal waters through effluents from wastewater treatment plants and river inputs, leading to seawater contamination and adding to the growing impacts and pressures on sea and coastal areas. In addition to emerging pollutants, another group of contaminants can be distinguished. It includes substances that have not been detected in the environment but are highly probable to occur in the near future. Ionic liquids are a class of organic salts that have gained a lot of attention over the past few years because of their potential applications in industrial areas. As a result of their chemical stability, excellent solubility, and resistance to biodegradation, ILs are considered possible water pollutants.

The purpose of the presentation is to present a general overview of the challenges and potential consequences associated with the presence of micropollutants in the aquatic environment. At present, regulatory risk and hazard assessments are mainly based on the evaluation of the effects of individual chemicals. However, ecosystems are exposed to multicomponent pollutant mixtures. Interactions between these pollutants and their continuous presence in the environment can cause an increase in the overall threat to living organisms and result in unexpected effects.

Clinical significance of circulating heat shock protein 90 (Hsp90) and autoantibodies to Hsp90 in patients with atopic dermatitis

K. Sitko¹, M. Bednarek¹, J. Mantej¹, M. Trzeciak², S. Tukaj¹

¹Faculty of Biology, University of Gdansk, Wita Stwosza 59, 80-308, Gdansk, Poland

²Department of Dermatology, Venerology and Allergology, Medical University of Gdansk, Gdansk, Poland

Atopic dermatitis (AD) is one of the most common chronic inflammatory dermatoses characterized by persistent itching and recurrent eczematous lesions. While the primary events and key drivers of AD are topics of ongoing debate, cutaneous inflammation due to inappropriate IgE (auto)antibody-related immune reactions is frequently considered. Highly conserved and immunogenic heat shock protein 90 (Hsp90), a key intra- and extracellular chaperone, can activate the immune response driving the generation of circulating anti-Hsp90 autoantibodies that are found to be elevated in several autoimmune disorders. Here, we observed that serum levels of Hsp90 and anti-Hsp90 IgE autoantibodies are significantly elevated in AD patients (n = 29) when compared to age- and gender-matched healthy controls (n = 70). We revealed a positive correlation between serum levels of Hsp90 and the severity of AD assessed by Scoring Atopic Dermatitis (SCORAD). In addition, seropositivity for anti-Hsp90 IgE has been found in about 50% of AD patients and in 2.85% of healthy controls. Our results suggest that extracellular Hsp90 and autoantibodies to Hsp90 deserve attention in the study of the mechanisms that promote the development or maintenance of atopic dermatitis.

The importance of riverine organic matter for macrozoobenthic food web and community structure in the Vistula River prodelta

M. Szczepanek, M. J. Silberberger, K. Kozirowska-Makuch,
M. Kedra

Institute of Oceanology Polish Academy of Sciences, Powstancow Warszawy 55, 81-712, Sopot, Poland

In this study, we aimed to assess the diet composition of common macroinvertebrates forming benthic communities in the transition zone of one of the largest riverine outlets of the Baltic Sea, Vistula River prodelta. We also aimed to look for the spatial and temporal variability in the resource utilization by those communities expressed as the organic carbon accumulated in benthic biomass. We show that despite the similar distance to the river mouth the contribution of riverine organic matter to the diet of benthic fauna significantly decreases with increasing depth. Nevertheless, due to synchronous structural changes in benthic fauna populations, specifically for suspension-feeding bivalves and deposit-feeding polychaetes, the riverine share in the biomass of benthic communities may remain similar between the shallow and deeper prodelta parts. The results of this study contribute to the understanding of the influence of riverine subsidization on the coastal ecosystem function.

S/S Stuttgart shipwreck as a source of mercury to surface sediments of the Gulf of Gdansk

A. Zarzeczanska¹, P. Plonska¹, A. Poplawska¹, J. Beldowski²,
L. Leczynski³, M. Beldowska¹

¹Department of Marine Chemistry and Marine Environment Protection, Institute of Oceanography, University of Gdansk, Pilsudskiego Av. 46, 81-378 Gdynia, Poland

²Department of Marine Chemistry and Biochemistry, Institute of Oceanology of the National Academy of Sciences, Powstancow Warszawy 71/1, 81-712 Sopot, Poland

³Institute of Oceanography, University of Gdansk, Pilsudskiego Av. 46, 81-378 Gdynia, Poland

The S/S Stuttgart shipwreck, which has been lying on the bottom of the South Baltic Sea for 79 years. Pyrotechnic destruction contributed significantly to the present condition of the unit, and additionally, progressing corrosion over the years led to an oil leak. Thus, contamination with metals (including mercury) also occurs. The progress of pollution moves forward and may pose a threat not only at the site of the vessel, but also in the surrounding marine habitat. Therefore, the aim of the study was to estimate total mercury content in surface sediments in the vicinity of the S/S Stuttgart shipwreck.

Sediment samples were collected with a Van Veen scoop near the S/S Stuttgart shipwreck in 2019 (14 stations) and in 2021 (5 stations). The mercury content in the samples was measured by thermodesorption on a DMA-80 analyzer (Milestone, Italy).

The highest concentration (4750,6 ng g⁻¹) from all nearest subject was observed at the closest station of the S / S Stuttgart wreck (2019). Based on the available literature, it can be concluded that it might be the highest concentration of Hg that was measured in the sediments of the Baltic Sea and is almost 78 times higher than the average concentration in the Bay of Gdańsk. In general, the results within the wreckage varied and ranged from 123.78 – 4750.6 ng g⁻¹, so they differed even 37 times. It could have been caused by the shape of the seafloor, which goes south-east and may explain movement of contaminated by fuel sediment.

PROCEEDINGS OF THE INTERNATIONAL SOPOT YOUTH CONFERENCE 2022
entitled Where the World is Heading?



ISBN 978-83-946541-6-0



9 788394 654160