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THE WORLD IS HEADING

7 JUNE 2024
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Proceedings of the International Sopot Youth Conference 2024: Where the World is Heading

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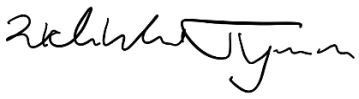
FOREWORD

For decades, attempts to assess human impact on natural environment have been undertaken, and they have involved various approaches, means and tools. In order to secure the sustainable use of the planet we must fully understand the processes which govern the environment and thus its functioning, including knowledge of the impacts of human activities on the natural environment.

We need to strive for a predicted planetary system where society understands and can respond to changing conditions. We want an accessible planet with open and equitable access to data, information and technology and innovation, an inspiring and engaging environment where society understands and values it in relation to human well-being and sustainable development.

With the International Sopot Youth Conference, we provide a platform for interdisciplinary and multidisciplinary discussions and exchange of information across all scientific disciplines. We are confident that this annual opportunity is a step forward to create a generation of researchers, who think and work in terms of sustainable science.



Tymon Zielinski

Chairman of the Sopot Science Association

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7 JUNE 2024

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Importance of lipid metabolism in plant cold stress resilience: insights from PDAT enzyme studies.

12:35 – 12:50 **Joanna Mancewicz et al., University of Gdansk and Medical University of Gdansk, Poland**
Temperature stress condition - how LPCAT enzymes can help plant to adapt and survive?

12:50 – 13:05 **Mattia Fragola et al., Università del Salento, Lecce, Italy**
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14:30 – 14:45 **A. M. Cefali, et al., RSE – Ricerca sul Sistema Energetico and Università degli Studi di Milano-Bicocca, Italy**
Evaluating Formaldehyde Detection Techniques using 'LOOP' Test Bench.

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Enhancing Biomedical Imaging: Novel Fluorescent Carbon Dots Synthesized via Eco-Friendly Methods.

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Session Chair: Tymon Zielinski, SSA/IO PAN.

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17:00 Closing of the conference.

ORAL PRESENTATION ABSTRACTS

Carbon Dioxide Removal (CDR): the way out of the climate problem?

Sally Soria-Dengg

Ludwig-Maximilians-University Munich, Germany.

According to the UN IPCC report in 2022, even if aggressive measures to reduce CO2 emissions were implemented immediately, the 1.5°C threshold will likely be exceeded in the coming decades. This "overshoot above 1.5°C" seems now inevitable before global temperatures would be able to decline (assuming that current and future CO2 emissions reduction measures are rigidly pursued and effective). In order to still reach the 1.5°C target, additional instruments will have to be resorted to. One of these alternative methods is the active removal of CO2 from the atmosphere (Carbon Dioxide Removal, CDR). CDR has recently been given more attention in the global political debate because even now the 1.5°C limit is exceeded intermittently in some parts of the world.

In a German research program funded by the Ministry of Education and Research,

more than 200 scientists from different fields are working on the ecological, economic and political feasibility of various CDR methods and consider their ethical and social acceptance.

In this talk some of the CDR methods will be introduced: how do they work, what are the advantages or the risks involved when these are deployed, how are they perceived in public and how do they interact with other climate change mitigation measures?

The significance of plants in funeral culture based on the results of archaeobotanical research of the equipment from 17th-18th century burials from crypt V of the Church of St. Francis of Assisi in Cracow.

Jakub Stankiewicz[1], Monika Badura[1], Anna Drazkowska[2]

[1] University of Gdansk, Faculty of Biology, Department of Plant Ecology, Laboratory of Palaeoecology and Archaeobotany, Poland.

[2] Nicolaus Copernicus University in Torun, Institute of Archaeology, Department of Medieval and Modern Times, Poland.

An archaeobotanical analysis of materials found in 17th-18th c. burials in crypt V of the Church of St. Francis of Assisi in Cracow revealed numerous macroscopic botanical remains (2016/23/B/HS3/01910; 531-D040-D581-24). Plant material was used to fill pillows and mattresses. Over 6750 specimens were isolated from 10 coffins, representing 58 taxa. The archaeobotanical samples showed a high diversity. Species with aesthetic qualities such as colourful flowers, strong biological properties and deep cultural significance were abundant. This is characteristic of Christian burials in wealthy communities. Native taxa dominated the botanical composition, with Artemisia sp., Cichorium intybus, Hypericum perforatum and Tanacetum parthenium being the most common. This analysis sheds light on the significance of plants placed in burials, emphasising both their symbolic and practical functions, as well as their ecological characteristics. The use of plants with preservative properties suggests that the community was aware of the need to delay the decomposition of corpses, while the presence of species with aesthetic qualities speaks to spirituality. This study contributes to a better understanding of funeral practices of modern beliefs and traditions, and reflects the deep connection between humans and nature in the context of death and farewell.

Same but different: How do we differ around the world?

Emilia Nawrocka

University of Gdansk, Institute of Psychology, Poland.

We live in a world that gets more and more diverse in terms of culture. People may be aware of cultural changes, multicultural cooperation, and the progressive cultural changes in societies. A lot of people work in international companies, have friends from around the world, or move abroad. However, not everyone is aware of the implications that go with cultural dissimilarities. It is important to be conscious of the limitations that come along with multicultural interactions, so we won't face any kind of misunderstandings. We tend to evaluate people by our values while we forget about important cultural differences that have a big impact on our behavior, cognitive processes, communication styles, values, and many other factors that make us people. In my presentation, I would like to present the important differences in culture across countries based on Hofstede's theory of cultural dimensions. I would present a study that was conducted to outline the importance of cultural differences in communication. In addition, I would show examples of how cultural differences impact daily life if we are not aware of them.

Quantification and qualification study on the distribution of marine microplastics (MMPs) in the Baltic Sea

Ilaria Guardamagna

Università degli Studi di Milano Bicocca, Italy.

The study aimed to understand the distribution of the marine microplastics (MMPs) vertically and horizontally in the water column in the Baltic Sea, supporting previous results on the vertical distribution of buoyant particles based on their density. For this purpose, three sampling methods have been adopted during a cruise on board the Polish Oceania Vessel on February 7th-16th, 2022. The surface water has been sampled with a Hydro-Bios 300 µm net and a pump located at 2 m deep on the side of the vessel. The deep-water samples have been collected twice per station with a 30 L Niskin bottle. All samples have been filtered with a 300 µm mesh. A visual analysis with a stereomicroscope has been conducted to assess the abundance and dimension of the MMPs, and a Raman spectroscopy analysis have been done to assess the polymer composition. The study revealed concentrations ranging between 0.2 – 1083.3 MPs/m3, and mean dimensions of 1.22 ± 0.05 mm length and 49.03 ± 5.68 µm width, supporting the results previously collected in the October 2019 cruise. The Raman spectroscopy revealed higher concentrations of polyester PES (49.5 %) and smallest concentrations of nylon PA (1.2%). This research revealed a possible implication of sedimentation-resuspension processes on the distribution and abundance of MMPs in the deep-water layer. Moreover, it opens to new study on the evident bimodal behavior of the particles dimension.

Importance of lipid metabolism in plant cold stress resilience: insights from PDAT enzyme studies

Sara Kedzierska, Sylwia Klinska-Bachor, Joanna Mancewicz, Antoni Banas

Intercollegiate Faculty of Biotechnology of University of Gdansk and Medical University of Gdansk, Poland.

Plant abiotic stress significantly influences both plant growth and productivity. Understanding plant physiological stress responses is paramount, given its direct implications for food safety and economic stability. In colder regions, low temperatures stand out as a critical abiotic factor shaping plant resilience and productivity. Our current focus is on PDAT1 (phospholipid: diacylglycerol acyltransferase 1), an enzyme vital for lipid biosynthesis and membrane dynamics, important factors in stress response. PDAT catalyzes the transfer of fatty acids from phospholipids to diacylglycerol, leading to the synthesis of triacylglycerol (TAG). We investigate PDAT1's role in Arabidopsis' low-temperature response, emphasizing lipid remodeling and metabolism. Our observations indicate that PDAT1 enhances cold tolerance when overexpressed, contrasting with knockouts. Our findings revealed heightened vitality of overexpressors, that potentially can be attributable to boosted lipid metabolism and/or alter nutrient redistribution. Our study involves morphological observation, lipid profiling via gas chromatography and thin-layer chromatography, exploring carbohydrate and protein metabolism. The direction in which the world is heading involves sustainable and modern agriculture. Grasping the intricate function of PDAT1 could significantly contribute to reshaping stress-resilient crop development.

The Environmental Impact of K-pop Album Overconsumption

Marta Gorska

WNB, University of Wroclaw, Poland.

While the rise of popularity of music streaming services has led to a decline in physical CD sales within other music genres, Korean pop music (K-pop) album sales have been continuously rising due to the global popularization of K-pop, leading to a rapid increase in plastic waste production. The marketing practices of releasing multiple versions of the same album have become the standard within the K-pop community, with up to four versions of a single album being distributed during numerous events, each of them offering different collectible items such as photocards. This phenomenon combined with the K-pop photocard collecting culture results in the encouragement of overconsumption related to album bulk buying. During promotional campaigns for new releases, fans may feel compelled to acquire a significant number of albums to complete their collections and have a chance to participate in fan events, sometimes requiring the purchase of hundreds of albums. Consequently, the excess albums from bulk purchases create an environmental risk by leading to the disposal of large amounts of unused merchandise. This highlights a serious environmental issue that needs addressing and action within the K-pop industry.

Atmospheric heating rate at Ny-Ålesund: early estimates and sources apportionment from an innovative method.

N. Losi [2] , S. Gilardoni [3] , M. Mazzola [4] , M. Maturilli [5] ,C. Ritter [5] , A.M. Cefalì [2] , I. Gini [2] , A. Doldi [2] , E. Bolzacchini [2] , L. Ferrero [2].

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[2] GEMMA Centre, Department of Earth and Environmental Sciences, University of Milano-Bicocca, Piazza dellaScienza1, 20126, Milan, Italy.

[3] National Research Council, Institute of Polar Sciences (CNR-ISP), Milano, Italy.

[4] National Research Council, Institute of Polar Sciences (CNR-ISP), Bologna, Italy.

[5] Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Potsdam, Germany.

The fate of the Arctic will become crucial in the coming years, given the Arctic Amplification, leading to temperature increase up to 4 times faster than the global average.

Light Absorbing Aerosols (LAAs), as short-lived climate forcings represents one of the major factors of uncertainty. LAAs, interacting directly with solar radiation and releasing energy to the surrounding air with a specific Heating Rate (HR), exert a positive atmospheric forcing. Therefore, an accurate estimation of LAAs-induced HR is crucial, as the LLAs direct radiative effect trigger various local and regional feedback. Our work, for the first time, aims to estimate the LAAs induced HR at a fixed sampling site in the Arctic, using an innovative methods and measurements collected by AWIPEV and CNR-ISP at Ny-Ålesund. Our results revealed a significant decrease in the mean values of all analysed parameters from "spring" to "summer", consistent with the complete melting of the snowpack during summer, and the expected albedo variation. These results suggest a relevant contribution of snow reflection to the HR. Additionally, the decrease in diffuse radiation-HR, consistent with the dissipation of Arctic Haze, and the total-HR, almost equal to that inferred from previous estimates in the Arctic region, strengthen the method used. These findings highlight the need for further research on the role of LAAs as crucial targets for mitigation strategies, given the changing climatic conditions in the Arctic.

Temperature stress condition - how LPCAT enzymes can help plant to adapt and survive?

Joanna Mancewicz, Sylwia Klinska-Bachor, Antoni Banas

Intercollegiate Faculty of Biotechnology UG&MUG, Gdansk, Poland.

Acyl-CoA:lysophosphatidylcholine acyltransferases (LPCATs) are key enzymes, involved in the modification of lipid composition within cellular membranes. Their role is critical to maintaining the fluidity and functionality of this structures. However, their contributions to plant adaptation to abiotic stresses remain poorly understood. To investigate the impact of LPCATs on plants and their role in stress response, knock-out mutants of model organism A. thaliana were exposed to various temperature stress conditions. Knock-out plants, in genes encoding LPCAT1 or LPCAT2 as well as wild type plants were cultivated for 2 weeks in optimal, then they were transferred to 4°C or 35°C. During their growth, morphological analysis has been conducted as well as biochemical analysis. The results showed that in optimal conditions mutant plants possessed significantly reduced level of fatty acids per milligram of fresh weight, but that was not the case in cold and heat stress. Knock-out mutations also led to significant change of fatty acids composition depending on subjected temperature. Mutant lines cultivated in stress temperature exhibited altered phenotype. Especially lines subjected to cold were characterized by boosted fitness in cold (their rosettes weighed 60% more than of wild type plants). The ongoing LPCAT research may result in the developing plants resistant to abiotic stress and provide knowledge about plant adaptation to stress conditions.

Evaluating Formaldehyde Detection Techniques using 'LOOP' Test Bench

A.M. Cefalì[1,2], C. Franchina [1,2], M. Gianotti [1,2], N. Losi[2], A. Doldi[2], S. Cerri[2], L. Giovanazzi[2], L. Ferrero[2], E. Bolzacchini[2] and D. Cipriano [1]

[1] RSE – Ricerca sul Sistema Energetico, Milano, Italy.

[2] University of Milano-Bicocca, Milano, Italy.

Formaldehyde poses measurement challenges due to its sensitivity to light and its rapid reactivity with a range of compounds (e.g., radicals, OH, O3). Moreover, its high-water solubility often introduces uncertainties in measurement values due to potential artifacts.

The CEN/TC 264 WG 40 recently issued CEN/TS 17638:21, a normative document outlining the reference manual method for determining formaldehyde in emissions from stationary sources.

This study endeavors to assess formaldehyde measurement techniques through Proficiency Tests (PT), focusing on sampling procedures and associated uncertainties. The tests were carried out at the LOOP facility (RSE S.p.A., Milan), which replicates industrial combustion chimney emissions, thus allowing for reproducible and controlled sample analyses through the generation of synthetic emissions.

The sampling campaign encompassed multiple sessions in which mixtures containing varying concentrations of formaldehyde and interferents (e.g., water vapor, sulfur dioxide, ammonia) were generated to evaluate different formaldehyde measurement methods.

The Proficiency Tests scrutinized methods such as VDI 3862 – 2 and EPA 323. During these experimental activities, the main interferents of formaldehyde measurement were evaluated. This made it possible to develop a new measurement protocol.

Impact of climate change on the world ocean circulation. With a focus on the Baltic Sea.

Amandine Willems

SeaTech, Univerisité de Toulon, France.

One important property of the ocean is the world ocean circulation. We can divide it into two types: surface circulation and thermohaline circulation.The density of water (salinity and temperature) induces the thermohaline circulation that has a period between centuries to millennium. The creation of different water bodies takes place in Arctic, and Antarctic areas. The global wind circulation induces the surface currents by friction and the Coriolis effect. Around Ecuador, the currents are led by trade winds creating an Ekman transport with up or downwelling.

The currents contribute to distributing the heat absorbed by the ocean all over the world. Also, they allow the provision of oxygen and nutrients to develop biodiversity.

Because of climate change and the unsustainable way of exploiting the ocean, the world ocean circulation is impacted: by changes in temperature and salinity (thermohaline circulation) and disruption of atmospheric circulation (surface circulation).

Concerning the Baltic Sea, the currents are mostly due to the wind, the difference of density between the North Sea and the Baltic Sea, and water dilution because of rivers. This current circulation in the Baltic Sea is crucial as it is one of the biggest hypoxic areas of the world.

Maintaining ocean circulation must be one of our top priorities to secure sustainable use of services from the ocean and to limit climate change and its consequences, hence, aiming for sustainable development of our planet.

Comparative Analysis of Airborne Bacterial and Fungal Diversity in South-Eastern Italy and Albania Using 16S and ITS rRNA Gene Sequencing

Mattia Fragola, Salvatore Romano, Lekë Pepkolaj, Dalila Peccarrisi, Jostina Dhimitri, Alessandro Buccolieri, Adelfia Talà, Pietro Alifano, Gianluca Quarta and Lucio Calcagnile

Department of Mathematics and Physics, University of Salento, Lecce, Italy.

Department of Computer Science, Metropolitan Tirana University, Tirana, Albania.

Department of Geography, University of Tirana, Tirana, Albania.

Department of Biological and Environmental Sciences and Technologies, University of Salento, Lecce, Italy.

This study undertakes a comparative analysis exploring both airborne bacterial and fungal communities in different monitoring sites of South-Eastern Italy and Albania. All samples were collected in urban, suburban and rural areas by gravimetric deposition over 14 days (October-November 2022). The investigation employed advanced DNA-based techniques for species identification and an innovative compositional data analysis approach for thorough examination. The research reveals noteworthy distinctions in the composition of microbial communities at the species level between the two selected geographical areas, highlighting the impact of local environmental factors. Both the Aitchison distance-based dendrograms and the Principal Component Analysis biplots demonstrate the clear separation of samples based on their geographical origin, emphasizing the role of regional environmental conditions in shaping airborne microbial compositions. Notable bacterial species variations include Rubellimicrobium roseum and Sphingomonas cynarae in Albanian samples, while radiation-resistant species Truepera radiovictrix and Rubrobacter radiotolerans in Italian samples. Fungal species like Mycosphaerella tassiana, Aureobasidium pullulans, and Ascochyta herbicola also displayed geographic specificity, particularly in Albania. This research deepens our understanding of Mediterranean airborne microbial dynamics, offering insights into microbial ecology and its environmental and health implications.

Enhancing Biomedical Imaging: Novel Fluorescent Carbon Dots Synthesized via Eco-Friendly Methods

Alessandra Gabriele, Antonio Serra, Daniela Manno, Sabrina Cennamo, Giorgio Giuseppe Carbone, Alessandro Buccolieri, Lucio Calcagnile

Centro di Fisica Applicata, Datazione e Diagnostica CEDAD, Dipartimento di Matematica e Fisica "E.De Giorgi", Università del Salento, Lecce, Italy.

In recent years, scientific interest in nanomaterials, in particular carbon dots (C-dots), has increased significantly. These luminescent carbon nanoparticles, less than 10 nm in size, have a number of advantageous properties such as high stability, easy functionalisation and versatility.

Our study adopted a green chemistry strategy for the synthesis of C-dots, using sugars as precursors and microwaves as an energy source. This approach reduces the use of harmful substances and improves the energy efficiency of the process, making it more sustainable than traditional methods.

C-dots are characterised by their ability to emit light at different wavelengths, depending on their structure and composition, making them ideal for applications such as biological imaging. Fluorescence can be accurately modulated by controlling the condensation reaction or doping process.

In this paper, we present preliminary results on the modulation of the fluorescence properties of C-dots, induced by variations in synthesis conditions, such as precursors and pH.

Morphological, structural and spectroscopic characterisation was performed using techniques such as transmission electron microscopy (TEM), X-ray diffraction (XRD), Raman spectroscopy and UV-Vis analysis. Subsequently, C-dots were used in cellular imaging experiments.

The aim of the research is to explore new potentials of these nanoparticles in the scientific field, proposing innovative solutions for current diagnostic challenges.

Relationships between aerosol absorption properties and EC, OC, and PM2.5 concentrations over different monitoring sites in south-eastern Italy

Dalila Peccarrisi, Salvatore Romano, Mattia Fragola, Alessandro Buccolieri, Gianluca Quarta, Lucio Calcagnile

Centro di Fisica Applicata, Datazione e Diagnostica CEDAD, Dipartimento di Matematica e Fisica "E. De Giorgi", Università del Salento, Lecce, Italy.

In this work, we examined the key relations between the daily means of aer-osol absorption coefficient σabs at 470 nm (retrieved from an aethalometer) and organic OC and elemental carbon EC concentration (using a proven thermal-optical method). The measurements were performed at the monitor-ing station of the Mathematics and Physics Department of the University of Salento in a suburban site of Lecce (in south-eastern Italy, at the center of the Mediterranean basin). The daily means of σabs at 470 nm and OC and EC concentration were compared with the corresponding ones of PM2.5 and NO2 concentration from the Lecce-Cerrate (background site) and the Lecce-Libertini (urban site) stations belonging to the ARPA Puglia monitoring net-work. The seasonal changes of these selected relationships were also as-sessed. In more detail, different analytical techniques were used to investi-gate the daily means of σabs at 470 nm and EC and OC concentration at the monitoring station of the University of Salento in Lecce as a function of the co-located in time PM2.5 and NO2 concentration from Lecce-Cerrate (back-ground site) and from Lecce-Libertini (urban site) for each season. We also investigated the time evolution and the main features of the daily means of absorption Ångstrom exponent AAE estimated at the 470-660 nm wave-length pair at the UniSalento station and PM2.5/PM10 ratio from the Lecce-Cerrate and the Lecce-Libertini stations belonging to the ARPA Puglia net-work.

Marine-terminating glaciers in West Spitsbergen (Svalbard, European Arctic)– past, present and future

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The recession of marine-terminating glaciers onto land results in substantial remodeling of the coastal zones and the emergence of new marine ecosystems. The West Spitsbergen fjords (Svalbard, European Arctic), which host many ice-filled bays, are a natural laboratory to constrain the climate sensitivity of glaciers and predict their response to future warming. Thus, here we map changes in glacial bays area from historical aerial imagery (1936/38), satellite observations (1976-2023) and modelled bedrock elevation to constrain the past, present and future state of marine-terminating glaciers in West Spitsbergen. We show that in the last 85 years (1936-2023), the changes in the position of marine termini have led to the emergence of around 405 km2 of newly ice-free coastal waters, and their area will likely reach up to around 866 km2 when all the glaciers retreat onto land. While the timing depends on the individual glacial dynamics and can be delayed by surges, the past development of glacial bays (1976-2023) and current warming trends suggest that by 2100 around 80% of the marine-terminating glaciers will lose their connection to the sea, significantly increasing West Spitsbergen fjords area (around 20% increase since 1936). Even though West Spitsbergen is among the fastest warming regions, similar trends can be observed in other polar locations. Thus, the development of post-glacial environments constitutes one of the major regime shifts in the ecosystem dynamics globally.

Optimization of ISORROPIA model applied to Italian electrical system flashover prevention.

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Atmospheric aerosol accumulates over the electric power system insulators and solubilizes with humidity, giving conductive properties to the insulators, causing flashover accidents, damaging the system.

For future preventive applications, we applied the thermodynamic ISORROPIA model to the typical Italian insulators deposit composition. Differing from a standard sulfate-nitrate-ammonium aerosol system, which was well simulated, the insulators deposits, ammonium-poor and including crustal species, were not. Despite these species being the main elements of mineral dust and sea salt, their thermodynamic behavior is not well understood yet. To highlight possible errors in the code, we stressed the model by predicting single salts behavior, also giving a positive or negative charge excess. Problems of alternating deliquescence and crystallization or the total absence of deliquescence were found in the simulations for KCl, MgSO4, MgCl2, CaNO3, CaCl2. The behavior of these salts was studied in the Aerosol Exposure Chamber to have a experimental reference to which compare the model. We did find coding corrections that solved most of the irregular trends when simulating the total composition. This work constitutes a novelty for Italy and poses the fundamentals for a more reliable Italian electric system.

The Impact of Social Media on Interpersonal Relationships.

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The study on the impact of social media on interpersonal relationships is based on an analysis of the results of a survey of 234 people from various social groups. 62% of respondents are women, 33.3% are men, and 4.7% chose not to specify their gender. The majority of participants (46.2%) are under 18 years old, and other age groups are represented as follows: 18-26 years (15%), 27-35 years (3.8%), 36-49 years (22.2%) and over 50 years (12.8%). The majority of respondents rate their relationships positively, although 21 consider them weak and 16 say they have none. The most popular platform is Facebook (178 users), and Instagram (136 users). Interestingly, people over 50 also use less popular platforms. 41.9% of respondents spend more than 3 hours a day online, 39.3% spend between 1 and 3 hours, and 18.8% spend less than an hour. Preferences for spending time online vary, but most indicate activity with loved ones or at home. The results underscore the complexity of social media use decisions and their impact on social relationships.

Impact of human interventions on the river flow regimes in Poland

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Human activities have significantly modified river flow regimes worldwide, leading to ecological, social, and economic consequences. Conventional methods of river regime identification in Poland fail to account for the changes in the flow regime pattern resulting from human interventions. The present study attempts to identify the impact of human interventions on flow regimes using the time series analysis technique of wavelet transform. In contrast to traditional time series methods, the wavelet transform identifies the dominant frequencies present in the time series by time and scale, revealing detailed features that are hidden in the time series. The average wavelet plot summarizes the variability present in the hydrological time series at a range of temporal scales. These can be used to cluster the rivers with similar flow regimes. Average wavelet plots were obtained for 140 gauging stations throughout Poland. These were clustered using the Hierarchical method, where four distinct flow regime patterns were identified. The results of the study indicate that human activities generally alter the three-month and seasonal periodicity to a greater extent than annual and interannual periodicity. Our findings suggest that the integrating wavelet transform improves the determination of river flow regimes by capturing variation across temporal scales and should be considered in future flow regime assessments in Poland and other European countries.

Field evaluation of low-cost Alphasense OPC-N3 during urban regeneration activities: the case of MUSA Open-air laboratory at University of Milano-Bicocca.

Doldi, A., Pagliarulo, L., Cerri, S., Cefalì, A. M., Maroni, P., Giovinazzi, L., Losi, N., Ferrero, L.

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Low-cost sensors are becoming ever more prominent in air quality research, but much work needs to be done to improve their accuracy. Laboratory and field tests are necessary to assess the response of these devices compared to reference instrumentation, while site-specific correction factors may be necessary given the strong dependence on environmental factors. This work reports preliminary results from the deployment of low-cost sensors in the context of an urban regeneration project in the city of Milan. Particulate matter (PM) concentrations were monitored by means of four low-cost optical particle counters (OPC-N3, Alphasense), coupled with a research-grade instrument (Dust Monitor Grimm 1.108), during renovation works on the campus of the University of Milano-Bicocca. As results showed a consistent underestimation of PM concentrations by the OPC-N3 in both indoor and outdoor environments, a correction factor was calculated based on the reference data. Corrected data showed better correlation with the reference instrument for the pre-works and construction phase. The applied factor proved to be less effective with the intensification of the works and the cold season forcing, failing in correcting the technical limitation of the instrument during high PM emission events. A more specific algorithm, capable of considering increased emissions from the site and environmental parameters, will be derived as this research progresses.

Impact of Environmental Pollution on Waters and Oceans

Wiktoria Stradomska, Magdalena Mikolajczak, Alicja Adamus.

Ateneum Academy in Gdansk, Poland.

Environmental pollution threatens aquatic ecosystems globally. This abstract outlines its multifaceted impacts, focusing on biodiversity loss, human health risks, and ecosystem imbalance. Pollution sources such as industrial discharges, agricultural runoff, and plastic waste degrade water quality, challenging conservation efforts.

Pollution harms biodiversity, disrupting ecosystems and endangering species through chemical contaminants accumulation. Human health suffers as contaminants enter the food chain, posing risks from contaminated seafood consumption and waterborne diseases. Plastic pollution exacerbates the problem, harming marine life and ecosystems.

In conclusion, addressing environmental pollution in waters and oceans requires coordinated efforts from governments, industries, and individuals. Sustainable practices, pollution prevention, and global cooperation are essential for mitigating pollution's adverse effects, preserving biodiversity, and safeguarding both aquatic ecosystems and human health.

Humanity's need for conflict

Mateusz Zalewski

Ateneum Academy in Gdansk, Poland.

Conflict, a phenomenon that has accompanied humanity since the dawn of time, a force that played a crucial part in paving the direction of the world. This presentation delves into the multifaceted nature of human conflict, examining its psychological, social, and evolutionary roots. It suggests that conflicts may arise from desires for recognition, power, and identity, as well as competition for resources and conflicting values. The discussion goes beyond surface-level understanding, delving into historical, cultural, and cognitive factors shaping conflicts. It also explores the broader consequences of conflicts on society and civilization, emphasizing their pervasive influence on human interactions and societal development. Ultimately, the aim is to deepen understanding of why conflicts persist and their significance in shaping humanity's collective journey.

COVID-19 Pandemic and Work-Related Social Transformations

Natalia Gajewska-Zagrodna, Nikola Szyszka, Anna Chabowska

Ateneum Academy in Gdansk, Poland.

The COVID-19 pandemic has reshaped global work dynamics, impacting employment patterns, remote work, job security, and worker well-being. This study explores these transformations, emphasizing the need for adaptation amidst unprecedented challenges. We examine the pandemic's unequal impact across sectors and demographics, particularly in access to remote work. Challenges of remote work adaptation, aided by technology, and its impact on work-life balance are discussed. Mental health implications are also addressed, highlighting the necessity for holistic employee welfare approaches. Our research employed surveys as the primary method, focusing on COVID-19's impact on employment and worker well-being. Analysis of survey results, particularly percentage breakdowns, revealed insights into age, gender, and employment relationships. Case studies aided the analysis, allowing an understanding of pandemic-induced shifts in the job market and mental health implications. The study reflects on the enduring effects of the pandemic on work dynamics, speculating on the future of remote work and traditional office settings. It stresses the importance of fostering a resilient workforce and organizational adaptability. Remote work, initially a temporary measure, has become a long-term reality, exacerbating inequalities and widening the digital divide. The study advocates for inclusive policies to address these disparities and support employee well-being in evolving work environments.

Inside Out: Exploring the Link between Gut Microbiome and Well-being

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This presentation delves into recent advancements in understanding the intricate relationship between the gut microbiome and overall well-being, particularly focusing on the interplay with psychological factors. Emerging research has elucidated the multifaceted influence of gut microbial communities on human health, extending beyond traditional digestive functions. Through a presentation of current studies, we explore links between gut microbiota and health. Central to this discussion is the interdisciplinarity, integrating biological and psychological perspectives to discuss the complexities of the gut-brain axis. By merging insights from microbiology, neuroscience, and psychology, we gain deeper insights into the mechanisms underlying gut-brain communication and its implications for mental health outcomes. Furthermore, this presentation highlights the translational potential of gut microbiome research, offering insights into future directions for both basic science and clinical applications. By elucidating the bidirectional communication between the gut and the brain, this interdisciplinary approach holds promise for developing targeted interventions for overall health, ushering in a new era of personalized medicine strategies aimed at optimizing well-being.

The error in determining the mass of atmospheric particulate matter at 50% relative humidity.

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The European Union imposes limits to be maintained and sample collection and analysis methodologies (updated September 2021). These require not to exceed average annual concentrations of 5 µg/m3 for PM2.5, half the value indicated in 2005, and to store the filters, before weighing, at 20 ± 1 °C and 50 ± 5% RH with the aim of achieving balance. The standard, however, does not consider the "history" of the sample which can influence the water content of the particulate, it will in fact depend on whether the relative humidity during sampling is higher than the deliquescence RH (DRH) or lower than the 'Crystallization RH (CRH) of the hygroscopic constituents of PM. Observing the samples it is highlighted that the absolute mass delta between the dry and wet weighing is between 0.002 and 0.488 µg with an average of 0.178 µg. Since these are samples rich in nitrates, the points involved in deliquescence and crystallization are located around 50% of RH, precisely the zone considered to be of equilibrium as the critical zone. The fact that the sample is at 50% RH, therefore, is not able to indicate whether we are in dry or wet mass conditions, inducing an error in the measurement which at such low normative values can be very significant and not negligible.

Atmospheric Simulation Chamber and bioaerosol: experiments on bacteria viability in different atmospheric conditions

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In recent years, the interest in characterization of bioaerosol has grown, focusing on the effects it can have on the climate and human health. One of the main bioaerosol components are bacterial species: they can act as ice nucleating particles and cloud condensation nuclei, influencing precipitation processes and impacting the duration of clouds, optical properties and climate models. Furthermore, they can be damaging to human health due to their biological activity and ability to penetrate the respiratory system. At ChAMBRe (Chamber for Aerosol Modeling and Bio-aerosol Research), the atmospheric simulation chamber jointly managed by INFN and Department of Physics (UniGe), we study how bacterial viability is influenced by the concentration of some atmospheric gas pollutants (NO and NO2). We will present the results of experiments obtained on different bacterial strains, comparing the viability obtained in "clean air" conditions and in conditions of exposure to simulated solar radiation and different concentrations of pollutants.

Analysis of RNA to DNA ratio in fish larvae: key insights into development and adaptation

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The study of the RNA:DNA ratio is an important tool in research on the development and metabolism of fish larvae. In principle, this ratio tends to be higher in well-fed, metabolically active, growing fish compared to starving, lethargic, and metabolically inactive individuals. An analysis of herring larvae sampled in the Vistula Lagoon in 2022 and 2023 was conducted. Biochemical techniques were used to extract and measure RNA and DNA from larval samples. The results indicate variations in the RNA:DNA ratio depending on sampling time. The highest values were observed in May, while in April and June they were relatively low. It was hypothesized that observed differences in the RNA:DNA ratio reflect changes in metabolic activity, growth intensity, or environmental stress among the examined larvae. Identifying the sources of this variability can be crucial for assessing the condition of fish larvae and their potential responses to environmental changes, contributing to a better mechanistic understanding and prediction of fish population dynamics and recruitment.

What Made Us Afraid of Zombie? Reimagining Zombies in Film, TV Series, and Video Games

Marta Bubnowska

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The visual culture of the 21st century has reimagined the zombie. The zombie figure has started appearing in every corner of contemporary pop culture, especially in the last two decades, gathering audiences fascinated with the outbreak narratives in front of the screens, especially after they became too close to reality, firstly after 9/11, and then after the COVID-19 pandemic. The main point of my research is to elucidate how the zombie figure has transformed from a mindless, slowly-strolling monster in Night of the Living Dead (1968) by George A. Romero to fast, desolating zombies in TV Shows such as The Last of Us (2023) or re-introduced apocalyptic zombies in the newest Resident Evil (2023). I aim to explain their symbolic representation of global, often universal fears. My goal is to prove that the figure of a zombie fits into the concept of "the Other", and these are the monsters that are victims oppressed by humans, not otherwise. On the literary ground, the zombie apocalypse exposes plenty of societal fears and traumas, not only related to death or epidemiological threats but also fears related to the economy, such as corporate realms and subjectivity of workers pertaining to capitalistic structures, economic crisis, fear against the disruption of economic, political and social structures. Following that, I aim to answer the questions of what a zombie is in modern texts, why we are afraid of it, and what it is that we are so scared of outside the screen.

The Relationship between Religiosity and Ambivalent Sexism: A Systematic Review and Meta-Analysis

Jurand Sobiecki, Martyna Malcher, Oliwia Kosecka, Natasza Kosakowska-Berezecka

University of Gdansk, Poland.

This systematic review and meta-analysis aim to explore and analyze the existing research on the relationship between religiosity and two forms of ambivalent sexism (i.e. benevolent and hostile). A narrative synthesis approach and meta-analysis based on Fisher's z-transformed correlation coefficients were used to summarize the findings. The findings will be presented following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The findings suggest that religiosity is associated positively with both forms of ambivalent sexism. The stronger positive correlation was between religiosity and benevolent sexism (z = .29, 95% CI [.26, .33]) compared to religiosity and hostile sexism (z = .19, 95% CI [.13, .25]). However, the relationship varied significantly across studies suggesting moderating roles of religious affiliation and gender. The findings highlight the need for more nuanced and intersectional approaches. The empirical models that will allow a better understanding of this relationship will be presented along with the next steps of the project funded by the National Science Centre in Poland (grant 2023/49/N/HS6/01936).

POSTER PRESENTATION ABSTRACTS

The pyrazole derivative of usnic acid inhibits the metastatic potential of pancreatic cancer cells in vitro

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The incidence of neoplastic diseases is increasing, therefore new methods of prevention and treatment, including new drugs, are in constant demand. For this purpose, naturally occurring compounds are used or their derivatives with more favorable chemical and biological properties are synthesized. Usnic acid (UA), a secondary metabolite of lichens, belongs to such compounds. Reports indicate that it has a cytotoxic effect on cancer cells of various origins, in vitro and in vivo; but, it should be used in high concentrations. In this work, a new synthetic pyrazole derivative of UA was obtained using flow cytometry, colorimetric or microscopic methods, its activity - anti-migratory and anti-invasive potential toward pancreatic cancer cell lines (Mia PACA-2, PANC-1) was investigated. The effects of the UA derivative on the morphology of mitochondria and response of cancer cells to combined treatment with a glycolysis inhibitor (3BrPA) were tested. The results shows the potent anti-metastatic activity of the tested UA derivative against pancreatic cancer cell lines. UA derivative changed mitochondria morphology, 3BrPA potentiated cell death induced by the compound. It seems that modification of UA structure is a promising strategy to obtain compounds with a higher than parent compound anticancer potential. The combination of this derivative with available drugs may reduce the need for using high doses of therapeutics, alleviating their side effects and improving patient comfort.

The anticancer potential of compounds isolated from Baltic cyanobacteria against lung, breast and prostate cancer

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Cancer is one of the major causes of death globally, with WHO reporting nearly 10 million cancer related deaths in 2022. The treatment varies greatly depending on the affected tissue. However, presently available therapies often fail to address the problem fully which projects onto overall survivability. New therapies are being developed with cyanobacterial metabolites presenting as a promising new source of anticancer compounds.

During the course of the study, we strived to determine the effect of 5 fractions of cyanobacterial metabolites, which were isolated from the Baltic cyanobacteria Nostoc edaphicum and Pseudoanabaena cf. galeata, on the survivability of 3 cancer cell lines, including lung cancer (A549), breast cancer (T47D) and prostate cancer (PC3), as well as human embryonic kidney cells (HEK) which served as the control. Cell cultures were incubated for 24 hours with different concentrations of the isolates – their survivability was then determined with the use of an MTT assay.

Based on obtained results we can conclude that various cyanobacteria derived compounds exhibited anticancer properties – they successfully inhibited cancer cell growth.

The metabolomes of different cyanobacterial species show great pharmacological potential and could, in the future, be the source of potential marine drugs. However further studies must be carried out in order to confirm the cytotoxic activity as well as determine potential mechanism of action of the studied compounds.

Impact of leachates from smoked cigarette buts on early life stages of rainbow trout Oncorhynchus mykiss

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It is estimated that annually up to 767,000 tons of cigarette butts (CB) end up as litter.

Toxic ingredients can leach from CB and may harm fauna inhabiting the aquatic environment.

The aim of the study was to determine the impact of leachates from smoked CB on the early life stages of rainbow trout Oncorhynchus mykiss.

O. mykiss embryos were exposed to CB immediately after fertilization, experiment ended when the fish larvae started to swim actively but were still feeding endogenously after 52 days of exposition. In this study four CB concentrations were used: 0.001 CB/L; 0.01 CB/L; 0.1 CB/L and a control group without CB leachates.

Survival rate of O. mykiss embryos were not affected during exposure to CB. Survival rate of larvae was slightly lower, and the hatching rate was insensibly accelerated in CB treatments than in the control group. There were no differences between CB variants in heartbeat rate and gill covers move rate comparison to controls. Similarly, no differences were observed in growth rate of larvae among all variants compared to control. Toxic metal concentrations i.e. Mercury, Arsenic, Cadmium and Lead in O. mykiss larvae were higher in CB variants than in controls.

The results indicate for the first time that chronic exposure of various concentration of leachates from smoked CB released into aquatic ecosystems may have serious developmental implications as well as toxic metals contamination for the early life stages of salmonid fish.

Effect of prebiotics on anxiety level and brain GABAergic neurotransmission in rats subjected to long-term electrical stimulation of the amygdala

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In brain processing relies on inhibitory (largely GABAergic) neurons, which have been linked to anxiety. A key element of the anxiety circuitry is the amygdala (AMG) and long-term electrical stimulation (ES) of this brain structure in rats causes symptoms of anxiety disorders. The AMG has also a crucial role in the microbiota signals processing and integration Galacto-oligosaccharides (GOS) are prebiotics that increase the growth of health microorganisms and have some anxiolytic potential. The aim of this study is to verify whether GOS supplementation attenuates anxiety level and disruptions of GABAergic neurotransmission induced by ES of the AMG in rats.

32 male Wistar rats divided into four experimental groups were subjected to stereotaxic surgery of electrodes implantation into the amygdala and (after recovery period) to 14-day ES of the AMG (or sham stimulation) and 21-day treatment with GOS (control groups received water). The anxiety level was measured in behavioural elevated plus maze test and the GABA level was obtained in brain structures homogenates by ELISA method.

We found that in rats subjected to ES of the AMG, the GABA level in brain was significantly lower than in animals from the Sham group, which may caused observed anxiety-like behaviours. GOS therapy normalized GABAergic neurotransmission and alleviated behavioural symptoms related to anxiety.

The work is the result of the research project 2019/35/N/NZ4/00908 funded by the National Science Center.

Factors influencing the variability of stable isotopes of carbon, nitrogen, and sulfur in benthic macrofauna from Admiralty Bay, maritime Antarctic

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Stable isotopes of carbon (δ13C), nitrogen (δ15N) and sulfur (δ34S) are commonly used trophic markers in food web studies to identify the main sources of food web production and the trophic levels of organisms. The association of these stable isotope values with body size indicates changes in habitat use, resource selection, and trophic level during growth. This work investigated the variability of stable isotopes of carbon ($\delta^{13}C$), nitrogen ($\delta^{15}N$) and sulfur ($\delta^{34}S$) in the benthic macrofauna of Admiralty Bay. Isotope analyzes were performed on samples of benthic organisms (limpets, sea urchins, starfish and brittle stars). The results showed significant differences in isotopic composition between species, suggesting diverse food preferences. Additionally, isotopic diversity was observed depending on spatial distribution/depth, which may indicate differences in food availability and biogeochemical transformation processes. Statistical analysis showed significant relationships between the occurrence of organisms and the isotopic composition of benthic macrofauna. Our research suggests that factors such as food availability and the distribution of organic resources may have a significant impact on the isotopic variability of benthic organisms in Admiralty Bay. Understanding these processes is key to a more complete understanding of how Antarctic ecosystems function and how they respond to climate and anthropogenic change.

Characteristics of selected environmental bacteriophages infecting Salmonella enterica serovars

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The growing problem of antibiotic-resistant bacteria poses a serious threat to humans and animals around the world. It is estimated that in 2050 there will be more deaths from infections caused by multidrug-resistant strains of bacteria than from cancer and cardiovascular disease. Salmonella enterica is a Gram-negative bacteria that is one of the leading causes of gastrointestinal diseases worldwide. Inadequate administration of drugs has led to development of various antibiotic resistance mechanisms. In this situation, one alternative treatment for this type of infection may be phage therapy.

In this work, two lytic bacteriophages specific to Salmonella enterica strains were isolated and characterized. To assess the therapeutic potential of these phages, they were characterized accordingly. For this purpose, it was determined their survival rate under different physicochemical conditions. Their morphology was identified by using electron microscopy. Moreover, the host spectrum was checked on 100 strains of S. enterica.

In the experiments, both bacteriophages survived under different physicochemical conditions, such as high and low temperature and pH. Moreover, it was observed that the bacteriophages effectively lysed the vast majority of tested S. enterica strains.

The above work provides important information on the efficacy of using newly isolated bacteriophages, which can potentially be used as alternatives to antibiotics in the eradication of salmonellosis.

The effects of compounds isolated from Nostoc edaphicum and Pseudanabaena cf. galeata on the viability of cervical cancer cells

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According to WHO data from 2022, 662301 women suffered from cervical cancer (CC) which places CC as the 4th most commonly diagnosed cancer among women worldwide. At the same time, it has the highest mortality rate, at 53%, of all diagnoses of this cancer. Unfortunately, currently available treatments give unsatisfactory results.

For this reason, new treatment strategies are being sought, and cyanobacteria are a rich source of compounds that may have anticancer potential. Their metabolomes are rich in bioactive compounds, and some of them show cytotoxic effects on cancer cells.

Taking this information into account, a study was conducted to verify the effects of extracellular metabolites of two species of cyanobacteria, Nostoc edaphicum and Pseudanabaena cf. galeata, on the cell viability of five CC lines (HeLa, SiHa, DoTc2, Ca Ski, C-33 A) and an embryo kidney cell line (HEK-293) as a model of healthy human cells. Based on the results of the MTT assay, it can be concluded that the metabolites of the tested species had a cytotoxic effect on cancer cells, while having relatively little effect on healthy cells. The lowest relative survival rate was observed on the Ca Ski line.

Despite the promising results, it is necessary to carry out further studies of the individual compounds contained in the fractions tested and to assess the mechanisms of cell death induced by these compounds.

The impact of junk food on health and advertising it to children.

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The topic will be the impact of junk food on physical and mental health. The authors will focus on the consequences of an inadequate diet. The aspect of advertising fast food to children and teenagers will also be included.

Mercury and methylmercury in Baltic herring (Clupea harengus, Linnaeus, 1761.) in 2018.

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Mercury entering the sea undergoes bioaccumulation in organisms and biomagnification in subsequent links of the trophic pyramid. The highest concentration of Hg are observed in organisms at the top of the trophic pyramid. "Total mercury and methyl mercury as well as biological parameters were measured in the Baltic herring (Clupea harengus) caught in the southern Baltic Sea in 2018. The fish samples were obtained in 2018 from commercial catches conducted in four months corresponding to seasons (February - winter, May - spring, July - summer, and September - autumn) in the Władysławowo area. This fishing region is located on the steep slope of the Baltic Proper and is exposed to relatively strong water currents. Additionally, in May 2018, samples of herring were collected from other areas: Kołobrzeg (coastal zone of the Baltic Proper), Orłowo (Gulf of Gdańsk), and Tolkmicko (Vistula lagoon). Research whole fish for metal contamination is crucial, as these organisms provide food for a range of higher organisms: seals or birds. None of the fish examined exceeded the limit values set by the WHO for commercial fish (0.5 µg Hg/ g-1 w.w.). The relationships discovered by many researchers that mercury and methylmercury concentrations depend on length, weight, age have been confirmed.

Resveratrol boosts enzyme activity by enhancing lysosomal receptors: A combined therapy approach with resveratrol and enzymes in a cellular model of Mucopolysaccharidosis type I

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Mucopolysaccharidosis type I (MPS I) being the most commonly encountered form of MPS disease. It manifests due to mutations in the IDUA gene, resulting reduced lvl of enzyme α-L-iduronidase and accumulation specific glycosaminoglycans (GAGs) within lysosomes. As a results, organ failure, along with immune system hyperactivity. There are two supportive therapies, which are hematopoietic stem cell transplantation (HSCT) and enzyme replacement therapy (ERT) but HSCT is associated with a high risk of complications, and enzymes from ERT due to their sizes do not pass through the blood-brain barrier, which results in further exacerbation of neurological symptoms. Resveratrol (polyphenol) emerges as a promising, alternative therapeutic compound. Its anti-inflammatory properties and the ability to reduce GAG levels. Its small size enables it to penetrate the blood-brain barrier. The mentioned properties of resveratrol suggest that it may be an effective complement to existing therapies, especially enzymatic therapy. To assess the effectiveness of combined therapy, three experiments were conducted: Dot-blot to detect changes in GAG levels, enzymatic assay to analyze enzyme activity, and immunofluorescence to detected changes in M6PR. The results demonstrated a reduction in heparan sulfate levels, an increase in enzyme activity, and an increase in receptor expression. The findings suggest that resveratrol has the potential to support enzymatic therapy and thus improve quality of life.

Modernisation or degradation? Perception of social and spatial change in coastal cities by tourists and residents

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Each year, more and more resorts are being built in Polish coastal towns and cities, and green areas are being converted into tourist infrastructure facilities. The largest cities of the Baltic Sea are developing at a compelling pace, which contributes to an increase in the price of a stay at the Polish seaside, noise pollution and municipal waste. This has a particular impact on the needs and expectations of people for whom these towns and cities are permanent places of residence, as well as seasonal recreation. In our work, we would like to present the views of tourists and residents on their level of satisfaction with the current state and appearance of Polish Baltic cities and towns. To achieve that, we asked them questions about how progressive modernization affects their living comfort and satisfaction with their stay at the Baltic Sea. The results of the survey are intended to give an answer to the question of whether permanent residents and tourists visiting the seaside locations really perceive them as clean and safe places suitable for recreation and rest from the "urban jungle.”

Mercury concentration and diatom flora changes in the developmental phases of the Baltic Sea from Ancylus Lake to the Post-Littoral Sea

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Diatoms are the base of the trophic web as a result of which the mercury they accumulate can biomagnify, enriching subsequent levels of the trophic web with higher concentrations of Hg. Diatoms, in addition to fine sediment and organic matter, can be an important component of the environment adsorbing and absorbing mercury. The aim of this study was to determine changes in mercury concentrations in the diatom flora.

The PB2 core (5.11 m) sediments covered the developmental periods of the Baltic Sea from Ancylus Lake to the Post-Littorina Sea. Total mercury concentrations ranged from 3.3 ng g-1 (Lake Ancylus) to 353 ng g-1 (Post-Littorina Sea). Along with low Hg concentrations, a high percentage of freshwater diatoms such as Tabelaria floculosa and diatoms of the genus Fragilaria were observed in the freshwater development phase. In the developmental phase of the Littorina Sea, the increase in Hg concentrations to 16.4 ng g-1 was accompanied by an abundance of the marine species Thalassionema nitzschioides and Pseudosolenia calcar-avis. A rapid increase in sediment Hgtot concentrations was observed with an increase in the frequency of eutrophants such as the species Chaetoceros spp. RS and the anthropogenic taxa Thalassiosira levanderii and Cyclotella choctawhatcheeana. Which indicates the importance of human activity in the inflow of Hg to the marine environment in the last developmental phase of the Baltic Sea.

Exploring the Spectrum of Learning: Unveiling the Dynamics of Visual, Auditory, Read/Write, and Kinaesthetic Learning Modalities

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Understanding the various ways individuals process information is pivotal for effective teaching and learning. This presentation delves into four distinct learning modalities: visual, auditory, read/write, and kinaesthetic. Each modality offers unique pathways for acquiring and retaining knowledge, catering to the diverse needs of learners. The poster will be divided into 6 sections, 1st - title and a short introduction, 2nd - each of the 4 types of learning will be presented and described, 3 rd - consists of problems related to the existance of those 4 types, 4th - we will mention solutions for the problems described in the previous point.

Don't let the teachers burn out.

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Teacher burnout occurs when teachers undergoing stress for long periods of time experience emotional exhaustion, depersonalization, and lack of personal accomplishment (Maslauch, 2003). Teachers are significant contributors to society. They play the key role in the holistic development of children. Moreover, they pass on knowlegde, build up critical thinking skills, inspire students and parents, serve as role models. Overall, they shape the future of children. It is crucial to support them.

This poster not only provides practical advice on how to avoid teacher burnout but it also describes symptoms and causes of teacher burnout. In addition, the results of the research on Polish teachers' well-being made in March, 2023 by dr Mateusz Paliga are attached.

Characterization of bacterial inocula for experiments in ChAMBRe-Chamber for Aerosol Modelling and Bio-aerosol Research.

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The effects of bioaerosol, the biological component of atmospheric aerosol, on the environment and health are numerous but still little known. Experiments conducted in Atmospheric Simulation Chambers (ASCs), can provide valuable information on the viability and dispersion of bacteria in the aerosols. For this purpose, a multi-step procedure was developed to conduct experiments in ChAMBRe (Chamber for Aerosol Modelling and Bio-aerosol Research), an atmospheric simulation chamber at the National Institute of Nuclear Physics in Genoa (Italy), in collaboration with the University of Genoa (Vernocchi et al., 2023). The first step of each experiment, focus of this abstract, is the characterization in terms of total and viable concentration of the bacterial inoculum which will then be injected into the chamber.

The bacterial inoculum consists of bacteria resuspended in physiological solution. To retrieve the concentration of viable bacteria we use serial dilutions on petri dishes; the following day the CFU (Colony Forming Units) formed are counted to calculate the number of bacteria in solution. For the total bacterial concentration, we use an automatic cell counter with a fluorescent probe: QUANTOM Tx. At the same time, an analysis is also carried out via fluorescence microscopy (live/dead) for comparison. The use of different methodological approaches that we report here constitutes a precise protocol, a valid support, in the study of bioaerosols.

Shipwrecks – from dangers to new habitats.

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A introduction of an anthropogenic object to the marine environment never goes without consequences. The debate thus revolves around evaluating both – the ecosystem services it provides, as well as potential risk it poses for the sea bottom habitat. Due to ever-increasing interest in offshore investments around the world, investigating this issue is essential to understanding the implications of the man-driven changes at the seabed. Shipwrecks are particularly interesting objects to consider due to the unintended circumstances in which they have found their way to the sea bottom. Therefore, they may pose potential danger to marine environment due to hazardous load they may contain, such as fuels, explosives and other toxic agents, becoming navigation obstacles or underwater snags accumulating abandoned or lost fishing gear (commonly referred as 'ghost nets'). In many cases shipwrecks are also seen as underwater cultural heritage, hence managed and preserved due to their historical and recreational (diving spots) value. Finally, they can be perceived as natural laboratories for investigating complex interactions between such unplanned hard-bottom structures and dynamic processes occurring at the seafloor. Globally there are approximately 3 million sunken vessels of various kinds laying at the seabed – too many to ignore their influence on marine environment.

Exploring the future: modern tools for learning English

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The poster presents a study on the use of modern tools for learning English by students in Polish schools and during their independent learning. The survey results provide an opportunity to take a closer look at current schools and what expectations students have for the process of learning a second language. What is more, it should be stated that the answers showed that there is a need for more frequent use of modern tools by English teachers.

It is worth mentioning here that one of the most important factors shaping the future of language learning is technology [Chapelle, 2003: 9]. In order to use it in a successful way, teachers should learn strategies for using digital media in teaching and increase their electronic literacy abilities [Son, 2020: 10]. This is necessary because there are many different modern tools and ways of using them for learning purposes [Motteram, 2013: 5]. For example, students can listen to podcasts, write blogs, or use social media platforms, and through these activities, they can develop their language skills [Carrió-Pastor, 2016: 45]. However, it is important to know the distinction between two ways of learning. Those examples of activities can be described as an active process of gaining knowledge. The second way is more passive, and it is learning from technology. Nowadays, the emphasis is placed on tools that provoke people to be active. Moreover, it is also noticed that the use of technology is beneficial [Thouësny and Bradley, 2011: 2].

BLAnCA: a new broadband light absorption analyser for complex aerosol

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Atmospheric particulate matter (PM) plays a fundamental role in the Earth's energy balance and climate due to its light absorption and scattering properties. It is crucial to be able to study these properties in detail to obtain insights on its climate impact and to develop efficient abatement strategies. In this context, a new instrument for light absorption measurements has been developed at the Physics department of the University of Genoa. BLAnCA (Broadband Light Analyzer of Complex Aerosol) is equipped with a wide spectrum light source and a high-resolution spectrometer. It can perform measurements of the light absorption coefficient of aerosol collected on a filter, on the spectral range [350, 1000] nm with a resolution of 5 nm. At each wavelength, the angular profile of the light scattered by the sample is measured by placing the detector element on a movable arm that spans the scattering half-plane. To determine the wavelength-resolved absorption coefficient of the sample from the measured phase functions, a modified version of the Multi-Angle Absorption Photometer scheme is used. Existing devices can only measure light absorption at a limited number of wavelengths, whereas BLAnCA makes it possible to distinguish finer features in the absorption spectra that could be missed without this high spectral resolution. This data allows to obtain crucial information about the aerosol type, composition, ageing-induced optical modifications and source apportionment.

A girl in the Arctic – my experience during polar expeditions

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Working aboard science ships presents constant challenges. By joining these expeditions, we commit to operating under extraordinary circumstances, often facing adverse weather or cramped quarters. Personally, I've been part of four Arctic scientific missions: AREX2019, AREX2020, AREX2022 (all in the Svalbard region), and MOSAiC School 2019 (Central Arctic). In my poster, I aim to portray a young female scientist, demonstrating unwavering determination and inspiration as she performs one of the most interesting works in very exceptional conditions.

Distribution of suspended particulate matter and heavy metals near Hansbreen Glacier (Hansbukta Bay, Hornsund)

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Heavy metals are introduced into the Arctic environment mainly through anthropogenic sources, primarily via long-range atmospheric transport. These pollutants deposit on land and glaciers through dry and wet deposition. Intensive climate change in the Arctic accelerates glacier melting and permafrost thawing, leading to the release of suspended particulate matter (SPM) into the sea, along with heavy metals, which have an affinity for organic matter and fine mineral fractions. The study focuses on understanding the proportion of heavy metals transported with waters from the melting glacier Hansbreen that will be retained in Hansbukta Bay and what will be transported beyond its boundaries. The research utilizes SPM data from the IGF database and analyzes metal concentrations (Cu, Zn, Pb, Cd) using ICP-MS, while the distribution of SPM and metals is examined through PCHIP interpolation (MATLAB). Results show higher SPM concentrations in the upper water layer (0–14 meters). Seasonality and precipitation influence sediment distribution, and metal content analysis in Hansbukta Bay waters indicates seasonal changes and differences in the water column. Higher concentrations of heavy metals in the upper layers suggest their potential transport to the central part of Hornsund Fjord, while higher concentrations at the bay's bottom indicate their deposition and long-term accumulation in bottom sediments, and thus may pose a threat to the organisms living there.

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