

# INTERNATIONAL SOPOT YOUTH CONFERENCE



May 26<sup>th</sup>, 2017  
Sopot, Poland

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PROCEEDINGS OF THE INTERNATIONAL SOPOT YOUTH  
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## Partners and Supporting Institutions



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## Foreword

In September 2015, a historic UN Summit took place, during which the nations of the world agreed on the 17 Sustainable Development Goals of the 2030 Agenda for Sustainable Development. These Goals officially came into effect on 1 January 2016. These Goals are fully universal and simply apply to all. The aim is to mobilize all efforts in order to end poverty, inequalities, and to challenge the issues involving climate change. However, the main goal is to ensure that no one is left behind.

Having this in mind, we are happy to present you with the outcome of the International Conference entitled Where the World is Heading. This conference is the continuation of the long tradition of the Sopot Youth Forum. Since 2008 the Sopot Science Association has created a platform for over 250 scientists from all over Europe.

This year, we gathered young scientists and science enthusiasts, university students, Ph.D. students and young doctors, from all over Europe and gave them the opportunity to present their work, visions, opinions, and thoughts. Traditionally, the Sopot Youth Conference is divided into two categories: humanities and social sciences, and natural sciences. Due to the multidisciplinary character of the Sopot Youth Conference, the abstracts and presentations are intended for the general audience. In accordance with previous editions, this year the best presentations have been granted financial awards.

**Tymon Zielinski**  
**Chairman of the Sopot Science Association**

## Agenda

8:15 – 9:00	<b>Registration</b>
9:00 – 9:10	<b>Welcome by Prof. Janusz Pempkowiak, IO PAN Director and Assoc. Prof. Tymon Zielinski, IO PAN, Sopot Science Association Chairman</b>
9:10 – 9:30	<b>Where is the World heading? A subjective and selective review of the past 10 years. Assoc. Prof. Tymon Zielinski</b>
9:30 - 10:45	<b>Session I: Polar Studies Session Chairs: Paulina Pakszys, Anna Raczkowska</b>
9:30 – 9:45	Near surface variability of the water properties in relation to the ocean color remote sensing in the European Arctic. <i>M. Konik, IO PAN</i>
9:45 – 10:00	Submesoscale Atmospheric Boundary Layer Processes over Fragmented Sea Ice. <i>M. Wenta, A. Herman, University of Gdansk</i>
10:00 – 10:15	Feeding activity and diet of Antarctic herbivorous copepods in response to change in phytoplankton community composition (Admiralty Bay, South Shetland Islands). <i>B. Jerzak, M. I. Zmijewska, A. Zgrundo, University of Gdansk</i>
10:15 – 10:30	Melting glaciers – an inconspicuous threat to polar zooplankton. <i>M. Walczynska, M. Manko, A. Weydmann, University of Gdansk</i>
10:30 – 10:45	Can we use our brain to study climate change? <i>I. Wrobel, IO PAN</i>
10:45 – 11:00	<b>Coffee break</b>
11:00 – 12:30	<b>Session II: Social Sciences I Session Chair: Dorota Majewicz</b>
11:00 – 11:15	Where the family is heading? Child parentification in the context of relationships with siblings. <i>J. Borchet, A. Lewandowska-Walter, University of Gdansk</i>
11:15 – 11:30	The Role of the First Lady in the United States of America. <i>I. Stasiak, University of Gdansk</i>
11:30 – 11:45	The dark side of immigration. <i>N. Grajaszek, M. Romaniuk, University of Gdansk</i>
11:45 – 12:00	Adaptation to Climate Change in Africa: A Technical Riddle or a Democratic Challenge? <i>M. Mikulewicz, University of Manchester</i>
12:00 – 12:15	Foreign Influences on Poland. <i>K. Najman, A. Sierant, M. Skrzynska, University of Gdansk</i>
12:15 – 12:30	The challenges facing the Arctic region governance – from theory to practice.

*W. Szczerbowicz, University of Wroclaw*

**12:30 – 13:15**

**Session III: 1 minute poster presentations**

**Session Chairs: Iwona Wrobel, Milosz Grabowski**

**13:15 – 14:00**

**Lunch**

**14:00 – 15:15**

**Session IV: Natural Sciences I**

**Session Chairs: Przemyslaw Makuch, Katarzyna Draganska-Deja**

14:00 – 14:15

The characteristics of the carbonate system in the Odra river estuary (Poland).

*M. Stokowski, B. Schneider, J. Müller, G. Rehder, K. Kulinski, IO PAN*

14:15 – 14:30

Comparing orientation of geological planes – topological aspects.

*M. Michalak, G. Bytomski, University of Silesia*

14:30 – 14:45

Transport and accumulation of radioactive particles in the Gulf of Gdansk.

*K. Zielinski, University of Gdansk*

14:45 – 15:00

How supercomputers will give raise to a breakthrough in materials science?

*P. Klejment, Institute of Geophysics PAS*

15:00 – 15:15

Impact of anthropogenic pressure on the southern Baltic Sea bottom.

*M. Grabowski, IO PAN*

**15:15 – 15:30**

**Coffee break**

**15:30 – 17:00**

**Session V: Social sciences II**

**Session Chairs: Joanna Laszcz, Jacek Maslankowski**

15:30 – 15:45

The subjective feeling of caregivers' burden in Parkinson's Disease (PD). Research Overview.

*P. Golinska, M. Bidzan, University of Gdansk*

15:45 – 16:00

Changes That Affect Process of Teaching—Persuasion vs. Manipulation.

*E. Ornowska, University of Gdansk*

16:00 – 16:15

The Future of Polish Employees on the European Union Labour Market.

*E. Podgorska-Rakiel, University of Gdansk*

16:15 – 16:30

Racial Diversity And Racism In the USA - a Contemporary Perspective.

*B. Bem, M. Puczynska, M. Pawlowska, University of Gdansk*

16:30 – 16:45

Where is the entrepreneurship heading? From productive to destructive entrepreneurship - the border.

*M. Bielenia, University of Warsaw*

16:45 – 17:00

Relationship between social anxiety and study addiction.

*W. Wrobel, University of Gdansk*

**17:00 – 17:15**

**Coffee break**

**17:15 – 18:15**

**Session VI: Natural Sciences II**

**Session Chair: Karolina Pierzynowska, Mikolaj Mazurkiewicz**

17:15 – 17:30	The impact of small-scale fisheries activities toward fisheries sustainability in Indonesia. <i>N. Ayunda, M. Sapota, University of Gdansk</i>
17:30 – 17:45	Microplastics in the marine environment – sources, fate and impact on organisms. <i>K. Szewc, B. Graca, University of Gdansk</i>
17:45 – 18:00	The role of the endoplasmic reticulum (ER) channels in transport of ricin from the ER to the cytosol. <i>N. Sowa, M. Slominska-Wojewodzka, University of Gdansk</i>
18:00 – 18:15	The genistein-induced autophagy process as a novel approach for treatment of neurodegenerative diseases. <i>K. Pierzynowska, M. Podlacha, D. Myslinska, I. Majkutewicz, J. Mantej, N. Niedzialek, A. Wegrzyn, G. Wegrzyn, University of Gdansk</i>
18:15 – 18:45	<b>Session VII: Poster presentations</b>
18:45 – 19:15	<b>Jury proceedings</b>
19:15	<b>Announcement of the results of the best presentation contest and the awards ceremony.</b>
<b>Social Program</b>	
20:00	<b>Afterparty in Club Atelier (Sopot, ul. Mamuszki 1, near Hotel Grand) All participants are welcome!</b>

## Oral Presentation abstracts (session order)

### Session I: Polar Studies

Session Chairs: Paulina Pakszys, Anna Raczkowska

#### ***Near-surface variability of the water properties in relation to the ocean color remote sensing in the European Arctic***

**Marta Konik**

*Institute of Oceanology Polish Academy of Sciences, Sopot, Poland*

The phytoplankton are key players in the estimation of the global primary productivity due to their photosynthetic abilities. In order to photosynthesize they absorb light in specific wavelengths of the light spectrum, what is used to quantify their biomass based on the characteristics of the water leaving radiances.

Since the late 1970s numerous algorithms based on relationships between chlorophyll a concentration and spectral characteristics of water leaving radiances have been developed, but most of them took the European Arctic as a one water type and that could be a reason they still do not provide retrieved values with demanded quality.

On the other hand, the European Arctic is a region of dynamic mixing and inter annual variability of the current routes. Moreover, longterm cloud cover, abundance of many optically active constituents and recently noticed – deep chlorophyll maxima, which occur during pronounced stratification with waters of contrasting properties, make it a highly errorprone area for the remote sensing measurements. Considering that optical imagery is limited to the euphotic zone, these factors may significantly bias estimations inferred from the near surface measurements.

The aim of this study was to compare optical properties of the various near surface water types in the European Arctic area and analyze potential influence of them on the ocean color algorithms. Data collected during field campaigns in years 2013 2015 were used in this study.

#### ***Submesoscale Atmospheric Boundary Layer Processes over Fragmented Sea Ice***

**Marta Wenta, Agnieszka Herman**

*Faculty of Oceanography and Geography, University of Gdansk, Gdynia, Poland*

The resolution of few kilometers is the one currently used in most numerical weather prediction (NWP) models. Therefore the small scale variations of ice properties and fracturing are not taken into account in models parameterizations, along with the processes describing the atmospheric boundary layer response to the nonuniform sea ice distribution. Those floe/lead level related processes have a significant influence of the dynamics and thermodynamics of the lower atmosphere and upper ocean, as well as the ice cover itself. Therefore there is a growing need of detailed analysis and parametrization of them.

Taking this into account we decided to analyze three-dimensional air circulation within the atmospheric boundary layer over fragmented sea ice. A series of highresolution numerical simulations with the Weather Research and Forecasting (WRF) model is performed for various distributions of ice floes and leads, two different ice concentrations and several wind speeds. While the distribution of sea ice differs for each set of the results, its concentration and volume remains the same to enable the examination of different sea ice spatial arrangements influence on the lower atmosphere.

Our analysis proves that the domain-averaged values are sensitive to the subgridscale spatial distribution of sea ice, especially for higher ice concentrations. This confirms

that the parameterization of those effects may lead to the improvement of the performance of NWP models.



***Feeding activity and diet of Antarctic herbivorous copepods in response to change in phytoplankton community composition (Admiralty Bay, South Shetland Islands)***

**Bartłomiej Jerzak, Maria I. Zmijewska, Aleksandra Zgrundo**

*Faculty of Oceanography and Geography, University of Gdansk, Gdynia, Poland*

Recent results of phytoplankton monitoring in Admiralty Bay revealed a diminished percentage contribution of diatoms in the phytoplankton assemblages in comparison to the earliest studies. Also the lowering contribution of the larger diatoms (> 20 µm) has been shown. These phenomena may be related to wider shift in phytoplankton community structure documented in coastal waters along the Antarctic Peninsula. Intense glacial meltwater runoff reduce surface water salinity and cause an increase in turbidity, resulting in better conditions for tiny organisms to dominate the phytoplankton. This marked shift in size distribution of the phytoplankton community is potentially of great importance for the pelagic filter-feeders. It could impact the feeding of herbivorous copepods, as they feed mainly on diatoms and their grazing efficiency is highly dependent on food density and size of its particles.

The aim of the study is to examine feeding behavior of four copepod species – *Calanoides acutus*, *Calanus propinquus*, *Rhincalanus gigas* and *Metridia gerlachei* in Admiralty Bay. During presentation a results of the studies on feeding activity (estimated as a percentage of copepods with food in gut) and gut content analysis of four mentioned copepod species will be shown. This findings will be a part of the major research which purpose will be to determine whether the documented shift in size distribution of the phytoplankton community affect the populations of phytoplankton grazers.

***Melting glaciers – an inconspicuous threat to polar zooplankton***

**Katarzyna Walczynska<sup>1,2</sup>, Maciej Manko<sup>1</sup>, Agata Weydmann<sup>1</sup>**

<sup>1</sup>*Faculty of Oceanography and Geography, University of Gdansk, Gdynia, Poland*

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Climate change induced increases of water temperatures are influencing melting and calving of glaciers, thus leading to drastic salinity fluctuations. This is especially apparent in the Arctic Ocean, where the extent of ice layer is evidently decreasing on the year-to-year basis. The observed influx of low salinity meltwater is posing a serious threat to the mostly stenohaline polar zooplankton species, exposing them to the osmotic shock. Moreover, the meltwater is a source of enormous amount of suspended organic matter that aside from affecting both the trophic and transparency of water, may be a cause of *e.g.*, clogging the filtering apparatus of planktonic suspension feeders.

We analyzed the impact and the extent of glaciers melting related processes on the zooplankton, in terms of their survival and ecophysiology. We will also discuss the result of the experiment conducted on Spitsbergen, during which we investigated the effect of salinity on mortality and respiration of several Arctic zooplankton species: *Calanus* spp., *Thysanoessa* spp., *Themisto abyssorum*, *Clione limacina* and *Mertensia ovum*.

## ***Can we use our brain to study climate change?***

**Iwona Wrobel**

*Institute of Oceanology Polish Academy of Sciences,  
Sopot, Poland*

Our brain, in every hemisphere, has a primary visual cortex, containing 140 million neurons, with tens of billions of connections between them. We have a supercomputer in our heads, tuned by evolution over hundreds of millions of years, and perfectly adapted to understand the visual world. By using and imitating supercomputer in our heads, we created supercomputation model, called Artificial Neural Networks. Neural networks are modeling technique that learn by example, and can be described as empirical statistical tools that resolve, the nonlinear and often discontinuous relations among proxy parameters without any priori assumptions. Neural networks derive meaning from complicated or imprecise data and can be used to extract patterns and detect trends that are too complex to be noticed by either humans or other computer techniques.

## Session II: Social Sciences I

Session Chairs: Dorota Majewicz

### **Where the family is heading? Child parentification in the context of relationships with siblings**

**Judyta Borchet, Aleksandra Lewandowska-Walter**  
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Parentification is a form of distorted division of roles and responsibilities in the family where those roles are being reversed (cf. Minuchin, 1984; Jurkovic, 1997; Hooper, 2008, 2011; Schier, 2010, 2014; Haxhe, 2016). A situation which goes beyond the child's capabilities and exhausts resources usually yields numerous negative consequences. Nevertheless, in some circumstances the child may feel helpful and valuable by performing certain functions and roles in the family, so parentification may be beneficial by boosting one's self-agency (cf. Chase, 1989; Hooper, 2008, 2011). Additionally, when parents are inefficient, siblings may become important figures in one's development (Bowlby, 1988; Byng-Hall, 2008).

The presentation contains the preliminary research analyses. The study focuses on the relations between sibling relationships and parentification characteristics. There were 218 late adolescents ( $M=21.37$ ;  $SD=2.49$ ) surveyed using polish adaptation of Hooper's *Parentification Inventory* (Borchet, Lewandowska-Walter, Połomski, Peplińska, in press) and *The Questionnaire of Relationships with Siblings* (Lewandowska-Walter, Połomski, Peplińska, 2016).

Obtained results are very interesting. Firstly, sisters turned out to be more burdened with taking care of their parents than their brothers. Secondly, increasing the number of siblings also increases the perceived benefits of parentification. Perhaps this relationship is due to the fact that in childhood, people with several siblings shared responsibilities between them, which relieved them, and at the same time, the experience of cooperation built their important social skills. The results of the analyses also indicated the significant relationship between the sibling relationship dimensions and the characteristics of parentification.

Apart from various reasons why parents may be inefficient, parentification may also occur due to cultural changes in today's world. Such trends as increased divorce rate, decreasing the number of children in the family, emigration or

parents working late increase the demand for child help (Schier, 2014). Therefore, looking for protective factors in the face of parentification seems reasonable. The obtained results are novel and show that it is important to note the sibling relationships quality while assessing perceived benefits of family roles dysfunctions.

### **The Role of The First Lady in the past and now in United States**

**Irmina Stasiak**

Faculty of Languages, University of Gdansk, Gdansk,  
Poland

The purpose of my presentation is to present the image of the first Lady in the United States. I would like to describe in a few words a picture from the past and nowadays.

What is her role and what functions she performs at the side of her husband? Is the wife of the president of the greatest power in the world commits to something? Should other presidents' wives should take an example from them? Is the president's wife just a figurehead? Is she able to show the proper pattern for other women? Can it be an example for ordinary housewife?

The duties of the First Lady are in general- unspecified. Traditionally, the wife accompanies the husband and the president during official ceremonies, and is also the hostess of the White House, of course with the support of the staff - including a personal spokesperson, head of office or flower arranging expert.

I chose some meaningful characters for me. First is Eleonora Roosevelt, another Jackie Kennedy, then Hilary Clinton, who, as we know, lost the presidential race a few months ago, Michelle Obama and the last of Melanie Trump's wives. They reached the first lady they could be ashamed of or support their husbands. Did their role end in being an ornament? Maybe they could do something great themselves.

## ***The Dark Side of Immigration***

**Natalia Grajaszek, Mirosława Romaniuk**

*Faculty of Languages, University of Gdansk, Gdansk, Poland*

The presentation will focus on the immigration affairs, which have recently stirred heated debates in the political sphere in the United States as well as in European Union countries. The reasons and causes that have led to increased migration processes will be analyzed to present one side of the relation between immigrants and the target country. The following part will discuss the point of view of chosen American and European target countries, whose foreign policies have changed in the last two decades in the face of an influx of immigrants. The causes of growing opposition of citizens of particular target countries will be presented to show how problems provoked by a smaller part of an immigrant group as a whole can affect the way of thinking in a society and, thus, create prejudices and antagonism leading to political changes and deterioration in foreign policy relations

## ***Adaptation to Climate Change in Africa: A Technical Riddle or a Democratic Challenge?***

**Michael Mikulewicz**

*School of Environment, Education and Development, University of Manchester, United Kingdom*

Over the last two decades, the international development community has taken a leading role in addressing the growing adaptation needs in the Global South through policy support and an increasing number of adaptation interventions. However, little empirical research currently exists to assess adaptation's problematization and operationalization on the ground. Through a series of 30 expert interviews with development practitioners based in sub-Saharan Africa, this paper contributes to addressing this gap. Specifically, it analyzes the understandings of adaptation to climate change by development practitioners, including their views on the challenges and opportunities for adaptation found in the field. Through the use of the analytical framework of post-politics, the study also critically investigates the implications of the current operationalization of adaptation for the near future. Emerging themes suggest that adaptation is problematized as an explicitly techno-managerial issue that requires expert knowledge and solutions. On the other hand, concerns related to participation and democratic decision-making at the community level are not of immediate importance to the development industry. This, it is argued, can lead to adaptation becoming a theater of regressive redistribution of resources away from the poor and marginalized in the adaptive process. Avenues for politicizing adaptation to climate change are thus required to ensure more equitable outcomes at the local level

## ***Foreign Influences on Poland***

**Karolina Najman, Aleksandra Sierant, Magdalena Skrzynska**

*Faculty of Languages, University of Gdansk, Gdansk, Poland*

The main aim of our project is to portray how different cultures have influenced the Polish perception of the world over the years. We will focus on the aspects such as: the impact of Russian regime on the society of Poland until the end of the 1980s; the growing urge of purchasing American goods and growing admiration for American lifestyle (film, music, fashion trends, fast food networks.) We would like to include the subject of hypocrisy of the Polish society regarding the issue of the so-called garrulous patriotism (the glorifying of Polish symbols, events, or historic figures.) The presentation will also touch upon the subject of the unwillingness of the Poles towards the topics that in their opinion are inconvenient, such as immigration or religious and racial intolerance.

## ***The challenges facing the Arctic region governance – from theory to practice***

**Wojciech Szczerbowicz**

*Institute of International Studies, University of Wroclaw, Wroclaw, Poland*

The Arctic is becoming a region of some of the greatest changes observed in the modern world. These changes are attracting the attention of researchers from many disciplines, policy-makers from the Arctic states and non-Arctic states, local business and transnational corporations, ecologists and local communities, which are facing the direct battle against the effects of changes. However, quantifiable dimension of international cooperation in the region is relatively dependent on political factors.

The author conceptualizes the Arctic governance defined in terms of the club model. This theoretical framework is based on a common work of Robert O. Keohane and Joseph S. Nye Jr. and within the liberal tradition is placed in the neo-institutional thought. The unit of analysis is examined in accordance with its accountability, on the input side, and effectiveness, on the output side. The author discusses Arctic governance features such as a level of transparency, formalization, and barriers to participation therein.

The author also describes a struggling of the club model in cooperation with others from the governance triangle and non-Arctic actors in times of the diffusion of power. It implies certain problems for the Arctic states to govern the issue-areas within the regional regime. This case study analysis is an exploratory one with the potential of defining more questions and hypothesis for further research of the concept of club model governance.

## Session IV: Physical Phenomena

Session Chairs: Przemyslaw Makuch, Katarzyna Draganska-Deja

### ***The characteristics of the carbonate system in the Odra river estuary (Poland)***

**Marcin Stokowski<sup>1</sup>, Bernd Schneider<sup>2</sup>, Jens Müller<sup>2</sup>, Gregor Rehder<sup>2</sup>, Karol Kulinski<sup>1</sup>**

<sup>1</sup>*Institute of Oceanology Polish Academy of Sciences, Sopot, Poland*

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Studies on the carbon cycle and especially on the CO<sub>2</sub> system in the Baltic Sea are mostly focused in the open waters, while coastal zone is poorly investigated in this respect. The aim of our study was to characterize the CO<sub>2</sub> system in the estuary of the Odra River - one of the biggest rivers entering the Baltic Sea.

During two cruises in May and November 2016 all four measurable parameters describing the CO<sub>2</sub> system (A<sub>T</sub>, DIC, pCO<sub>2</sub>, pH) were measured together with O<sub>2</sub>, salinity and temperature. Four characteristic sections were identified along the estuary: freshwater in the Odra River, low saline water in the Szczecin Lagoon, steep salinity gradients in the Swina River and Baltic Sea water in the Pomeranian Bay. The Odra River was oversaturated with CO<sub>2</sub> irrespective of the season (pCO<sub>2</sub> of 1084-1350 µatm). In the Szczecin Lagoon, pCO<sub>2</sub> dropped significantly down to 467 µatm in November and as low as 62 µatm in May. Large A<sub>T</sub> and C<sub>T</sub> changes along the salinity gradient as well as O<sub>2</sub> saturation (up to 122 %) being inversely correlated to pCO<sub>2</sub> suggest that horizontal mixing and biological activity are the main drivers shaping CO<sub>2</sub> system in that region.

Although the obtained data significantly improve our knowledge on the structure of the CO<sub>2</sub> system in the Odra estuary still further studies are required to estimate the role of estuaries in the Baltic Sea carbon cycle.

### ***Comparing orientation of geological planes – topological aspects***

**Michal Michalak, Grzegorz Bytomski**

*Faculty of Earth Sciences, University of Silesia, Sosnowiec, Poland*

*Faculty of Mathematics, Physics and Chemistry, University of Silesia, Katowice, Poland*

In the presentation we discuss the problem of comparing geological planes in terms of their orientation. Our goal is to describe some functions that will provide a quantitative assessment of the difference in dipping. The problem is strictly connected with the notion of angular unconformity in structural geology. The authors point out that there are no sufficient notions and tools for measuring the angular unconformity. The discussion involves some topological notions, especially we introduce some definitions connected with pseudometric and metric spaces in the context of measuring the difference of orientation of geological planes. In order to make the idea clear, we present a model that consists of three layers that are examined in terms of their orientation. In the results we point out that using the pseudometric or metric spaces requires proving that the introduced functions satisfy conditions for pseudometrics or metrics. Because we still work on the proofs, we do not provide a wide range of possible applications. Nevertheless we mention those that focus on detecting angular unconformities or hydrogeological perturbations.

## ***Transport and accumulation of radioactive particles in the Gulf of Gdansk***

**Kasper Zielinski**

*Faculty of Oceanography and Geography, University of Gdansk, Gdansk, Poland*

The Baltic Sea is a unique basin of the World Ocean. It is a small and shallow inland sea located in the north-eastern part of Europe, and is surrounded by nine highly industrialized countries. These countries lie within the Baltic Sea catchment area, which covers nearly a fifth of the European continent. The basin covers heterogeneous terrain including variable land surfaces, numerous rivers and lakes, with considerable seasonal, interannual, decadal and long-term variations, and covers a wide range of human impacts and vegetation zones.

The majority of winds in the summer reach the southern part of the Baltic Sea, including the Gulf of Gdansk, from NE and SE directions. Approximately half of the wind that reaches the southern Baltic during comes from the east and south. This means it crosses over the areas of Belarus and Ukraine.

The multiannual average air temperature in Europe is steadily increasing due to global warming. High-temperature extremes have become more frequent, while low-temperature extremes are decreasing in number and strength. Such conditions and the related phenomena (heat waves, hot days) are a direct cause for wild fire outbreaks in the areas of Eastern Europe.

This work focuses on the transport (both air and land based) and deposition of radioactive particles in the Gulf of Gdansk area and the possible future trends in the seasonal variations of concentrations of radioisotopes.

## ***How supercomputers will give raise to a breakthrough in materials science?***

**Piotr Klejment**

*Institute of Geophysics Polish Academy of Sciences, Warsaw, Poland*

Supercomputers respond to our increasing needs to process huge amount of data. In the ability to understand the information complexity, lies our response to some of the unsolved challenges of our time. For instance, with supercomputers and the equations of mechanics, scientists can design new materials atom by atom, before ever running an experiment.

In the field of geophysics, crucially important is an issue of fracture mechanics. Understanding of rocks behavior under extreme conditions can explain many phenomena connected with earthquake nucleation, oil and gas exploration or geomechanics. One of the methods for simulating materials is The Discrete Element Method. In this approach we treat the substance as an assembly of particles.

Discrete Element Methods are relatively computationally expensive, which limits either the length of a simulation or the number of particles. For this reason we decided to make an attempt of running our simulations on supercomputer. We would like to present our efforts of using Okeanos supercomputer for simulating rocks behavior in The Brazilian Test – geotechnical method of estimating the tensile strength of rocks.

All of this is why we believe we are entering a golden age of materials design. We hope that in the very near future, materials scientists will use massive computing power to turn raw matter into useful technologies.

## ***Impact of anthropogenic pressure on the southern Baltic Sea bottom***

**Milosz Grabowski**

*Institute of Oceanology Polish Academy of Sciences,  
Sopot, Poland*

In the last century, marine traffic in the Baltic Sea has been relentlessly increasing. Also, other maritime activities, such as fishery, military, an advance in the marine infrastructure, and exploration of subbottom resources were rapidly growing. After the Second World War, the southern Baltic became a storage area for the particularly dangerous chemical and conventional weapons. All above-mentioned actions have an undesirable impact on the marine habitats and ecosystems. With employment into practice modern seabed observation techniques, particularly based on a hydroacoustic survey, it is possible to depict the anthropogenic pressure, even in the deepest parts of the Baltic Sea. To realize this goal, unmanned underwater robots equipped with advanced hydroacoustic and optical apparatus were used to perform search and identification missions in the areas of Gdańsk Deep, Bornholm Deep, and in the region of Kolberger Heide. With the usage of proper image processing techniques, targets were selected and categorized into one of 4 types of remnants and tracks of human activity on the seabed: trawl marks, garbage dumped from ships, shipwrecks, and deployed or sunken weaponry. Additionally, visual inspection of identified objects was carried out. Methodology and results of the investigations, together with a short description of equipment and processing techniques are presented.



## Session V: Social Sciences II

Session Chairs: Joanna Laszcz, Jacek Maslankowski

### ***The subjective feeling of caregivers' burden in Parkinson's Disease (PD). Research Overview***

**Paulina Golinska, Mariola Bidzan**

*Faculty of Social Sciences, University of Gdansk, Gdansk, Poland*

Introduction: The aim of the speech is to present an overview on foreign literature and the presentation of own research concerning the feeling of caregivers' burden in PD. Due to unique symptoms of disease and its characteristics, researches on the subjective feeling of burden could be differentiated. The major difficulty in researches on PD is a heterogenic picture of the disease (due to multitude and diversity of symptoms). Executive function disorders are the most common problem in cognitive functioning.

Aim: The research was performed to prove the influence of a type and intensification of cognitive disorders on the functioning patients and their caregivers in the family system, and to show that some psychological resources of caregivers may have an influence on the feeling of caregivers' burden.

Methodology: The research consisted of two parts. There were 40 people examined, 20 pairs - a caregiver with a diseased person. Every person with PD was subjected to a standard neuropsychological assessment. The caregiver was asked to fill in the questionnaire and solve a few psychometric tests.

Conclusions: Most patients have disorders of executive functions and the cognitive impairment has the essential influence on the feeling of caregivers' burden.

### ***Changes That Affect Process of Teaching—Persuasion vs. Manipulation***

**Ewa Ornowska**

*Faculty of Languages, University of Gdansk, Gdansk, Poland*

The presentation explores the importance of persuasion and manipulation in our life, with the focus on school environment.

The first part is discusses the tenet of persuasion, its rules and influence with reference to effectiveness in the teaching process: the increasing role of persuasive teaching, effects on relations between students and teachers, and on the process of teaching and learning. A teacher's role in education involves several different tasks, such as to organise and select information, support and motivate students (especially those so-called difficult and rebellious), and, most importantly, a teacher aspires to influence students and develop ideas. In order to use persuasive communication successfully, he or she has to demonstrate credibility, reliability, confidence, and authenticity.

The second part is focused on manipulation and its mechanisms with reference to school environment as a camouflaged impact on the consciousness and behaviour of individuals. Furthermore, it likewise affects social groups to achieve specified learning objectives, which are main dimensions of its content, namely students and teachers, as well as parents and teachers. The essential part of the presentation takes into account all emotional factors which determine intertwining manipulation and persuasion.

## ***The Future of Polish Employees on the European Union Labour Market***

**Ewa Podgorska-Rakiel**

*Faculty of Languages, University of Gdansk, Gdansk, Poland*

The aim of the presentation is the answer to questions on legal aspects of Polish employees and their future on the European Union labour market. Citizens' knowledge is limited to the fact that Poles work abroad legally as migrant workers, individual job seekers or posted workers.

European Union countries appreciate the work of hardworking Poles, who are highly estimated by foreign employers. Unfortunately, hardworking Poles have eliminated many French, German or Belgian from their own labour markets. However the main legal principles of the European Union include the freedom to provide services and the prohibition of discrimination on grounds of nationality, these principles are increasingly embarrassing for local governments. In practice, enterprises from the EU also more willingly hire Poles than their own citizens like French, German, Belgian, but, at the same time, legal actions of particular governments, such as an obligation to use French language in the construction sector in certain parts of France or additional charges imposed on posting entrepreneurs for each posted worker, make the impression that it the EU countries protect their own labour markets, instead of making the effort to incorporate international workers into the local ones.

Has a hardworking Pole any future in the European Union yet? Do the EU bodies such as the European Commission and the European Parliament take action to provide a uniform legal framework? Where is the EU labour market heading?

## ***Racial Diversity and Racism In the USA – a Contemporary Perspective***

**Bartosz Bem, Magda Puczynska, Magdalena Pawlowska**

*Faculty of Languages, University of Gdansk, Gdansk, Poland*

Before the arrival of Columbus, Native Americans were living their peaceful and uninterrupted lives and, with the start of colonization, they were forced into slavery. Later, Native Americans were granted the abolition of slavery, but laborers substituted them with the Blacks, brought to America through the mid Atlantic passage from Africa.

However there were many abolitionists and people who fought for Civil Rights of colored people, as well as many Amendments to the constitution that regulated the rights of colored inhabitants, racial discrimination. Fight for Civil Rights became extremely significant in the middle of the twentieth century and intensified, for example, it in the 1960s when the lynching of blacks was still a huge issue; African-Americans would be hanged and photos were taken and sent as post cards. The situation became better at the beginning of the twenty-first century, but it has recently become worse again.

People would think that now, in year 2017, we would have fewer racial-related problems but slogans like "black lives matter," which refer to the series of killings of black people, are still an up-to-date issue. The presentation will focus on the political decisions of the current—and also controversial—US President, Donald Trump, who has many racial issues himself, and will try to predict the future in the country called "the world's oldest democracy."

## ***Where is the entrepreneurship heading? From productive to destructive entrepreneurship-the border***

**Malgorzata Bielenia**

*Institute of Applied Social Sciences, University of Warsaw, Warsaw, Poland*

The purpose of this paper is to investigate the phenomenon of the border between productive and destructive entrepreneurship from a contextual perspective. The distinction within productive, unproductive and destructive entrepreneurship is relatively new in the entrepreneurship field. The essence of the proposed research problem is to redefine the impact of entrepreneurship in economic development and social utility. Generally, it is considered that entrepreneurship leads to the growth and development of the economy (productive entrepreneurship). The Schumpeterian analysis depicts that a capitalistic entrepreneur by creative destruction adds to the national product and positively affects the economy's productivity growth. From this perspective, the so called *new combinations (innovations)* emerge as a result of entrepreneur's willingness to achieve new profit opportunities. In economics, beneficial profit-seeking behavior is distinguished from detrimental rent-seeking behavior. Devoting special attention to differentiating those two issues is caused by the fact that rent-seeking activities reduce total social wealth, while profit-seeking ones create social wealth. Current determinant of productive entrepreneurship is a profit-seeking behavior that causes welfare, while destructive entrepreneurship (including the forms of negative ethical behavior) is a rent-seeking behavior that leads to a shortage of goods. The theoretical framework of my paper derives from the idea developed by W. J. Baumol who assumes that entrepreneurial activities may be productive, unproductive and destructive from a perspective of social productivity

## ***Relationship between social anxiety and study addiction***

**Wiktor Wrobel**

*Faculty of Social Sciences, University of Gdansk, Gdansk, Poland*

In Europe alone there was 19.6 million university students in 2013. About 10% of all students has social anxiety disorder – an extreme end of social anxiety continuum. Social anxiety is characterized by fear of being negatively evaluated by others. This ailment produces negative emotions that one has to cope with. One of the possible ways of doing so is by studying. This in turn may result in further problems as sometimes students may develop study addiction – an excessive, uncontrollable motivation to study which is related to deteriorated psychosocial functioning. The aim of this research was to determine the possible relation between social anxiety and study addiction.

The sample was comprised of 1157 undergraduate students: 601 females (51.9%), 546 males (47.2%) and 10 persons (0.9%) who did not report gender, mean age was  $M = 20.33$  years ( $SD = 1.68$ ). The individuals were studying at the universities from Gdańsk. Students were from different faculties, courses of study and years of study.

Results showed that social anxiety was positively associated with study addiction and that social anxiety was predicting study addiction above and beyond demographics and personality. It is important to understand the mechanisms of developing this addiction, because it seems like a socially acceptable manner of coping with social anxiety. However, it does not help achieving better grades, but takes its toll on one's health and quality of life. Furthermore, it is thought be a precursor or an early stage of work addiction.

## Session VI: Biology and medicine

Session Chairs: Karolina Pierzynowska

### ***The impact of small-scale fisheries activities toward fisheries sustainability in Indonesia***

**Nisa Ayunda, Mariusz R. Sapota**

*Faculty of Oceanography and Geography, University of Gdansk, Gdynia, Poland*

Indonesia as an archipelago country has high potential in fisheries and the fisheries sector shares 3% of GDP in 2012. More than 80% of Indonesia fisheries production is from small-scale fisheries. Small-scale fisheries in Indonesia are dominated by outboard motor fishing fleets (more than 30% of registered fishing fleet in 2004) with various fishing gears such as portable traps, guiding barrier, beach seine, boat lift net, set gillnet, encircling gillnet, troll line and skipjack, and also pole and line. This research involves question how to governing fisheries resources sustainability in small-scale fisheries in Indonesia. We had analyzed the small-scale fisheries activities for non-motor and outboard boats that caught eastern little tuna (*Euthynnusaffinis*), skipjack tuna (*Katsuwonuspelamis*), red snappers (*Lutjanussaguineus*), blue line sea bass (*Epinephelus*), and halibut (*Psettodeserumei*) from 2004 until 2014 by estimating the impact of these activities in fisheries resources. The estimated of effort and production in small-scale fisheries varied every year and had decrease trend. The highest effort was 8461622 fishing days in 2007, and the lowest effort was 3162790 fishing days in 2014; the highest production was 68905.37 ton in 2013, and the lowest production was 34319.69 ton in 2005 with the average of the rapid of degradation and depreciation were 0.2 with trend increase near to the threshold score (0.5) every year. These results showed the small-scale fisheries activities in Indonesia were still inefficient and caused the increasing of the rapid of degradation and depreciation. Indonesia government needs more strengthening in the supervision and monitoring the small-scale fisheries activities such as restriction of fishing effort and increasing cooperation with local fishermen to develop the national program in the conservation.

***Microplastics in the marine environment – sources, fate and impact on organisms***

**Karolina Szewc, Bozena Graca**

*Faculty of Oceanography and Geography, University of Gdansk, Gdynia, Poland*

In the marine environment microplastics ( $\leq 5$  mm) have an impact on organisms of all trophic levels: worms, fishes, turtles, birds and mammals. Their ingestion may lead to severe abrasions, ulcers and blockage of the digestive tract, and even to death of an organism. Some of the harmful compounds leaching from microplastics or sorbed to them can cause mutations and cancer. Particularly dangerous particles smaller than 150  $\mu\text{m}$  may enter the circulatory system. Microplastics in the aquatic environment originate from fragmentation of larger plastic fragments or plastics directly manufactured on a millimetric or submillimetric size. One of possible major sources of microplastics in the marine environment, beside municipal wastewater, fisheries, maritime transport and tourism, could be atmospheric deposition. It probably has a great importance in highly urbanized areas where manufacturing plants, traffic, constructions sites, extensive urban infrastructure and numerous households can emit microplastics into the atmosphere. However, similarly as microplastics' impact on terrestrial organisms, these issues has been poorly studied.

## ***The role of the endoplasmic reticulum (ER) channels in transport of ricin from the ER to the cytosol***

**Natalia Sowa, Monika Slominska - Wojewodzka**

*Faculty of Biology, University of Gdansk, Gdansk, Poland*

Each cell of human body requires functional proteins for its proper functioning. Cytosol and endoplasmic reticulum (ER) are optimal environments that ensure the formation of properly folded proteins. If proteins cannot be correctly folded may become a threat to the cell and thus must be degraded. The ER does not have its own degradation system, misfolded proteins are delivered to the cytosol where are degraded by the proteasome. The protein degradation process associated with the endoplasmic reticulum is called ERAD (Endoplasmic Reticulum Associated protein Degradation).

As ERAD is a central part of the protein quality control system, disorders in its activity can cause cancer development and neurodegenerative diseases.

Proteins are transported from the ER to the cytosol through translocons present in the membrane of the ER. Currently, two types of channels are known - Sec61p and Derlin. The ERAD process is not only utilized by misfolded proteins; some toxins and viruses also use ERAD to be transported from the ER to the cytosol. Plant toxin ricin is among them. Ricin causes inhibition of protein synthesis and cell death, therefore is considered as one of the most dangerous toxin. On the other hand, ricin can be used in anti-cancer therapy or for the development of immunotoxins and vaccines.

The aim of the present study was to elucidate if we can regulate cytotoxicity and transport of ricin from the ER to the cytosol by changes in the amount of translocon proteins.

## ***The genistein-induced autophagy process as a novel approach for treatment of neurodegenerative diseases***

**Karolina Pierzynowska<sup>1</sup>, Magdalena Podlacha<sup>1</sup>, Dorota Myslinska<sup>1</sup>, Irena Majkutewicz<sup>1</sup>, Jagoda Mantej<sup>1</sup>, Natalia Niedzialek<sup>1</sup>, Alicja Wegrzyn<sup>2</sup>, Grzegorz Wwgrzyn<sup>1</sup>**

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The number of patients suffering from neurodegenerative diseases is increasing rapidly, now extending 100 millions. Most of these disorders are caused by aggregation of macromolecules in neurons, damaging their structure and function, and thus, causing severe psycho-motoric symptoms. Currently, only alleviation of symptoms is possible, with no possibility to eliminate causes or primary effects of the diseases. It was supposed previously (including our own studies) that induction of autophagy might be a treatment strategy in neurodegenerative disorders. Here, we aimed to determine effects of genistein, a compound inducing autophagy while being safe even in a long-term use, on Huntington disease (HD) and Alzheimer disease (AD). In the course of our studies, we found a decrease in the level of toxin proteins: mutant Huntingtin (mHtt) in HD, and beta-amyloid (BA) and hyperphosphorylated tau (P-tau) in AD. We have used an animal model of the sporadic form of AD to test effects of genistein treatment at the organismal level. In the Morris maze test, we found a significant improvement in memory of genistein-treated (150 mg/kg/day) AD rats, contrary to non-treated sick animals. In the actometer test, allowing to assess motoric functions, non-treated AD rats were characterized by increased number of horizontal, vertical, and ambulatory movements, while genistein treatment led to normalization of the animal movement. Thus, genistein appears to be effective in treatment of HD and AD.

***The effect of cholinergic stimulation of the ventral tegmental area for electrical hippocampal activity***

**Aleksandra Piwka, Piotr Zawistowski,  
Lukasz Braszka, Jolanta Orzel-Gryglewska**

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Theta rhythm is a fascinating, highly synchronized electrical activity of the hippocampus, which plays a key role in processes important to the right functioning of human beings such as learning and memory, spatial navigation, cognitive processes and REM sleep. Theta registrations in deep narcotic rats are used in studies of selected structures of the rhythm control system.

Recent experience has shown that the ventral tegmental area (VTA) stimulation is also accompanied by the theta rhythm in the hippocampus, that is why we are talking about a parallel to the classic, "complementary" impulse pathway led by VTA. While the effect of VTA glutamatergic activation on theta has already been described, there is currently no data showing the effect of cholinergic VTA stimulation on induction of this rhythm. The aim of the planned experiments is to investigate the effect of pharmacological cholinergic activation (carbachol) and inactivation (atropine, mecamylamine) of VTA on the formation and regulation of hippocampal theta rhythm.

The results will allow us to verify the hypothesis of significant effect of cholinergic activation (analogous to PPN) in VTA for induction of theta rhythm and to better understand the functioning of neuronal circles involved in the induction of this rhythm from the brainstem level.

## Poster Presentation abstracts

### Session VI: Posters

Session Chairs: Iwona Wrobel, Milosz Grabowski

#### **Comparison of water temperature, salinity and current data from the Nordflux project with results from ROMS model in the Porsanger fjord**

**Paulina Aniskiewicz<sup>1,2,3</sup>, Mari S. Myksvol<sup>4</sup>,  
Malgorzata Stramska<sup>1,3</sup>, Knut Yngve Børshem<sup>4</sup>**

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The aim of this work is to quantitatively compare water temperature, salinity and current data from the Regional Ocean Modeling System (ROMS) with observational data collected in 2014 and 2015 during the Nordflux project.

The Porsanger fjord is located in northern Norway in coastal waters of the Barents Sea. It extends between 70°N-71°N and 25°E-26.5°E. In the inner part the ecosystem is unique because of limited water connection to other zones of the fjord. To assess the accuracy of the model we have compared the results of model simulations with in situ data provided by the Nordflux project. For comparisons we have used subsurface currents from vertical profiles and water temperatures at 140 m depth collected with the Nortek Continental 190 kHz ADCP deployed on a mooring (June 9 – June 23, 2014). Water temperature and salinity were compared with data from Seacat NY deployed from a buoy at 20 m depth.

This work has been financed from the funds of Hjort Centre for Marine Ecosystem Dynamics in Bergen, Norway and by the Norway Grants through the Polish-Norwegian Research Programme at the National Centre for Research and Development (contract No. 201985. This work has been also supported by the Leading National Research Centre (KNOW) received by the Centre for Polar Studies in Poland for the period 2014-2018 and by the statutory funds of the IO PAS.

#### **Environmental determinants of invertebrate taxonomic diversity in temporary waters of the upper and middle Limpopo River basins in Botswana and South Africa**

**Marta Haraburda<sup>1</sup>, Agata Szwarc<sup>1</sup>, Natalia Walczuk<sup>1</sup>,  
Tadeusz Namiotko<sup>2</sup>**

<sup>1</sup>*Student Science Club of Hydrobiology and Water Protection, Faculty of Biology, University of Gdansk, Gdansk, Poland*

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Freshwater biodiversity of southern Africa is still relatively poorly known. The present study aimed at investigating relationship between the structure and taxonomic composition of aquatic invertebrate assemblages and both local and regional environmental and climatic factors in the Limpopo River basin of eastern Botswana and North-West Province of South Africa. In total 25023 specimens belonging to 65 different taxa were collected from 28 study sites. The most numerous taxa in the whole material were crustaceans, copepods Cyclopidae (31%) and ostracods (23%). Based on zoocoenological analysis three major assemblage types of freshwater invertebrates were distinguished: the assemblage type A with the largest contribution of Cyclopidae (49%), the type B dominated by larvae of Chironomidae midges (39%) and C with predominant water boatmen Corixidae (25%) and ostracods Cypridopsinae (19%). Redundancy analysis showed that the taxonomic structure of the assemblage types was significantly dependent on regional climate factors. Chironomidae and Dytiscidae beetles prevailed in the areas with higher annual precipitation of 541-675 mm, whereas in semi-arid areas of annual precipitation < 497 mm Cyclopidae were the most common. Local factors related to water chemistry (e.g. electric conductivity or pH), sediment type or vegetation appeared less important but further studies including also the climatically different areas of the lower Limpopo basin are needed to confirm these findings.

**Identifying the mechanisms underpinning transport of amyloid precursor protein from the endoplasmic reticulum to the cytosol**

**Jowita Nowakowska<sup>1</sup>,**

**Monika Slominska-Wojewodzka<sup>2</sup>**

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Alzheimer's disease (AD) is a neurodegenerative disorder that manifests itself in behavioral disturbances and short-term memory loss. Nowadays, this problem afflicts more than 46 million of people worldwide. The pathophysiology of AD is characterized by the formation of brain senile plaques from a peptide amyloid- $\beta$ . Amyloid- $\beta$  is generated after sequential cleavage of amyloid precursor protein (APP). APP is a transmembrane glycoprotein which serves a variety of functions related to cell adhesion and migration. Like all plasma membrane proteins, APP is processed in the endoplasmic reticulum (ER) and in the Golgi complex, before being transported to the cell surface. Aberrant processing of APP in the ER may result in overproduction of amyloidogenic products. In the ER special proteins- chaperones, assist in proper folding or degradation of incorrect proteins. For degradation, these proteins have to be transported from the ER to cytosol, where they are substrates for the proteolytic enzyme complex- proteasome. Interaction of APP with some chaperones can reduce levels of amyloid- $\beta$  secretion. Our research focus on studies of the regulation of ER chaperones-dependent transport of APP from the ER to the cytosol.

**Allelopathic activity of the picocyanobacterium *Synechococcus* sp. on a natural plankton community**

**Sylwia Sliwinska-Wilczewska<sup>1</sup>, Jakub Maculewicz<sup>1</sup>,  
Agata Cieszynska<sup>2</sup>, Adam Latala<sup>1</sup>**

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Chroococcoid picocyanobacteria are a ubiquitous component of the natural plankton communities of both marine and freshwater ecosystems. Despite the ecological importance of marine *Synechococcus*, very little is known about their allelopathic effects on other phytoplankton organisms. In this study, the influence of allelopathic compounds on the growth curve, total abundance and structure of phytoplankton community was investigated by single and multiple addition of cell-free filtrate of picocyanobacterium *Synechococcus* sp.

We studied allelopathic effect of picocyanobacterium on a natural plankton community. *Synechococcus* sp. affected the growth curve and total abundance of phytoplankton community after single and multiple filtrate addition. This study indicated that diatoms of the genus *Navicula*, *Chaetoceros*, *Amphora*, *Coscinodiscus*, *Grammatophora* and *Nitzschia* were the most affected organisms. Moreover, it was showed that filtrate, obtained from donor picocyanobacterium, changes the whole community structure and had generally an inhibitory effect on all phytoplankton organisms except the cyanobacteria, which increased in filtrate treatment.

The observation that allelopathic compounds produced and released by *Synechococcus* sp. affected the all group of the phytoplankton community showed the importance of picocyanobacterial allelopathy in aquatic ecosystems.



## ***Marine alternatives against antibiotic-resistant microbes***

**Wiktoria Dolynny, Anna Torunska-Sitarz**

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The discovery of penicillin and the initiation of the antibiotic era have revolutionized modern medicine and saved millions of lives. Before the implementation of antibiotics into clinical treatment, even common injuries could result in serious health problems or death arising from the bacterial infections. One century has almost passed since the first patients were treated with antibiotics and we seem to stand on the threshold of post-antibiotic era. Multi-drugs resistant microbes so called 'superbugs' are wide spread across the globe posing a substantial health and economic threat. Thus, the discovery of novel antimicrobial drugs or the development of alternative therapies is clearly a matter of urgency.

The oceans contain a huge variety of organisms that produce unique and largely unexplored metabolites, including bioactive compounds with potential therapeutic application.

In the first part of the presented work, the mechanisms and consequences of bacterial resistance to antimicrobial agents will be discussed. Then, the current state of knowledge about the production of antimicrobial metabolites by marine microorganisms will be reviewed. The authors will focus on the results of the recent studies on antibacterial activity of Baltic cyanobacteria.

## ***X chromosome inactivation analysis in healthy females in different age groups and different tissues***

**Patrycja Juchniewicz, Karolina Portalska, Anna Kloska, Grzegorz Wegrzyn, Joanna Jakobkiewicz-Banecka, Ewa Piotrowska**

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X chromosome inactivation (XCI) is an example of a long-term epigenetic modification consisting of a transcriptional silencing of one of the two X chromosomes in female mammals, balancing expression of X genes between females (XX) and males (XY). It is generally believed that in most cases this phenomenon occurs randomly, generating in females somatic mosaics of two cell lines with only one active X chromosome, either maternal or paternal. The incidence of extremely skewed XCI increases with age and is a relatively common phenomenon. In healthy females degree of randomness of XCI may have no clinical implications.

The aim of the study was to determine the pattern of XCI in healthy females, divided into three age groups: < 14, 15–35 and >35 years old, in tissues such as buccal epithelial cells, saliva, and blood. Patterns of X inactivation were determined by studying the methylation in the first exon of the human androgen receptor (AR) gene in DNA isolated from collected samples.

The obtained results indicate that nonrandom inactivation of the X chromosome is common in healthy females and increases with age. The XCI pattern in the DNA isolated from saliva was more similar to that established for blood than buccal epithelial cells. The study confirmed that women are genetic mosaics and the randomness of X chromosome inactivation may vary from one tissue to another in the same person.

***Protein production level creates the proper functional balance between restriction and modification enzymes***

**Karolina Wilkowska, Marian Sektas**

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Restriction-modification systems (R-M) are common among the bacteria serving as a defense mechanism against invasion of foreign DNA, like bacteriophages. These systems consist of two opposite enzymes recognizing the same sequence of DNA. The first one is the endonuclease, which cuts double-stranded DNA and the second one – DNA methyltransferase protects DNA sequence from being cut. The production's level of endonuclease and DNA methyltransferase determines the antiviral features of the bacterial host. The effectiveness of restriction of foreign DNA has its limitation. I used EcoRI R-M system from *Escherichia coli* as a model. During the studies, the efficiency of R-M system was tested in conditions of both the highest and lowest enzymes production. The restriction effectivity is higher in case, when the production level of endonuclease and methyltransferase is low, and it is decreased, when the level of enzymes production is high. The results show that the balance between restriction and modification is highly sensitive to any changes in protein's concentration in the single cell. These researches give insight into maintaining the R-M systems in bacteria and the conflict between viruses and bacteria.

***Evaluation of ITS rDNA, mtSSU rDNA and MCM7 markers for analysis of intraspecific genetic diversity of lichen-forming fungus *Protoparmeliopsis muralis****

**Magdalena Kosecka, Beata Guzow-Krzeminska**

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Lichen-forming fungi (mycobionts) live in symbiotic associations with green-algal and/or cyanobacterial photobionts. They are distributed worldwide and *Protoparmeliopsis muralis* is one of the most successful urban lichens in the world.

Molecular markers allow investigation of genetic diversity of organisms at different taxonomical levels. In order to test usefulness of ITS rDNA, mtSSU rDNA and MCM7 markers to study genetic diversity of lichen forming fungus *Protoparmeliopsis muralis* 21 individuals from European populations were compared. CTAB method was used for DNA isolation. PCR amplified DNA markers were sequenced and TCS method was used to construct haplotypes networks and statistics for each marker was calculated. All loci were found to be variable, however, the highest number of haplotypes and the highest haplotype diversity was observed in ITS rDNA marker. Other markers, i.e. mtSSU rDNA and MCM7 were less variable. Furthermore, our analysis revealed that in the case of *P. muralis*, ITS rDNA, mtSSU rDNA and MCM7 markers may be used together and/or separately. The ITS rDNA that was previously proposed as the first fungal DNA barcode marker, seems to be the best indicator of the diversity of this mycobiont.

## **Statistical analysis of meteorological conditions in two fjords located in the European Arctic region**

**Paulina Aniskiewicz<sup>1,2,3</sup>, Malgorzata Stramska<sup>1,3</sup>, Tomasz Wawrzyniak<sup>4</sup>**

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In the Arctic zone the climate change is amplified in comparison to globally averaged trends, and the observed trends are variable spatially. Our research is focused on two Arctic fjords: Porsanger and Horsund. Porsanger fjord is located in the coastal waters of the Barents Sea. Hornsund is one of fjords located in the western part of the Svalbard archipelago.

In this presentation we have used data provided by the Norwegian Meteorological Institute and from glacio-topoclim website for three meteorological stations. Two of the them are located in the Porsanger fjord (Lakselv – in the inner part, Honningsvåg – in the outer part of the fjord). The third station provides data from the Hornsund fjord. Using these data we have estimated the 33-year trends (1983-2015) of air temperature and relative humidity in each station using linear regression analysis (statistically significant at 95% confidence level). In addition we have estimated other statistical quantities (min, max, mean, median and standard deviation) in order to characterize meteorological conditions in the fjords.

This work has been supported by the Leading National Research Centre (KNOW) received by the Centre for Polar Studies in Poland for the period 2014-2018 and by the statutory funds of the IO PAS and also by the Norway Grants through the Polish-Norwegian Research Programme at the National Centre for Research and Development (contract No. 201985).

## **The role of EDEM3 in ricin cytotoxicity and its transport from the endoplasmic reticulum to the cytosol**

**Hanna Sominka<sup>1</sup>, Jowita Nowakowska<sup>2</sup>, Monika Sobolewska<sup>1</sup>, Monika Slominska-Wojewodzka<sup>1</sup>**

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ERAD-ER-associated degradation is a part of a protein quality control system operating in the endoplasmic reticulum (ER), which has an impact on process determining the proper functioning of all eukaryotic cells. Many of all newly synthesized proteins are produced in the ER. Some of them may fail to attain their native structure and have to be degraded. ER do not possess its own degradation machinery, proteins have to be transported to the cytosol for proteasomal degradation (ERAD). The major group of chaperones which recognize terminally misfolded proteins is EDEM family (EDEM1, EDEM2, EDEM3).

Ricin is a protein toxin that utilizes the ERAD pathway in its transport from the ER to the cytosol where it acts. Due to high toxicity, it is considered as a biological weapon. On the other hand, this toxin can be used as a component of modern immunotoxins and vaccines. Ricin is heterodimeric holotoxin composed of an A-chain (RTA) connected to a cell binding lectin B-chain (RTB). RTA contains hydrophobic C-terminal region. Substitution of proline into alanine in position 250 (P250A) of this region alters the secondary structure of ricin and decreases its cytotoxicity. In contrast to wild-type RTA, P250A transport to the cytosol appears to be EDEM1- and EDEM2-independent. Moreover, RTA P250A do not interact with EDEM1 and EDEM2. Supposedly, recognition of proteins by EDEM1 and EDEM2 may be determined by the structure of the ERAD substrate. The role of EDEM3 in this process is unknown.

## **Features of the productive mRNA transcriptional slippage sequences**

**Dawid Koscielniak, Ewa Wons, Monika Szadkowska, Marian Sektas**

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Errors in gene expression result from inaccuracies during the process of transcription or translation are found in all kingdoms of life. In vivo measurements of errors in gene expression in bacteria have been estimated to occur at rate ranging from  $10^4$  per nucleotide during transcription and  $10^3$  per codon during translation. Short sequence repeats and homonucleotide repeats are prone to InDels mutations that disrupt the reading frame and thus leading to loss of function of particular genes. Such individual sequences are point of our particular interest since there are known mechanisms for bypassing these InDel mutations due to transcriptional polymerase infidelity. In our study we investigate rescue of the *mbolIM2* InDel mutant genes (methyltransferase gene from *Moraxella bovis*) by transcriptional slippage that occurs in poli (A+T) homopolymer regions. The long A/T homopolymer runs can be mistakenly edited during transcription, what leads to frameshift and production of protein variants mixture, including restoration of the wild type due to transcriptional slippage process. We show that bypass of InDel mutations through a transcriptional slippage is common, but its efficiency is RNA polymerase-dependent (e.g. *E. coli* host RNA polymerase is several fold less efficient than T7 RNAP). Additionally by using a series of *gfp* reporter gene in fusion with set of various fragments consisting of A/T-rich homopolymeric sequences we determine the slippage ability of studied RNAPs regarding to the length and the type of nucleotide composition of a homopolymer run, but also in the context of the adjacent sequence. We show that the T7 bacteriophage RNA polymerase has exceptional ability to perform transcriptional slippage at these sequences of mRNA by leading in effect to a high frequency of InDel mutant gene rescue. In contrast, comparable to bacterial host RNAP we show relatively lower ability to repair mutations by editing mRNA.

## **The role of open reading frame 63 (*orf63*) from the *exo-xis* region of lambdoid phages in the development of these phages**

**Aleksandra Dydecka<sup>1</sup>, Sylwia Bloch<sup>1</sup>, Gracja Topka<sup>1</sup>, Bożena Nejman-Falenczyk<sup>1</sup>, Agnieszka Necel<sup>1</sup>, Katarzyna Licznarska<sup>1</sup>, Tomasz Gasior<sup>2</sup>, Grzegorz Węgrzyn<sup>1</sup>, Alicja Węgrzyn<sup>2</sup>**

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Virulence of enterohemorrhagic *Escherichia coli* (EHEC) strains depends on production of Shiga toxins. These toxins are encoded by *stx* genes located in genomes of lambdoid prophages. Their expression is stimulated upon prophage induction and its further lytic development. Shiga toxin-converting phages (Stx phages) belong to lambdoid family of which phage  $\lambda$  is the best investigated member.

Products encoded in the *exo-xis* region of genome of lambdoid phages may be the potential factors involved in the regulation of phage development. This region contains highly conserved genes and open reading frames (ORFs) of largely unknown functions. This genetic elements could be involved in the regulation of lysogenization and prophage induction processes. The most recent results of our research indicate that the deletion of the *exo-xis* region negatively influences the expression of regulatory genes of  $\Phi24_B$ .

In the light of this, I decided to determine the role of the deletions of particular elements from the *exo-xis* region in the development of recombinant lambdoid phages. I observed that *orf63* from analyzed region may spectacular affect the regulation of lambda and Stx phage-  $\Phi24_B$  development at the stage of the lysis-vs-lysogenization decision. This elements may influence the changes the time of prophage induction with use hydrogen peroxide and survival of the *E. coli* bacteria after this process, intracellular lambdoid phage lytic development and lysogenization of *E. coli* bacteria.

## ***Allelopathic interactions between three strains of Baltic picocyanobacterium *Synechococcus* sp.***

**Jakub Maculewicz, Sylwia Sliwinska Wilczewska,  
Adam Latala**

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Allelopathic interactions of picocyanobacterium *Synechococcus* sp. may be one of the factors contributing to the formation of massive and harmful cyanobacterial blooms in many aquatic ecosystems. Species forming a massive blooms are still a serious problem, both for ecology and economy. Therefore, the main aim of this project is to precisely define the scope of the allelopathy phenomenon and characterize the mode of action of allelopathic compounds produced by the dominant in the summer period picocyanobacterium *Synechococcus* sp.

The experiments were conducted on three strains of Baltic picocyanobacterium *Synechococcus* sp.: BA-120 (red strain), BA-124 (green strain) and BA-132 (brown strain). In order to describe the phenomenon of allelopathy precisely, a “cross-culturing” and “mixed cultures” method were used. In order to determine the concentration of cells in monocultures and in mixed cultures the number of cells will be measured by BD Accuri™ C6 Plus flow cytometer.

Despite its association with open ocean systems, it is becoming increasingly evident in recent years that *Synechococcus* sp. is a significant contributor to cyanobacterial blooms. However, no allelopathic studies have been previously conducted for these species on such scale. Providing new information on the extent of the allelopathic effect of picocyanobacteria may be important for a better understanding of the worldwide intensifying phenomenon of the emergence of *Synechococcus* sp.

## ***Otolith biochronology as an indicator of marine fish responses to hydroclimatic conditions and ecosystem regime shifts***

**Szymon Smolinski, Zuzanna Mirny**

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Sclerochronological studies based on hard structures of marine organisms are valuable tools, which can help us answer the question: *where is the ocean heading?* Existing archives, which house millions of fish otoliths (ear stones) constitute an excellent basis for reconstructing past climate conditions and for predicting future impacts of environmental changes on marine resources. The objective of this project was to identify the factors that influence growth of the European flounder (*Platichthys flesus*) in the Baltic Sea based on an analysis of otolith increments. We applied linear mixed models to develop a 74-year long chronology (1942-2015) that reflects the variations in flounder growth rates. By analyzing the widths of increments we revealed the existence of common environmental factors that influence fish growth. We identified the optimal time windows for selected climatic factors (Baltic Sea Index and sea surface temperature). Change point analysis on the developed chronology revealed major alterations occurred in flounder growth in 1988, 1992 and 2006. This result is in accord with published studies on regime shifts in the Baltic Sea ecosystem. This paper reports information concerning the response of the commercially important species to the changing environment that may support future ecosystem-based management of fish stocks. The results highlight also the potential for applying biochronological techniques to identify rapid regime shifts in marine ecosystems.

**Story of the „missing” *atp8* gene.  
Based on real... *Mytilus edulis* tissue samples**

**Marek Lubosny, Akleksandra Przylucka,  
Beata Smietanka, Artur Burzynski**

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Once upon a time... In 1992 Hoffman and his associates had published first mitochondrial genome from Bivalvia class organism. Sequenced *Mytilus edulis* individual had been annotated with 37 genes, two ribosomal RNAs, 23 tRNAs (additional unique tRNA<sup>met</sup> gene) and only 12 protein coding genes. *Atp8* gene was missing and all comparative methods available at that time failed to detect it. This created a belief that bivalves might not have this gene at all.

Everything had to change in 2010 when two separate research groups Śmietanka's and Breton's based on bioinformatic analyses (gene evolution patterns, availability of EST sequences, prediction of transmembrane helix and conserved motifs) announced finding of this "missing" gene. Unfortunately it wasn't enough to convince everyone. Some of the scientists still consider this gene as pseudogene and more than one third of all bivalvian mitochondrial genomes (data from NCBI database) remain without annotated *atp8* gene.

To persuade remaining scientists, we have performed immunodetection of male and female type ATP8 protein, proving (once for all) existence of mitochondrially encoded ATP8 proteins in *Mytilus edulis* mussels, their connection to ATPase Complex V and distribution between sexes and tissue types. ...and they lived happily ever after.

**Medial septum NMDA receptor activation and neuro-immune interactions in rats exposed to novelty test**

**Magdalena Podlacha, Dorota Myslinska,  
Irena Majkutewicz, Agnieszka Wadolowska,  
Grazyna Jerzemowska, Karolina Plucinska,  
Ewelina Kurowska, Jan Rucinski, Danuta Wrona**

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There is now a strong body of evidence indicating that the nervous and immune systems are functionally connected. Our recent findings that medial septum (MS) NMDA receptors modulate the peripheral inflammatory reaction, is a piece of that evidence.

The purpose of the present study was to determine the influence of NMDA receptor agonist infusions into the MS on the plasma concentration of interleukin 6 (IL-6) in rats differing in behavioral characteristics and anxiety level measured by their locomotor response to novelty: high (HRs) or low (LRs) responders.

Male Wistar rats prior categorized as HRs or LRs in the novelty test (2 h) were injected with NMDA receptor agonist (0.25 µg/rat; n=14) or saline (SAL group, 0.5 µl/rat; n=12) via implanted cannulae into the MS. Immune activity was measured by the plasma concentration of IL-6 (ELISA) 60 min after the injection. Data are presented as mean±SD.

Following NMDA injection, a significant (p<0.001) increase in plasma IL-6 concentration both in HRs (373±20 pg/ml) and LRs (457±11 pg/ml) in comparison with SAL control group (HRs: 169±11 pg/ml, LRs: 212±11 pg/ml), was observed. This effect was more pronounced in LRs (p<0.001).

The obtained results indicate that MS NMDA glutamate receptor activation increases such a peripheral pro-inflammatory response as IL-6 concentration, particularly in rats with higher anxiety level but lower behavioral activity and stress susceptibility, which are attributed to the low responders (LRs).

## **Effect of Naturally Occurring Isothiocyanates on *Vibrio cholerae***

**Klaudyna Krause, Dariusz Nowicki,  
Agnieszka Szalewska-Palasz**

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**Introduction:** *Vibrio cholerae* is a causative agent of cholera disease. The aim of this study is to evaluate the antimicrobial activity of naturally derived compounds, isothiocyanates (ITCs), against pathogenic bacteria. The mechanism of its antimicrobial activities is not fully elucidated. Previously, we showed that ITC are promising agents against enterohemorrhagic *Escherichia coli* strains due to impairment of Shiga-toxin harboring bacteriophage development. Cholera toxin genes are also bacteriophage (CTXphi) origin.

**Methods:** The mechanism of ITC antimicrobial activities were tested according to CLSI standard methodology. Growth inhibition kinetics or time-kill curve was determined spectrophotometrically or by plating on MH agar, respectively, in the presence of relevant concentration of ITCs. The assessment of nucleic acid synthesis was performed using radioactive precursor of DNA and RNA synthesis.

**Results:** We determined Minimal Inhibitory Concentration and Minimal Bactericidal Concentration for phenethyl isothiocyanate, sulforaphane and benzyl isothiocyanate. We observed the growth inhibition by ITCs, varying for different ITCs. Also, time-kill curves showed that all ITCs inhibited bacterial growth. We found that ITCs caused inhibition of DNA and RNA synthesis.

**Summary:** We report here that isothiocyanate such as SFN, PEITC, BITC inhibit bacterial growth.

## **Carapace shape disparity in a non-marine cosmopolitan mussel shrimp *Heterocypris incongruens* (Ramd.) (Ostracoda) with reference to the genetic variation**

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Geometric morphometrics is a quantitative way to describe shape variation of biological objects, such as ostracod carapace valve outlines. This method allows statistical comparison of even slight differences in shape without the size factor, which is difficult to get using traditional comparative morphology. The present study aimed at comparing both the valve shape disparity and the genetic variation between and within 13 populations of a non-marine ostracod *Heterocypris incongruens* from Europe, North Africa and South America. For morphology 1121 valves of specimens cultured in identical laboratory conditions were analyzed. After approximation of the valve outlines by the B-spline algorithm, Principal Coordinates Analysis and ANOSIM test detected statistically significant differences between almost all pairs of the examined populations what indicates that much of the phenotypic variance of the *H. incongruens* valve shape is due to the variance in genetic factors. To assess the level of genetic variation, fragments of mitochondrial (COI) and nuclear (28S rRNA) genes from 74 specimens were sequenced. The results revealed remarkably high intraspecific diversity, suggesting that *H. incongruens* is a complex of distinct species. Analyses of mtDNA haplotypes distribution showed that individuals from distant localities shared the same haplotype. Finally, no statistically significant correlation was found between the level of interpopulational genetic and morphological diversities.

## **Characterization of selected bacteriophages isolated from urban sewages**

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Aleksandra Dydecka<sup>1</sup>, Agnieszka Necel<sup>1</sup>,  
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Bacteriophages are viruses infecting bacterial cells and developing inside them. They were discovered about 100 years ago and since then have played a tremendous role in the development of molecular biology, genetic engineering and biotechnology. Bacteriophage diversity appears to be huge as phages are the most abundant biological entities on Earth - their number is estimated to be  $10^{31}$ . As only a few bacteriophages have been selected as model organisms, our current knowledge on vast majority of these viruses is very limited and should be quickly improved.

In our work, 83 previously unknown bacteriophages (from samples of urban sewages) infecting various bacterial species, were isolated. In the course of the preliminary research, some properties of the isolated phages have been determined, including host range, virion morphology, plaque morphology, ability to propagate at different temperatures, sensitivity to physical and chemical agents. On the basis of the observed unusual biological features of particular phages, 5 of them have been selected for further analyses. We determined complete nucleotide sequences of their genomes, and looked in more detail at lytic development of these phages.

Morphological and physiological analyses of these bacteriophages indicated that there is high biodiversity among phages existing in one habitat. Some of the presented features of investigated phages, make them potentially interesting in the context of biotechnological applications.

## **Orexin peptides distribution across the brain and their new possible applications**

**Piotr Zawistowski, Lukasz Braszka, Aleksanda Piwka, Witold Zakowski**

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Two peptides called orexins, sometimes referred as hypocretins, discovered in 1998 were primarily linked to regulation of hunger and food intake via feeding center of the brain, i.e. the lateral hypothalamus. Orexins are synthesized solely in the mentioned hypothalamic nuclei, however their receptors are widely distributed across many crucial regions of the central nervous system (CNS). Two types of orexins were described: orexin A and orexin B. Both types of orexins bind to excitatory G-protein coupled receptors, orexin receptor type 1 (OX1R) and type 2 (OX2R), exhibit different functions in the CNS. Nowadays, orexins are linked to wide array of functions. They are gaining importance in the field of the wake-sleep state regulation, especially wake-sleep cycle in rodents. The orexin neurons are also believed to regulate circadian rhythms and arousal system in general, which is reflected by increased activity in orexin neurons during arousal. They may also play important role in narcolepsy in humans – brains of narcoleptics exhibit reduced level of neurons expressing orexin mRNA. On this poster we are reviewing current state of knowledge concerning orexins and assessing their possible applications.



## **Response of marine bacteria in multi-organism system to stress factors**

**Marta Sadowska, Piotr Golec,  
Agnieszka Szalewska-Palasz**

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Bacteria in most environments have to struggle for resources. Marine environment is an unusual habitat, where conditions such as salinity, nutrient availability, temperature or inflow of other species occur seasonally. Presented work is a part of a complex project revealing bacterial stress response mechanisms. Three bacteria species were chosen: *Flavobacterium* sp, *Paracoccus* sp and *Shewanella baltica*. Their genomes were sequenced and cultivation method optimized. Chemostat system provided continuous growth and mimicked natural conditions. The aim of this study was to exam growth rate and morphological changes during cultivation in stressful conditions in multi-organism system. Three salt concentrations were chosen as a stress inductor: 2‰, 7‰ and 20‰.

This study shows that there are differences between growth rate in different cultivation methods. The growth of *Flavobacterium* in multi-organisms system cultivated in flasks was faster than other two bacteria in all salt concentrations despite presence of secondary metabolites. Such phenomenon was not noticed in case of the chemostat system where after 48 hours of incubation, population of all three bacteria growth decreased.

Differences between growth rate among bacteria in multi-organisms system might be a cause of different growth rate of particular bacterial strain, biofilm and filament forming or other unknown factors which also may result in the mistakes in counting colonies on plates.

## **Internal and external factors determining PAHs deposition in household dust in the Tri-city region**

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The quality of indoor air is a public health issue. Significant information about substances, that people absorb can be indicated by the chemical composition of household dust. There can be found more than 80 organic compounds, including PAH's, which are basically known as cancerogenic pollutants. Inhalation and dust ingestion are main pathways of human exposure of PAHs. Nevertheless, PAHs measurements in dust have never been carried out in the Tri-city region. Thus, the main aim of our study was to find out what factors determine the deposition level of polycyclic aromatic hydrocarbons in household dust. Additionally, the deposition of organic (OC) and elemental carbon (EC) was considered. To identify the deposition levels of benzo(a)pyrene and dibenzo(a,h)anthracene (HMW); fluoranthene, pyrene and chrysene (MMW) as well as OC and EC samples were collected in 35 different houses during the winter period of 2016. Passive method has been used for taking samples. PAHs concentration analyze was performed using the liquid chromatography while OC and EC was analyzed by thermo-optic Sunset Laboratory method (EUSAAR2 protocol). The total PAHs deposition varied from  $0,1 \mu\text{g}\cdot\text{m}^{-2}\cdot\text{month}^{-1}$  to  $449 \mu\text{g}\cdot\text{m}^{-2}\cdot\text{month}^{-1}$ , which constituted between 0,001% and 0,8% of OC. The highest deposition was obtained in places with everyday smoking and cooking and in presence of pets and plats. Then HMW and MMW PAHs deposition exceeded  $533 \mu\text{g}\cdot\text{m}^{-2}\cdot\text{month}^{-1}$  and  $652 \mu\text{g}\cdot\text{m}^{-2}\cdot\text{month}^{-1}$ , respectively.

## **Determination of amphetamine and amphetamine analogs in blood by GC-MS/MS technique**

**Mateusz Kacper Wozniak<sup>1</sup>, Marek Wiergowski<sup>2</sup>, Justyna Aszyk<sup>1</sup>, Pawel Kubica<sup>1</sup>, Marek Biziuk<sup>1</sup>**

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Amphetamine, phentermine, methamphetamine, 3,4-methylenedioxyamphetamine (MDA), 3,4-methylenedioxymethamphetamine (MDMA), and 3,4-methylenedioxy-N-ethylamphetamine (MDEA) are the most popular drugs among amphetamine derivatives. The use of these drugs constitute social and economy worldwide problem. This work presents the application of as chromatography-tandem mass spectrometry (GC-MS/MS) technique for the imultaneous determination of six amphetamine analogs in blood. Quantification of analytes was based on multiple reaction monitoring transitions (MRMs). Rapid and simple method based on liquid-liquid extraction (LLE) and derivatization was developed and validated. The most important benefit of the presented protocol is reducing volume of sample used for extraction (down to 200  $\mu$ L) and extraction solvent (down to 2 mL) compared to published literature data. The validation parameters: recovery (91.4-104%), inter-day accuracy (95.2-104%), and inter-day precision (0.7-5.8%) showed the repeatability and sensitivity of the method. The procedures was applied to analysis of 21 blood samples. To the best of Authors' knowledge, this is the first work presenting the use of GC-MS/MS technique for the determination of amphetamines in blood. Low values of limits of detection (0.22-0.81 ng/ml) and limits of quantification (0.65-2.4 ng/mL) indicates, that the developed method may be useful for drug monitoring in both fatal and non-fatal intoxication cases in routine toxicology analysis.

## **Prognostic significance of gene expression and DNA methylation analysis of selected DNA repair genes in bladder cancer using artificial neural networks**

**Anita Wojtczyk<sup>1</sup>, Pawel Schlichtholz<sup>2</sup>, Malgorzata Presler<sup>1</sup>, Jerzy Michajlowski<sup>1</sup>, Marcin Matuszewski<sup>1</sup>, Beata Schlichtholz<sup>1</sup>**

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Transitional cell carcinoma (TCC) of the urinary bladder is a heterogeneous disease where the outcome is often uncertain due to the complex network of interacting molecular pathways. It is proposed that an artificial neural network (ANN) can be used to select the best predictive markers and make the process of making medical decisions more accurate and less confusing.

The aim of the study was: to evaluate the gene expression status for four selected DNA repair genes (MBD4, TDG, MLH1, MLH3), including DNMT1; to evaluate the promoter methylation status; and to develop an ANN model to identify a prognostic gene signature. A total of 50 patients with TCC were evaluated. The gene expression level was determined by qPCR and the methylation status was analyzed by MSRE-PCR. A neural network was trained to predict a shorter survival of patients with bladder cancer.

The relative levels of mRNA for MBD4, MLH3, and MLH1 were decreased in 28%, 34%, and 36% of tumor samples, respectively. Analysis of mRNA expression for TDG did not show any significant change. The increased mRNA expression of DNMT1 was found in 34% of tumor tissues. The overall methylation frequencies in tumor tissue were 18% for MBD4, 25% for MLH1 and there was no evidence of MLH3 promoter methylation. A set of three markers was identified as the optimal combination of biomarkers used in this study for predicting outcome in bladder cancer cases.

These findings show that our selected genes and ANN model can be successfully applied to the prediction of outcome in bladder cancer with a reasonably high performance for individual abnormalities.

## **Recognition of picocyanobacteria photochemical characteristics on the basis of laboratory experiments**

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The study is based on the laboratory experiments, where three strains: red (BA-120), green (BA-124), brown (BA-132) of Baltic picocyanobacteria – *Synechococcus* sp. were grown in different synthetic environmental conditions. The conditions were combinations of following: four temperatures (10, 15, 20 and 25 °C), four scalar irradiance in Photosynthetically Active Radiation Spectrum (PAR) levels (10, 100, 190 and 280  $\mu\text{mol photons m}^{-2}\text{s}^{-1}$ ), four salinities (3, 8, 13 and 18). This research is focused on changes in pigmentation – chlorofil *a* (Chl *a*) and carotenoids (Car) contents, Chl *a* fluorescence and photosynthesis characteristics as a function of ambient conditions for picoplankton cultures. The study shows significant differences in results derived for different strains. Moreover, each strain responds in different way to variable ecological conditions. Nonetheless, there are also similar features in *Synechococcus* sp. strains' photochemistry noted. One of these is the increase of Car/Chl *a* ratio in response to higher PAR levels, especially for BA-124 and BA-132, for which photo-inhibition point is not observed in conditions applied in this study. The point is observed for BA-120. The analysis of variance (ANOVA) and post-hoc multi-comparison test (Tukey's test) indicates that other factors, along with PAR and temperature, influence the Chl *a* fluorescence and photosynthesis. This contribution may states for some feedback relations as the influence of changes in pigmentation on fluorescence and photosynthesis. The derived relations will be used in development of Baltic picocyanobacteria life cycle numerical algorithm.

This work has been funded by the National Centre of Science (NCS) project (contract number: 2012/07/N/ST10/03485) entitled: "Improved understanding of phytoplankton blooms in the Baltic Sea based on numerical models and existing data sets". The Author (AC) received funding from NCS in doctoral scholarship program (contract number: 2016/20/T/ST10/00214).

## **Bacteriophage vb\_Eco4M-7 – a new hope in fight against Enterohemorrhagic Escherichia coli infections (EHEC).**

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Bożena Nejman-Falenczyk, Tomasz Gasior,  
Katarzyna Kwasnicka-Kosznik,  
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*Enterohemorrhagic Escherichia coli* (EHEC), in which the best known member is *E. coli* O157:H7, are highly dangerous group of pathogens that can cause *i.a.* haemolytic-uremic syndrome (HUS). The major source of those bacteria is cattle. Humans can get infected with EHEC mostly trough consumption *i.a.* of undercooked meat or a raw milk. The major virulence factors of EHEC are Shiga toxins, encoded by genes located on genomes of Shiga toxin-converting prophages (Stx phages). Effective production and release of toxins occurs only after induction of those prophages and start of a lytic life cycle.

Many antibiotics used to treat bacterial infections stimulate induction of Stx prophages, causing exacerbation of the disease symptoms. Also, the use of medications that slow down intestinal peristalsis is not recommended. At present, only symptomatic treatment is used and is important to search alternative methods.

A new hope against EHEC may be bacteriophages, which are currently used *i.a.* in phage therapy. In earlier biodiversity studies 83 bacteriophages were isolated from urban sewage. One of them *i.e.* vb\_Eco4M-7 have an ability to lysis only *Escherichia coli* O157:H7 strain (ATCC 700728) and clinical strain *Escherichia coli* O157:H7 with ST2-8624 prophage. Our study shows that bacteriophage vb\_Eco4M-7 is characterized by short life cycle and high multiplication rate (about 1000 phage particle) which may indicate his potential in the fight against *Enterohemorrhagic Escherichia coli* (EHEC).

## **Potential cardiotoxicity of urethane in Wistar male rats**

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Aleksandra Piwka, Witold Zakowski**

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Urethane (ethyl carbamate) was discovered in 1939. Since then it was used as herbicide and antineoplastic agent. Shortly after the World War II, its own cancerogenic properties were revealed and therapies in which the urethane was used were discontinued by majority of countries. Nowadays, it is mainly used as an anesthetic during acute experiments on mammal, fish and amphibian species. It is especially useful in experiments which take several hours and minimal alteration of physiological parameters is required, like electroencephalographic (EEG) recordings. During our recent study we discovered that a regular dose of urethane (1 ml / 150 g of body mass of 20% urethane solution) can cause a sudden death of an animal. Although it happened occasionally during the numerous experiments conducted in our department, this effect was never before observed with such alarming frequency. In this particular group, 8 out of 30 animals died shortly after the ethyl carbamate solution was intraperitoneally administered. In all the cases, the left ventricle of heart was constricted. We think that this blood circulation obstruction was most likely the direct cause of death. On this poster, we are presenting the gathered evidence and we are trying to assess, whether urethane, alongside the cancerogenic, can also have cardiotoxic properties.

## **Arsenic concentrations in Baltic Sea bottom sediments**

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Arsenic is an element ubiquitous in all environmental components, however 70% of its input to the Baltic Sea comes with surface runoff and results from on-land anthropogenic activity (the use of pesticides, coal burning, mining, smelting processes). Additional source of arsenic in the Baltic deeps is the Chemical Weapon dumped at sea after the II World War.

Arsenic is assumed toxic to plants, animals and humans. It disrupts enzymatic processes in cells, inhibits mitochondria functions, affects proteins formation by its high affinity to sulfhydryl groups, inhibits phosphate insertion to DNA, affecting transmission of genetic information. Chronic exposure to elevated arsenic concentrations can cause disturbance in nervous system and heart diseases. It is also assumed that bladder and lung cancer may be caused by chronic arsenic poisoning. As fish and seafood are the main sources of arsenic in human diet it is very important to investigate the marine environment for arsenic concentrations.

During several research projects since 2012, a total number of 350 surface sediments samples were collected in the area of southern Baltic Sea. Total arsenic concentrations in the samples were measured and additional sediments properties were examined. Obtained results of arsenic concentrations ranged from 0.1  $\mu\text{g}\cdot\text{g}^{-1}$  in sandy sediments to 24.5  $\mu\text{g}\cdot\text{g}^{-1}$  in muds. Levels of arsenic correlate significantly with iron concentration in the sediments, amount of organic matter and grain size.

## ***Paraglacial sequence in early development of talus slopes: the example of slopes near the Hans Glacier on SW Spitsbergen***

**Krzysztof Senderak**

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Talus slopes are an integral part of the high-mountain landscape of high- and mid-latitudes. In both cases, the initial point of evolution is the direct interaction with the glacier, regardless of the location. The later stages of their development depend on many factors, including the climate and its effects on the weathering of rock cliffs, the size of the area of sediment supply, or geological conditions. Internal structure of slope and its youngest surface layer can contain information about the paraglacial processes responsible for early development of talus slopes under the influence of glacier. The term *paraglacial* was defined as period of non-glacial morphogenetic processes conditioned by the glacial environment.

The example of slopes near the Hans Glacier on SW Spitsbergen allows to follow the changes in internal structure of the talus slopes in different stages of evolution. The aim of investigation was to compare the talus slopes behind and in front of the snout of glacier. There were carried out the geophysical surveys using electrical resistivity tomography (ERT) and ground-penetrating radar (GPR). The obtained results indicate on a significant differences in their internal structure, especially in thickness of studied slopes, content of buried glacial ice, location of permafrost. General model of paraglacial sequence in early development of talus slopes were presented based on geophysical data and geomorphological observations.

## ***Leading modes of Arctic sea ice variability and their local and global atmospheric imprints in the era of satellite observations***

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Several spectacular climate events occurred in the era of satellite observations (1979-present), especially in recent years in the Arctic region. In particular, the Arctic atmosphere warmed faster than the air at lower latitudes - a phenomenon known as Arctic amplification of the global warming. A major contributor to this phenomenon is the Arctic sea ice decline (reduction of its extent and thickness), which has accelerated over the last decade, especially in summer. The winter Arctic sea ice cover shrinks as well. The record minimum winter sea ice extent was observed just this (2016/2017) winter.

Here we present an analysis of leading modes of variability in the Arctic sea ice concentration (SIC) and their relationships with concurrent atmospheric anomalies. The analysis is based on statistical (principal component and linear regression) methods applied to monthly and seasonal mean (ERA-Interim reanalysis) data from the European Centre for Medium-Range Weather Forecasts.

The first SIC mode (mode with the largest amplitude and spatial extent of significant anomalies) extracted from the monthly mean data is a summertime mode exhibiting an overall Arctic sea ice decline. A significant global imprint of this mode (coherent anomalies in several remote regions) is present in atmospheric temperatures. The mode exhibits a spectacular shift from a larger ice extent to a smaller ice extent at around 2005. A similar shift is found in a leading mode of wintertime SIC variability, which also captures the 2016/2017 minimum.

## ***Underwater noise characteristics of the small scale spilling breakers***

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The breaking wave phenomenon significantly influences air-water interactions. Some part of the wave energy dissipated in this process is transformed into the energy of the sound. Since there are lots of limitations concerning methods of gathering the wave energy dissipation data in the field, a non-contact passive acoustic methods were proposed as an alternative. Moreover, there is a lack of reliable data related to underwater noise generation in the lowest wind speed conditions, with presence of small scale spilling/plunging breakers. In order to receive a multifaceted approach to the explanation of relationship between the wind-speed dependent noise and different types of the breaking waves, even the least energetic events must be considered. The goal of this research was to understand spectral and energy characteristics of the underwater noise generated by small scale spilling breakers. Acoustic data were collected under controlled conditions experiments conducted in the wave flume of the Institute of Hydro-Engineering PAS in Gdansk. Hydrophones RESON TC-4032 were used for acoustic data collection. A small scale spilling breakers were generated with a programmed piston and the surface water displacement was registered simultaneously with acoustic signal analysis.

## ***Induction of persistent genotoxic stress as a mechanism of the selective anticancer activity of isothiocyanates***

**Joanna Brokowska, Aleksandra Hac,  
Grzegorz Wegrzyn, Anna Herman-Antosiewicz**

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Epidemiological studies revealed that there is an inverse correlation between consumption of cruciferous vegetables and the incidence of certain types of cancer. Isothiocyanates (ITC) are products of hydrolysis of glucosinolates, compounds naturally present in cruciferous plants. Previous studies performed on animal models as well as cancer cell lines proved anticancer and chemopreventive activities of isothiocyanates. However, little is known about mechanisms of their selectivity toward cancer cells.

We investigated the impact of two isothiocyanates, sulforaphane (SFN) and phenethyl isothiocyanate (PEITC), on genotoxic stress in the non-transformed human dermal fibroblasts (HDFa) and the prostate cancer cells (PC3). Obtained results indicate that both, SFN and PEITC, induce DNA double strand breaks in cancer cells while DNA of fibroblasts is only slightly affected. Moreover, normal cells are able to repair DNA which is observed as a decrease of the levels of histone  $\gamma$ H2AX and phospho-RPA after ITC deprivation. In cancer cells, on the contrary, markers of genotoxic stress remain elevated, even in medium without ITC. This suggest that selective activity of ITCs may rely on induction and accumulation of DNA damage in cancer and not in healthy cells.

Summarizing, our results partially explain selective antiproliferative activity of ITC toward cancer cells. This property makes them promising candidates for cancer prevention and therapy.

**Three channel WET Star in situ fluorometer as a useful tool for characterization of Dissolved Organic Matter (DOM) and refinement of water masses classification in the Nordic Seas.**

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The Nordic Seas represents a crucial component of the northern hemisphere climate system due to encountering of two contrasting water masses and their contribution to the heat and salt budget. Nordic Seas are dominated by Atlantic Waters (AW) and Polar Waters (PW) and water formed in the mixing process or local modifications like precipitation and sea-ice melt. Various sources of fresh water in the Nordic Seas are not taken into account in the water masses classification based on of temperature, salinity and density. In this study we propose that application of the in situ three channel WET Star fluorometer could be a useful tool for characterization of DOM and improvement of water masses classification in the Nordic Seas.

Observations of Chromophoric Dissolved Organic Matter and Fluorescent Dissolved Organic Matter were carried out in different water masses in the Nordic Seas in 2014 and 2015 with use of in situ three channel WET Labs WET Star fluorometer. Measured WET Star fluorometer signal enabled to assess distribution of humic and protein-like DOM fractions. The distribution of humic-like fluorescence intensity in the function of salinity revealed three distinct mixing curves: the first indicates mixing between surface polar water diluted by sea-ice melt with core of PW from East Greenland Current, the second imply transition from PW to AW, the third curve is an indicator of modification of AW by sea ice melting in the area of Western and Northern Spitsbergen Shelf.

**Ecumenical education as a significant element of the whole of society**

**Dominika Kuberska, Adam Jan Karpinski**

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Contemporary world is a structural system. Each of its elements is like a lens focusing on the influence of many others. You can abstract them, but you have to it according to some methodological principles. It is therefore difficult to describe any subject of social action without pointing to the limits applied.

This also applies to various cultural circles, especially their religious content. Difficulties arise when we examine the influence of two or more different beliefs, whose representatives can't find a plane of agreement. These are communication problems arising from the lack of knowledge of some fundamental elements of knowledge. The solution to these issues may be the introduction of ecumenical education.

The stated aims of education can be fulfilled by religion. In it, the content of existing religions in the world can contribute to the development of open attitudes, to the understanding of others living in the same world, and doing the same, albeit for the "copper". Your area.

The presented work presents a model illustrating the scheme of the interaction of different spheres of human life together with the location and the visualization of the effects of ecumenical education. This approach is intended to indicate the content that should be taken into account in order to increase the effectiveness of the process of ecumenical education. And that in turn can contribute to the development of the ecumenical movement.

## ***The advantages of technological progress***

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Andrzej Zakrzewski**

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Nowadays many people think that technological development is heading in the wrong direction. Taking into consideration only the worst effects of the modern technology, people forget about the valuable advantages. One of them is a faster way of communication—people often assume that children and teenagers these days have lost their ability to talk to each other in real life, but we are going to prove that better technology often equals better communication, and it can be helpful in many social situations. Due to improved equipment we can improve or even save more human lives than ever before. Gaining knowledge, increase in security, defeating shyness—all of these factors are indisputable elements of modern technology.

## ***Killer Social Media***

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This project involves discovering how social media could affect our society, mainly the younger generations, in the future. The goal is to explain with the research we had done and our own findings what a negative impact it could be for the future of individuals. How they will perceive the world, the society and their personalities being constant consumers of social media. We found that many mental disorders are caused by the overuse of numerous social media platforms. Our generation is dissimilar to the generation our ancestors used to live in. We all have different values and expectations towards life and because of the never-ending change, it is an active phenomenon. Thanks to the research we had done, we are able to estimate what the future will bring with the growing consumerism of social media.



## ***How to deal with the global standardization? Global challenges – local responses***

### **Patrycja Grzys**

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Contemporary world is shaped by rapid changes in almost every level of its functioning. These changes are both political, economic, social and spatial. They significantly affect cities, since they have become the dominant place of residence of the majority of society. Cities, in addition, are especially vulnerable to these changes as units particularly related to the process of globalization.

One of the subprocess associated with the spatial and cultural aspect of globalization is the process of standardization. Along with this process we can observe spreading forms of western culture as the dominant cultural pattern. Within the context of these processes, the role of local cultures is shifting. There are two leading approaches in literature which can be pointed in this matter. The first approach is related to the approval of the globalization process. It states, that the importance of place and locality is diminishing [1]. However, the second part of the discourse, following by [2], the author of the concept glocalisation assumes that the global standardizations directly leads to the revival of local cultures.

This dispute evokes many doubts relating to the urban management. However, urban development do not have to mean losing its identity, as well as maintaining it do not have to exclude development-oriented urban policy. Proper diagnosis and strategy based on unique, local resources often appears more successful than „ a corporate stamp posed in different places of the globe" [3, p. 11].

[1] Cairncross F., *The Death of Distance: How the Communications Revolution Is Changing our Lives*. Harvard Business Review Press, Watertown, 2001.

[2] Robertson R., *Glocalization: Time-Space and Homogeneity-Heterogeneity* [in:] Featherstone M., Lash S., Robertson R (ed.) *Global Modernities*, Sage Publications, London 1995, p. 25-44.

[3] Dąbrowska-Milewska G., *Architektura w kontekście tożsamości miasta*. „Zeszyty Naukowe Politechniki Poznańskiej”, 2009, No 19, p. 5-11.

## ***The Earth limits***

### **Elzbieta Dolega**

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In this presentation I will discuss the cultural phenomena and believes that seem to disregard the consequences of human behaviour when it comes to Earth's ecosystem. In birth, life and death people can greatly affect nature of our planet. In modern times there seems to be no limitation of what we can change in nature but I want to take a look if we can truly be the absolute masters of the Universe. Can we concentrate on the symptoms of problems that hunt our societies or are we going to have to address the causes of said symptoms. I believe that there is a line which we won't be able to cross and it is getting closer and closer to us.

## ***Loesje as an example of postcolonial thinking***

**Joanna Laszcz**

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Poland*

*Loesje International* is an organization founded in 1994 but it has existed since 1983, when a group of young people from Netherlands had invented a new way to change the world. For more than thirty years, using language play, they have created white and black posters with funny, interesting, sometimes also ironic texts, signing by “mysterious” Loesje.

In my oral presentation I would like to focus on a history of *Loesje* and its development, explaining why one group from Netherlands decided to struggle for freedom of speech by creating these unusual posters. Because the history of *Loesje* is not only part of our modern European history but also part of a centuries-old history of colonialism, in my presentation I will also show connections between political, economic, social and cultural problems on the world stage, using postcolonial method.

In September 2015, a historic UN Summit took place, during which the nations of the world agreed on the 17 Sustainable Development Goals of the 2030 Agenda for Sustainable Development. These Goals officially came into effect on 1 January 2016. These Goals are fully universal and simply apply to all. The aim is to mobilize all efforts in order to end poverty, inequalities, and to challenge the issues involving climate change. However, the main goal is to ensure that no one is left behind.

Having this in mind, we are happy to present you with the outcome of the International Conference entitled Where the World is Heading. This conference is the continuation of the long tradition of the Sopot Youth Forum. Since 2008 the Sopot Science Association has created a platform for over 250 scientists from all over Europe.

This year, we gathered young scientists and science enthusiasts, university students, Ph.D. students and young doctors, from all over Europe and gave them the opportunity to present their work, visions, opinions, and thoughts. Traditionally, the Sopot Youth Conference is divided into two categories: humanities and social sciences, and natural sciences. Due to the multidisciplinary character of the Sopot Youth Conference, the abstracts and presentations are intended for the general audience. In accordance with previous editions, this year the best presentations have been granted financial awards.

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