



INTERNATIONAL SOPOT YOUTH CONFERENCE

ENTITLED: WHERE THE WORLD IS HEADING

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BOOK OF ABSTRACTS

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Agenda

8:30 – 8:50	Registration
8:50 – 9:00	Welcome by Prof. Janusz Pempkowiak, IO PAN Director and Assoc. Prof. Tymon Zielinski, IO PAN, Sopot Science Association Chairman
9:00 – 9:30	How does consumer culture influence our happiness? <i>Assoc. Prof. Anna Maria Zawadzka, University of Gdansk</i>
9:30 - 10:45	I Session: Fisheries, computing and navigation Session Chairs: Magdalena Lacka, Kajetan Deja
9:30 – 9:45	Game on! Machine learning in ecological modeling. <i>Sz. Smoliński, National Marine Fisheries Research Institute</i>
9:45 – 10:00	Small-Scale Fisheries in Indonesia: The Efficiency of Technology Used in East Lombok Coastal. <i>N. Ayunda, M. R. Sapota, University of Gdansk</i>
10:00 – 10:15	The Precise Orbit Determination for Navigation and Geodesy. <i>A. Wielgosz, M. Kalarus, Space Research Centre PAS</i>
10:15 – 10:30	The impact of shipwrecks on the geochemical characteristics of the surface layer of the marine bottom sediments in wrecks deposition areas on the example of ORP Wicher. <i>T. Figiel, Ż. Kłostowska, P. Wysocki, L. Łęczyński, T. Ossowski, D. Zarzeczńska, I. Pomian, University of Gdansk</i>
10:30 – 10:45	Assessment of the possibility of use of selected species for reduction of cargo microalgae phosphorus from urban after fish farms in closed circuits (RAS). <i>F. B. Harasimiuk, A. Nędzarek, West Pomeranian University of Technology in Szczecin</i>
10:45 – 11:00	Coffee break
11:00 – 12:15	II Session: Natural and anthropogenic phenomena Session Chairs: Katarzyna Draganska, Miłosz Grabowski
11:00 – 11:15	Triclosan (TCS), the pharmaceutical and personal care products ingredient (PPCPs) - elaboration of the new analytical method and a preliminary assessment of the Gdańsk Basin sediments contamination. <i>M. Kobusińska, K. Osińska, E. Niemirycz, University of Gdansk</i>
11:15 – 11:30	Microplastics in marine environments: problem overview. <i>G. Butrykowska, University of Gdansk</i>
11:30 – 11:45	Breaking sea wave loads on truss structures. <i>O. Podrażka, W. Cieślíkiewicz, University of Gdansk</i>

- 11:45 – 12:00 Influence of heat waves in South-West Poland in XXI century on the growth of the level of human mortality.
K. Martyński, University of Wrocław
- 12:00 – 12:15 The unthinkable is becoming a reality, or how to simulate earthquake on personal computer.
P. Klejment, Institute of Geophysics PAS
- 12:15 – 12:45 III Session: 1 minute poster presentations**
Session Chairs: Tymon Zielinski, Iwona Wrobel
- 12:45– 13:30 Lunch**
- 13:30 – 14:45 IV Session: Polar studies**
Session Chairs: Paulina Pakszys, Anna Raczkowska
- 13:30 – 13:45 What's the matter with the matter? Arctic studies on CDOM.
A. Raczkowska, P. Kowalczyk, S. Sagan, M. Zabłocka, Institute of Oceanology PAS
- 13:45 – 14:00 Meroplankton of polar regions.
K. Walczyńska, A. Weydmann, University of Gdansk
- 14:00 – 14:15 Ready, steady, germinate!
Z. Smoła, C. Hoppe, E. Leu, IO PAN, Alfred-Wegener-Institute for Polar and Marine Research, Akvaplan-niva AS, Science Park
- 14:15 – 14:30 Soil and feces as a valuable source of information about Arctic ecosystem.
S. Zielińska, D. Kidawa, L. Stempniewicz, M. Łoś, J. M. Łoś, University of Gdansk
- 14:30 – 14:45 Pelagic hydrozoan as indicators of climate change - Nordic Seas case study.
M. K. Mańko, S. Kwaśniewski, A. W. Weymann, University of Gdansk, IO PAN
- 14:45 – 15:00 Coffee break**
- 15:00 – 16:15 V Session: Social sciences**
Session Chairs: Dorota Majewicz, Natalia Treder
- 15:00 – 15:15 Extracurricular marine education at the Gdynia Aquarium – helping to create a more environmentally aware society.
D. Wojcieszek, W. Podlesińska, G. Niedożytko, National Marine Fisheries Research Institute, Gdynia Aquarium Education Center
- 15:15 – 15:30 The cognitive training with the game “Kalkulilo” and mathematical abilities in children – the preliminary results of a pilot study.
M. Kmiecik, Ł. Goraczewski, J. Matulewski, M. Gut, K. Finc, A. Ignaczewska, J. Stępińska, B. Bałaj, J. Dreszer, J. Majewski, E. Bendlin, P. Cholewa, W. Duch, Nicolaus Copernicus University in Torun
- 15:30 – 15:45 Is it worth to be delisted?
A. Ambroziak, M. Deryło, Poznan Uniwersytetu of Economics, University of Gdansk

15:45 – 16:00	Factorial structure of the social anxiety scale and its relationship with maladaptive perfectionism among Polish students. <i>P. Bereznowski, W. Wróbel, P. Atroszko, University of Gdansk</i>
16:00 – 16:15	“Putin Putout” – words are a man’s best friend. <i>J.Łaszcz, University of Gdansk</i>
16:15 – 16:30	Coffee break
16:30 – 17:15	VI Session Biology and medicine Session Chair: Martina Bolinska
16:30 – 16:45	Estimation of dissolved organic matter flux between bottom sediment and water column. <i>M. Lorin, Université de Toulon</i>
16:45 – 17:00	Virus like particles as a platform for universal anti-influenza vaccine. <i>J. Węsławski, University of Gdansk</i>
17:00 – 17:15	The level of mitochondrial DNA in fibroblasts from patients with Huntington disease. <i>N. Sowa, P. Jędrak, S. Barańska, G. Węgrzyn, University of Gdansk</i>
17:15 – 17:30	Human changes of lobelia lakes - the most precious polish water bodies. <i>A. Robioneck, K. Banaś, University of Gdansk</i>
17:30 – 17:45	Habitat preferences of singing males of the common rosefinch <i>Carpodacus erythrinus</i> in Żuławy Elbląskie. <i>Z. Pestka, University of Gdansk</i>
17:45 – 18:15	VI Session: Poster presentations
18:15 – 18:30	Jury proceedings
18:30	Announcement of the results of the best presentation contest and the awards ceremony.
19:30	Afterparty in Club Atelier (Sopot, ul. Mamuszki 1, near Hotel Grand) All participants are welcome!

Introduction

It is our pleasure to present you the outcome of the first edition 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 created a platform for over 180 scientists from all over Poland who presented their work during the Forum.

This year we have gathered young scientists and science enthusiasts, university students, Ph.D. students and young doctors, from Europe who have an opportunity to present their work, visions, opinions, and thoughts. Traditionally the Sopot Youth Conference consists of two thematic blocks: humanities and social sciences and the second one-natural and physical sciences. Due to the multidisciplinary character of the Sopot Youth Conference abstracts and presentations are prepared in an intelligible manner. Just like in previous editions this year the best presentations have been granted financial awards.

Tymon Zieliński

Chairman Sopot Science Association

Abstracts

I Session: Fisheries, computing and navigation

Session Chairs: Magdalena Lacka, Kajetan Deja

Game on! Machine learning in ecological modeling.

Szymon Smoliński

National Marine Fisheries Research Institute, Gdynia, Poland

Most of us probably use machine learning techniques every single day without knowing it. Have you ever asked yourself why web search is so effective? This is a great contribution of machine learning, science which aims on developing algorithms able to learn from and make predictions on data. Current computational capabilities and freely available statistical software allow to apply these modern methods without significant difficulties for real-life problems, including issues of ecological studies.

The work presents the example of machine learners application for predictive modeling of demersal fish diversity in the Baltic Sea. It was hypothesized that habitat features can influence fish assemblage structure and the effect of different environmental gradients were investigated. Random forest, one of the novel machine learning techniques, was trained on Database of Trawl Surveys and applied for prediction using maps of environmental drivers. Obtained results were presented with Geographic Information Systems, providing spatially explicit information about fish diversity patterns within the Baltic.

Ecologists ability to use machine learning algorithms is particularly important now, as the dynamic development of natural resource management and conservation moves towards more spatial and ecosystem-based approaches, which often require more flexible methods of biological data analysis. The application of machine learners, such as random forest, may be valuable for obtaining knowledge on factors affecting species distribution and precise, quantitative information on spatial variation in species diversity, which are essential for management actions.

Small-Scale Fisheries in Indonesia: The Efficiency of Technology Used in East Lombok Coastal.

Nisa Ayunda, Mariusz R. Sapota

Institute of Oceanography, University of Gdansk, Poland

As an archipelago country, Indonesia has high potential in fisheries. 75 % of Indonesia is waters, and it has nearly 18000 islands. 85% of Indonesian fishermen are from small-scale fisheries. Refer to Indonesia National Regulation of Marine and Fisheries (UU No. 31/2004 and the new version UU No. 45/2009), Indonesia applies Total Allowable Catch (TAC) to manage the fishing activities. Until now, Indonesia government still faces many obstacles toward this sustainability in fishing activities, such as illegal, unreported, and unregulated (IUU) issues. Many sustainable program developed to apply this TAC and control IUU fishing, such as, local institutional empowerment program to governance 0-4 miles waters area. Awik-awik in East Lombok is one of applied local institutional empowerment program. Awik-awik is local wisdom that develop in Bali Island and Lombok Island. This local wisdom includes rules, bans and sanctions in social relationship. In East Lombok, local fishermen who joined in Nautilus fishermen group adopted this wisdom to manage their coastal fisheries resources. The local fishermen applied this Awik-awik to face IUU issued in their costal, such as bombing; and catching the endangered, threatened, and protected (ETP) species. This study proposed to analyze the efficiency of technology used under Awik-awik, and used Data Envelopment Analysis (DEA) approach in small-scale fisheries in East Lombok from 2002 to 2011. The results showed that management under Awik-awik was still inefficient. Small-scale fishermen used technology relative efficient only in 2003 and 2004. Since 2005, the fishermen have started to elude Awik-awik rules so the production decline yearly. This study recommended to rearrangement the implementation and the rule in use in Awik-awik, such as control in fishing gears, fishing days, and surveillance regularly.

The Precise Orbit Determination for Navigation and Geodesy.

Agata Wielgosz, Maciej Kalarus

*Department of Planetary Geodesy, Space Research
Centre PAS, Warsaw, Poland*

The Precise Orbit Determination of artificial Earth's satellites plays an important role in navigation and science. The exact knowledge about satellite position benefits in better positioning on Earth surface, in air and in space. Moreover it will be useful e.g. in airborne gravimetry to discover mineral deposits or for earth wobble monitoring at finer detail. Nowadays the best reached accuracy of satellite position on orbit is reported to be about 2.5 cm. To achieve the goals mentioned above the orbital position of the satellite should be known in sub-centimeter accuracy. The determination of precise position of satellite is a complex process which requires the advanced modeling of the Earth and space environment (e.g. Earth gravity and its changes, relativistic effects, solar radiation pressure, albedo and much more). Whilst the gravitational forces are quite easy to model thanks to well-known theories and measurements, the non-gravitational perturbations of the orbit are the main factors limiting the accuracy of satellite position on orbit. Our studies are concerned with the impact of non-gravitational forces on satellite and its position. Additionally we consider the other possibilities to improve the orbit solution allow to measure that forces directly by putting on board accelerometers and adding the Inter Satellite Links to enhance the constellation.

The impact of shipwrecks on the geochemical characteristics of the surface layer of the marine bottom sediments in wrecks deposition areas on the example of ORP Wicher.

Tomasz Figiel¹, Żaneta Kłostowska¹, Paweł Wysocki¹, Leszek Łęczyński¹, Tadeusz Ossowski², Dorota Zarzeczańska², Iwona Pomian³

¹*Institute of Oceanography, University of Gdańsk, Poland*

²*Department of Analytical Chemistry, University of Gdańsk, Poland*

³*National Maritime Museum in Gdańsk, Poland*

In the last tens years on the bottom of the Baltic Sea discovered the remains of World War II like shipwrecks, chemical warfare or ammunition. With the current knowledge, it is proved that the wrecks are a real threat to the sea environment. Mainly due to the chemicals used for impregnation of structural elements, as well as loading, fuel and weapons (including chemical warfare). In the case of metal wrecks, an important parameter is the degree of corrosion, which is subject to specific elements, whereby contamination gradually and systematically penetrate into the sea environment, where they are incorporated into other elements of the trophic chain. ORP Wicher is located in the area of intense currents for a depth of 5-17 m, which determines the transport of pollutants in further areas of the bay.

In 2016 collected a series of samples of bottom sediments of the ORP Wicher wreck. The surface layer of sediments was subjected to geochemical analysis, measured the content of selected metals, petroleum substances, organic and inorganic matter and basic physical parameters of sediments. Compared to the reference materials can be concluded that the residual wreck is important point source of pollution in the studied area. Further research and monitoring wrecks areas, allows for the observation of trends in the spread of harmful substances. This is particularly important in the case of petroleum substances which are a real threat for marine environment in long-term aspect and indirectly also for human health and life. Due to their numerous placement at the bottom of the southern Baltic Sea are important sources of input of pollutants into the sea environment.

Assessment of the possibility of use of selected species for reduction of cargo microalgae phosphorus from urban after fish farms closed circuits (RAS).

Filip B. Harasimiuk, Arkadiusz Nędzarek

Department of Aquatic Zoology, Faculty of Food Sciences and Fisheries, West Pomeranian University of Technology in Szczecin, Poland

Treatment of industrial wastewater poses serious problems of a technical nature and technology. This is due to the fact that certain industrial waste water have a heterogeneous composition, high concentrations of organic impurities and the content of specific substances. In addition, the effluent can be characterized by the presence of both simple phosphates and organic phosphorus. Examples of such plants are effluent of fish farming. Due to the possibility of adverse effects of wastewater on natural systems, it is necessary normalization permissible concentrations of pollutants in wastewater. Organic compounds of phosphorus are serious problems with wastewater treatment. They are difficult to remove. Conventional methods of removing them from wastewater are not always effective. So far the problem has not been solved yet. For this reason, fully justified seems to be searching for new methods of removal of phosphorus from wastewater. The primary objective of the study was to determine the possibility of using *Oocystis submarina* for the reduction of organic phosphorus from the effluent with closed circuit farming (RAS). The presented results indicate that the 7 day duration of the process, it is possible to remove approx. 35% organic phosphorus. At the same time it has been observed increase in biomass mikroglonu determined from measurements chlorophyll "a" of approximately 1800%. The proposed research solution can be competitive solution for traditional methods of wastewater treatment with loads of phosphorus used today.

II Session: Natural and anthropogenic phenomena

Session Chairs: Katarzyna Draganska, Miłosz Grabowski

Triclosan (TCS), the pharmaceutical and personal care products ingredient (PPCPs) - elaboration of the new analytical method and a preliminary assessment of the Gdańsk Basin sediments contamination.

Marta Kobusińska, Karolina Osińska, Elżbieta Niemirycz
University of Gdansk, Institute of Oceanography,
Poland

Triclosan (TCS) is a non-ionic, broad spectrum antimicrobial agent. Among different kinds of antibacterial agents, TCS is very commonly used in a number of products as diverse as toothpaste, detergents, household sponges, plastic cutting boards, socks and underwear. As the usage remains widespread and unlimited and the removal from the waste effluents incomplete, the marine environment appears to be the final sink of its accumulation. The occurrence and the reactivity of TCS in the aquatic environment is another issue of relevance since its photolysis is an important source of the incomparably persistent and toxic polychlorinated dibenzo-p-dioxins and dibenzo-p-furans- PCDD/F (Buth et al. 2010). Since there is no data on the TCS contamination in the Baltic Sea, the aim of the study was to evaluate and validate the analytical procedure for TCS determination in marine bottom sediments applying the High Performance Liquid Chromatography coupled with diode array detector (HPLC-DAD) and the further assessment of the TCS contamination profile in the bottom sediments of the Gdańsk Basin. TCS has been detected and quantified in all sediments samples. The data have indicated 2 major hot-spots.

The contamination patterns revealed the resemblance to other dioxin-like halogenated organic compounds and proportionally correspond to the toxicity recorded in the studied region (Niemirycz, Jankowska 2011, Kobusińska et al. 2014, Witt et al. 2014).

References:

- Buth J.M., Steen P.O., Sueper C., Blumentritt D., Vikesland P.J., Arnold W.A., McNeill K., 2010, *Dioxin Photoproducts of Triclosan and its Chlorinated Derivatives in Sediment Cores*, Environmental Science & Technology 44, 4545-4551.
- Kobusińska M., Skauradszun M., Niemirycz E., 2014. *Factors determining the accumulation of pentachlorophenol - a precursor of dioxins in bottom sediments of the Gulf of Gdańsk (Baltic Sea)*. Oceanological and Hydrobiological Studies, 43(2), 154 - 164.
- Niemirycz E., Jankowska D., 2011, *Concentration and profiles of PCDD/Fs in sediments of major Polish rivers and the Gdańsk Basin – Baltic Sea*. Chemosphere 85, 525-532.
- Witt M., Kobusińska M., Maciak J., Niemirycz E., 2014 *Geostatistical methods for estimation of toxicity of Marine bottom sediments based on Gdańsk Basin area*, Oceanological and Hydrobiological Studies, 43,3:247-253

Microplastics in marine environments: problem overview.

Grażyna Butrykowska

*Department of Vertebrate Ecology and Zoology,
University of Gdansk, Poland*

Microplastics are small particles of plastic litter. It can have different shapes and colors, but its size, by definition, is smaller than 5 mm. It can originate from the production of plastic items, or from decomposing plastic products. Sources of microplastics are: vehicle tires, washing synthetic clothes, cleaning and personal care products, as well as packages and bigger plastic litter in general. In recent years, researchers have tried to investigate the accumulation of microplastics in the water, especially the seas and the oceans. The results show that microplastics are present in the water in different densities, depending on the distance from the coastline, and also in sediments. The Baltic Sea, as a shallow inland sea, is particularly endangered by microplastic pollution. The consequences of the presence of microplastics are still being studied. It can be ingested by zooplankton, affecting its feeding capability. It travels in the food web, which is dangerous because of its ability to absorb various substances. It can act like a sponge, collecting toxins, which influence the animals that will ingest it. There is still a lot to discover, but it is certain that immediate action must be taken to prevent further pollution. Rising awareness of this problem, along with laws banning microplastic ingredients, and a growing number of inventions designed to collect marine litter are giving hope for managing the problem of micro pollution.

Breaking sea wave loads on truss structures.

Olga Podrażka, Witold Cieślikiwicz

*Institute of Oceanography, University of Gdansk,
Poland*

Due to depletion of the conventional energy sources and growing energy demands, wind energy is becoming more popular. Wind energy is being produced mostly from onshore farms, but recently wind turbines have been installed offshore. Because of the specific nature of the wind field over the maritime areas, the wind farms located there are more productive. The foundations of offshore wind turbines can be truss structures and be placed in shallow water, where they are subjected to highly varying hydrodynamic loads, particularly from plunging breaking waves. Many investigations have been made regarding the wave slamming forces acting on both vertical and inclined piles, on flat and sloping bottoms. However, very few studies have been carried out to study the slamming forces on truss structures and there are still uncertainties in this area. The initiative within the WaveSlam project has been taken up at European level in order to reduce those uncertainties and to gain a deeper insight into the process of loading on truss structures by breaking waves. The total force and the forces on local members of the structure were registered during the WaveSlam experiment and have been analysed using two different methods. The slamming forces calculated from the measurements were compared with the values obtained using the existing force models. In addition, the relationship between slamming force and breaking wave characteristics was investigated.

Influence of heat waves in South-West Poland in XXI century on the growth of the level of human mortality.

Karol Martynski

Department of Climatology and Atmosphere Protection, University of Wrocław, Poland

Heat waves are the main reason of deaths related with weather. In order to registered climate changes, it seems that hypothesis is correct, that it may occur in higher frequency, insensitivity or length. Basic problem in defining trends is the lack of method to designate heat waves, and also designate heat strain of human organism. In lecture there is stated analysis of changing heat waves on the area of SW Poland based on data gathered from Institute of Meteorology and Water Management and also from Department of Climatology and Atmosphere Protection from University Of Wrocław gathered from 2001 to 2015. Replacement of meteorological data were statistics of number of deaths from Main Statistic Office and data about concentration of pollution in the air from Provincial Inspectorate of Environmental Protection. Based on gathered data, it was designed number of heat waves based on 95th percentile method, which inform that 2003, 2006 and 2015, were mostly heating years, in the last one in Wrocław there were 29 days with diurnal maximum temperature above 30°C and 8 days with temperature above 35°C. In addition UTCI indicator was counted, and changing of concentration of troposphere ozone was analyzed. For the whole time, number of deaths related with heat waves was compared. The main target of lecture is rating influence of thermal strain conditions on human organism. Appearing such extreme high temperature depends on circulation conditions, humidity and air transparency, but also on level of dryness of soil (reduced evaporation losses) and changes in albedo active surface.

The unthinkable is becoming a reality, or how to simulate earthquake on personal computer.

Piotr Klejment

Institute of Geophysics Polish Academy of Sciences, Poland

Gordon Moore, a founder of Intel, observed that computing power of our computers doubles every two years. His observation has become very popular and now is known as Moore's Law. Originally, the computers were the size of a large room. Meanwhile, modern computers are billions of times more efficient than the early machines and are small enough to fit into mobile devices.

As a result, the unthinkable is becoming a reality. The high performance computing possibilities have opened up new perspectives for researches in every branches of science. It appears to be especially rapid progress in the material science. All of the useful properties of materials are closely related to their structure, including how the atoms are joined and how groups of atoms are arranged throughout the material.

Theoretical method for simulating materials behavior, called molecular dynamics, is known for several decades. However, only now it can be used efficiently even on our PC's. By calculating movements of every particle, we can simulate behavior of real material in varying external conditions. Molecular dynamics allow to study so complex issues like a state of local stresses in the solid body or fracturing process, to name a few. In geophysical application we believe that it can help us to understand better the processes leading to release of accumulate tectonic stresses – the earthquake.

III Session: 1 minute poster presentations

Session Chairs: Tymon Zielinski, Iwona Wrobel

IV Session: Polar studies

Session Chairs: Paulina Pakszys, Anna Raczkowska

What's the matter with the matter? Arctic studies on CDOM.

Anna Raczkowska, Piotr Kowalczuk, Sławomir Sagan, Monika Zabłocka

Institute of Oceanology Polish Academy of Sciences, Poland

Colored dissolved organic matter (CDOM) is one of the most important optically significant constituent of marine water and is present in all natural waters. CDOM is a key factor responsible for the vertical entrapment of heat and light availability for primary production in the Arctic Ocean. Recent studies has shown that about 50–60% more heat deposition is gathered in the upper meters of the East Greenland Current waters as a consequence of high concentrations of CDOM in comparison to clearest natural waters (Granskog et al., 2015). The heat absorbed by CDOM contributes to acceleration of sea-ice melt process and albedo changes in Arctic's physical system.

The aim of this study is to characterize dissolved organic matter in Nordic Seas. The experimental material has been collected during three summer seasons on board research vessels Oceania and Lance. How measurements of optical properties look like in the ocean covered by ice flows? What is the spatial distribution of CDOM? How to link phytoplankton with variability of CDOM in the Arctic? The answers to the above as well as other questions will be addressed during my presentation. Keep in mind that the matter matters!

Meroplankton of polar regions.

Katarzyna Walczyńska, Agata Weydmann

Institute of Oceanography, University of Gdansk, Poland

Meroplankton are organisms, which spend only a portion of their lives in pelagic environment. Usually word “meroplankton” refers to pelagic larvae of benthic invertebrates, like sea urchins, starfish or crustaceans.

Marine invertebrates display a variety of developmental modes. Indirect development with a pelagic larval stage is regarded as the most widely spread developmental mode of benthic marine invertebrates. Meroplanktonic larvae have a high importance in the ecosystems, because the structure of benthic communities is determined by the supply of recruits, transport mechanisms, settlement success and post-larval processes. That is why the understanding of benthic community dynamics without the knowledge of larval ecology is almost impossible.

Meroplankton in the polar regions has been poorly studied. In the last century, the paradigm known as Thorson's rule, which assumed the general scarcity of invertebrate larvae in polar regions was established. However, recent research has revealed that there is a great variety of larval forms and types in the Arctic and Antarctic waters.

What is more, polar regions are the most influenced by ongoing global change. Increasing water temperature, will have an impact on water mass transport, thus on meroplankton, as the metabolism of marine invertebrates is temperature-dependent, changes in sea water temperature may influence their reproductive cycles.

Ready, steady, germinate!**Zofia Smola¹, Clara Hoppe², Eva Leu³**¹*Institute of Oceanology, Polish Academy of Sciences, Polar Studies KNOW (Leading National Research Centre), Poland*²*Alfred-Wegener-Institute for Polar and Marine Research, Germany*³*Akvaplan-niva AS, Science Park, Norway*

One of the most important limiting factor for primary producers growth in polar regions is specific light regime with dark period during polar night. During winter in water column scarce autotrophic protists exists. However every spring, those organisms forms blooms – main source of new organic carbon for polar ecosystems. For many years there was no clear answer to the question, from where autotrophic protists come from in pelagic ecosystem when the Sun returns above horizon. Little is known how microalgae survive unfavorable conditions, about its physiology and mechanisms indicating germination after dark period.

Some protists can survive no light period in form a resting stages (cysts or spores). Some of them can wait for suitable conditions in viable form for more than two years buried in sediments. To investigate whether buried in sediment autotrophic protists are able to germinate after light return and if yes – what environmental condition initiate Spring bloom, preliminary experiment in Ny-Ålesund, (Spitsbergen) was conducted during polar night.

In course of experiment, surface layer of bottom (200m) sediment of Kongsfjorden was incubated in different photoperiods and light intensities. During more than three weeks incubation, development of protists assemblages was measured. The biomass (chlorophyll *a* concentration), photosynthetic yield development, primary production and species composition evaluated.

Results indicated that light intensities about 50 $\mu\text{mol photons m}^{-2} \text{ s}^{-1}$ triggered development. Although we collected living microalgae cells containing photosynthetic pigments, the measurements of primary production (C^{14} method) in situ do not confirm carbon assimilation. Abundant presence of cells and cysts in sediment in turn, confirms the hypothesis about this type of microalgae survival strategy. Whereas growth of photosynthetic activity and yield in the relatively short and

limited (presence of mineral particles in cultures) light exposition, suggest that phytoplankton is able to take active growth shortly after improving light conditions.

Soil and feces as a valuable source of information about Arctic ecosystem.

Sylwia Zielińska¹, Dorota Kidawa², Lech Stempniewicz², Marcin Łoś¹, Joanna M. Łoś¹

¹Department of Molecular Biology, University of Gdansk, Poland

²Department of Vertebrate Ecology and Zoology, University of Gdansk, Poland

Arctic ecosystems are highly vulnerable to ongoing environmental changes and it depends significantly on nutrient subsidies provided by seabirds breeding in large colonies. As they forage at sea and nest on land, they transfer large amounts of organic matter of marine origin, which affects soil chemistry, microorganisms as well as tundra plant and animal abundance.

Direct extraction of DNA from environmental samples can deliver information about microorganisms inhabiting soil and feces of herbivores living in the Arctic. It allows comparison of soil bacteria associated with area influenced by large breeding colony of little auks with topographically similar location but away of the routine flight route of seabirds. It can also provide a comprehensive view of the fecal microbiota of Svalbard reindeer population. Based on reindeer fecal samples, detection of Shiga tox-in genes can also be performed. Individual identification of reindeer and the analysis of male-specific DNA can be performed on the basis of genetic content of each sample, which can lead to collection of more detailed information about this endemic population.

Soil and feces can constitute a valuable source of information in the context of microbiological aspects, providing information about changes in physicochemical parameters of soil and changes in animal structure. This provides a valuable information about the Arctic ecosystem functioning.

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Pelagic hydrozoan as indicators of climate change - Nordic Seas case study.

Maciej K. Mańko¹, Sławomir Kwaśniewski², Agata W. Weydmann¹

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Climate change, driving World Ocean warmer and warmer, has the most profound effects in the polar regions, especially the Arctic Ocean. Increasing water temperature affects diverse aspects of organisms biology. To respond to such ecosystem alterations, organisms can either adapt and thrive (when they are warmth-loving) or retreat (when they prefer cooler conditions). Assuming such reactions, it seems possible to detect spatial patterns in organisms distribution shifts, in relation to climate change.

Marine plankton constitute good indicator of climate change, particularly, because of lack of anthropogenic impact on populations, short-lasting life cycles and limited swimming capabilities, making their dispersal primarily dependent on drift of ocean currents. Simultaneous studies of all planktonic taxa create many methodological challenges, therefore it is often more practical to choose the focal group for such a study.

Here we used the pelagic hydrozoans that are known for their mass occurrences and high predatory impact, resulting in their significance in structuring pelagic trophic webs and ecosystem functioning.

We applied analyzes of hydrozoans spatial diversity, as a tool for characterizing the directionality of climate change impact in the Nordic Seas and up to the Arctic Ocean. Supported with long-term data, we validated usage of these organisms as *in situ* indicators and predictors of future changes in water mass distribution and ecosystem modification patterns.

V Session: Social sciences

Session Chairs: Dorota Majewicz

Extracurricular marine education at the Gdynia Aquarium – helping to create a more environmentally aware society.

Dominika Wojcieszek, Weronika Podlesińska, Grażyna Niedożytko

National Marine Fisheries Research Institute, Gdynia Aquarium Education Center, Poland

In its 45-year history the Gdynia Aquarium of the National Marine Fisheries Research Institute evolved from a local Marine Museum with few small collections to the largest marine life exhibit in Poland. It has also developed the largest informal Education Center in Poland that offers extracurricular marine education – one of the most unique programs in the country. The mission of the Center is to promote environmental awareness, and ocean literacy, as well as educate about the most pressing environmental issues. We provide classes for over 35000 students per year, and a number of special events open to the public.

Currently, many students in public schools don't have access to biological samples and well equipped labs, and therefore have limited resources in the realm of environmental education. For those students our educational offer is the only opportunity for hands-on experience in marine science, as well as a chance to learn about the environmental issues in the global ocean. Our classes provide a unique opportunity to observe, and learn about animals from the Baltic Sea and other regions of the global ocean such as coral reefs. Shrimp, herring, starfish, and stony corals are just a few examples of biological samples that the students can touch, observe or even dissect in our classes. Such hands-on experiences arouse curiosity and help create a bond between the youth and the natural environment, which is the first step towards building their environmental awareness.

The cognitive training with the game “Kalkulilo” and mathematical abilities in children – the preliminary results of a pilot study.

Magdalena Kmicik^{1,2}, Łukasz Goraczewski², Jacek Matulewski^{2,3}, Małgorzata Gut¹, Karolina Finc², Agnieszka Ignaczewska^{1,2}, Julia Stępińska^{1,2}, Bibiana Balaj², Joanna Dreszer^{1,2}, Jakub Majewski^{2,3}, Ewelina Bendlin^{2,3}, Piotr Cholewa^{2,3} and Włodzisław Duch^{2,3}

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The cognitive benefits of playing video games are widely proved in the scientific literature and the use of computer technology to support learning has become popular. Also several studies on the effect of this type of intervention methods on mathematical abilities provided promising results showing the positive outcomes of using computer-assisted intervention, including counting skills, recognizing of numbers as well as spatial-numerical relationship. The aim of our study was to examine the effect of training with the use of computer mathematical game “Kalkulilo” on such mathematical abilities as numerosity assessing, number magnitudes comparison with the use of different formats of displayed numbers (Arabic symbols and dots patterns) and localization of numbers on the number line. Ten children aged 5-10 participated in the pilot experiment. We found that training using “Kalkulilo” game did not improve accuracy in any condition of number magnitude comparison task. However, after training we observed a reduction of response times in case of numbers presented in different formats (i.e. when dots vs. digits were compared). No similar significant differences were found for numbers displayed in the same formats (digits vs. digits, dots vs. dots). This result may suggest that cognitive training using “Kalkulilo” supports the automatization in the processing of mental representations of numerical magnitudes. Hence, this cognitive ability may strengthen the number sense.

Is it worth to be delisted?

Adam Ambroziak, Marta Derylo

*Poznan University of Economic and Buisnes, Poland
Faculty of Management, University of Gdansk, Poland*

Initial Public Offering (IPO) on the stock exchange is perceived as the stage of the development of the company. It involves gaining access to sources of financing so far unavailable to the entity, and is connected with different challenges and threats. Moreover, the IPO is possible after experiencing a procedure enabling the introduction of shares to the trade on the stock exchange market.

Meanwhile, since 1997 every year a few to a dozen companies are delisted (in 2002-2003 it was 19 entities per year). To date, a total of 189 companies have left the Polish stock exchange. It also has implications for the shareholders who have in possession shares of such companies.

The Authors put the question why this happens and what benefits are connected with delisting.

In this work an identification of the reasons of delisting of the companies from the Warsaw Stock Exchange will be made. Benefits associated with this action will also be indicated.

Factorial structure of the social anxiety scale and its relationship with maladaptive perfectionism among Polish students.

Bereznowski Piotr¹, Wiktor Wróbel¹, Atroszko Paweł Andrzej¹

*¹ Institute of Psychology, Faculty of Social Sciences,
University of Gdansk, Poland*

One of the most popular measures of social phobia is the *Liebowitz Social Anxiety Scale* (LSAS; Liebowitz, 1987). The LSAS has been modified to a self-report version (LSAS-SR). The LSAS-SR is a 24-item measure of fear or anxiety and avoidance experienced in social interactions and performance situations. Scoring instructions for the LSAS imply two components: (1) fear or anxiety and (2) avoidance, while exploratory and confirmatory factor analyses yielded better match for 4-factor structure among outpatients in North America: (1) social interaction, (2) public speaking, (3) observation by others, and (4) eating and drinking in public (Oakman et al., 2003; Safren et al., 1999). A self-report version offers ease of administration, but it may differ from the structured interview version in its psychometric properties. The study was conducted on 392 university students (including 248 women and 137 men, 7 participants did not report gender). Mean age was $M = 23.09$ years ($SD = 5.31$). These individuals were studying at the universities in Tricity and Katowice. The factorial structure of LSAS-SR as well as its relationship with maladaptive perfectionism was examined. The results showed that both 2-factor and 4-factor structures have barely acceptable fit to data in Polish student sample. It is suggested that the scale could be shortened to achieve better psychometric properties.

“Putin Putout” – words are a man’s best friend.

Joanna Laszcz

*Institute of Eastern-Slavic Philology, Faculty of
Philology, University of Gdansk, Poland*

On March 18, 2015, Russian President Vladimir Putin and Russian singer Lari-sa Dolina sang the national anthem in central Moscow. Nearly a year later Slovenian impressionist, artist, performer and musician Klemen Slakonja made a parody version of Putin singing entitled “Putin Putout”. He performed it at Slovenia's Eurovision selection contest on February 27, 2016, and posted this satirical (or even mocking) music video with the song on YouTube, which, according to BBC News, has gone viral across Eastern Europe. In my presentation I would like to explain why this official video has been viewed over 800,000 times in less than two days and today total number of views is about 5,000,000 and answer the question how the influence of political context increases its popularity.

VI Session: Biology and medicine

Session Chair: Artur Nowicki

Estimation of dissolved organic matter flux between bottom sediment and water column.

Marion Lorin

*Sciences et Techniques de l'environnement marin,
Université de Toulon, France*

The Baltic Sea is almost entirely land-locked with limited water exchange through the Danish Strait. There are nine countries around the Baltic Sea, which represent 90 million people living along the coast. In addition, the Baltic Sea supports 15% of the world maritime traffic. It is one of the most polluted seas in the world because of the problems of eutrophication. Eutrophication is caused by the anthropogenic pressure like urban and agricultural rejections which leads to the water's enrichment in nitrogen and phosphates. Eutrophication can drive to modification of chemical balance of sea water as well as plankton and fish populations. Organisms are also affected by pollutants, radioactive substances originating from the Chernobyl fallout as well as chemical weapons and munitions deposited after the WWII at the Baltic Sea's bottom. Its special geographical, oceanographic, and climatological characteristics turn the Baltic ecosystem highly sensitive to the environmental impacts of human activities.

The oceanic DOM plays crucial ecological and biogeochemical roles as one of the most important stock of active organic carbon on Earth. In fact, it is at the base of food chain and absorbs the UV solar radiation which can protect the phytoplankton biomass (which produce 50% of dioxygen on Earth) and trap heat in the first meters of the column water.

How measure DOM? With which instruments and what information can it bring us? Description of experiment (photos from cruise, lab measurements) and preliminary results will be presented.

Virus like particles as a platform for universal anti-influenza vaccine.

Jan Węslawski

*Intercollegiate Faculty of Biotechnology, University of Gdansk and Medical University of Gdansk,
Laboratory of Recombinant Vaccines, Poland*

Influenza virus is not only a major human pathogen, causing hundreds of thousands deaths every year, but also a serious economic problem as it infects poultry. Potential pandemic outbreaks like so called *Spanish flue* which invaded Europe in 1918, killing millions of people are still a threat. Due to extremely high variability of the virus, only seasonal vaccines are available. Determination of the strain which will circulate particular year is very demanding task. Moreover, production of conventional vaccines is time-consuming and expensive, that's why novel methods are required. One of the possibilities are virus like particles.

Virus like particles (VLPs) consist of full or partial viral capsid resembling functional pathogen, but are deprived of the genetic material which makes them completely unable to cause infection. Broadly used example of this technique is *Norovirus*, member of the *Caliciviridae* family. Its protein VP1 is able to spontaneously form full size capsid, even in the absence of viral genome. What's more, genetic engineering makes it possible to expose on the surface of the capsid antigens from other pathogens. Basic gene cloning techniques, and modern protein expression systems such as *Baculovirus expression system*, could help to produce fast, safe and inexpensive vaccines against specific antigen. This could allow to react quickly to an outbreak of particular pathogen such as influenza.

The level of mitochondrial DNA in fibroblasts from patients with Huntington disease.

Natalia Sowa, Paulina Jędrak, Sylwia Barańska, Grzegorz Węgrzyn

Department of Molecular Biology, University of Gdansk, Poland

Huntington disease (HD) is a genetic disorder caused by a mutation in a huntingtin gene (*Htt*), leading to expansion of CAG repeats in the gene and formation of an abnormal huntingtin protein. The mutant Htt protein, due to impaired degradation, tends to accumulate and aggregate. Huntington disease affects not only the nervous system but also peripheral tissues, for example fibroblasts. The main suppliers of cellular energy, mitochondria, are also impaired in HD. Mitochondria as semi-autonomous organelles have their own DNA. The ratio of mitochondrial (mtDNA) to nuclear DNA (nDNA) is often used as a biomarker of mitochondrial dysfunction. Estimation of mtDNA copy number per cell can be obtained by quantitative real-time PCR.

The aim of the present study was to determine the level of mtDNA in fibroblasts obtained from HD patients and healthy controls by real-time quantitative PCR.

Material was collected from 6 persons who carried the mutation in the huntingtin gene on different stages of the disease progression and 6 healthy volunteers as a control. Total DNA was extracted from cells at two different passages (9 and 15). Two pairs of primers were used in real-time quantitative PCR to confirm obtained results of mtDNA level.

Our results indicate that level of mtDNA differs among fibroblasts of different passages but there is no difference depending on the two pairs of primers.

Human changes of lobelia lakes - the most precious polish water bodies.

Alicja Robioneck, Krzysztof Banaś

Department of Plant Ecology, University of Gdansk, Poland

Lobelia lakes are especially valuable, due to presence of rare plant species and specific environmental conditions. They are oligotrophic lakes with macroflora dominated by isoetids. Lobelia lakes are very rare in W Europe, whereas in N Poland they are more frequent (ca 190). The clear water makes them recreationally attractive. In view of the soft-water conditions (poor and acidic water) they are peculiarly susceptible to anthropopressure.

Both the species and the water bodies itself are protected, including parks, reserves, Natura 2000 areas. Despite of various forms of protection, these lakes are subject to very strong transformations, and the unique vegetation is dying out. Only 20% of polish lobelia lakes are in good state of preservation. During last century at least 60 lakes lost its specificity and are included in the so-called old (degraded) lobelia lakes.

A part of lobelia lakes (20%) are subject to humisation, that is enriching in humic substances, causing coloration and acidification of water. Other 20% are eutrophic – enriched with nutrients. Next 20% are extensively used for fishing and angling. Finally, 20% are recreationally over-used. Often various anthropogenic pressures affect one lake, which enhances the harmful effects.

We are not able to protect this precious and rare group of lakes. It is necessary to revise the protection methods for increasing their effectiveness. It is especially important in light of climate changes and decrease of water resources.

Habitat preferences of singing males of the common rosefinch *Carpodacus erythrinus* in Żuławy Elbląskie.

Zuzanna Pestka

University of Gdansk, Faculty of Biology, Department of Vertebrate Ecology and Zoology, Poland

The aim of the current study was to investigate the habitat preferences of singing males of the common rosefinch *Carpodacus erythrinus* in Żuławy Elbląskie (N Poland) in the Drużno Lake nature reserve area.

The common rosefinch is a small passerine bird associated in breeding season with wetlands, wintering in South Asia. Males of the common rosefinch defend their singing posts against rivals.

Singing males were counted along transects (total length 32 km), based on regular controls throughout the whole breeding season. Locations of singing males were marked with the GPS receiver. Age of males and place of sing were also recorded. To examine habitat preferences multivariate analyses were performed - proportions of habitat types were compared between singing posts and random plots.

In total, 238 of singing males of the common rosefinch were observed. The average density was 1.5 male/km of transect (range 0.1-5.9). Males' singing posts were mainly situated in willows and black alders. The habitat characteristics of singing posts were significantly different from random plots. Studied species preferred bushes, rivers, reed beds and wet willow shrubs and avoided open agricultural landscape, anthropogenic areas and lake.

The current research confirmed preference of the common rosefinch to wetlands. Moreover, it showed that Drużno Lake nature reserve is characterized by high density of breeding population of this species compared to other regions of Poland and Europe.

Poster presentations

1. The differences of atmospheric conditions between fjords: Porsanger, Hornsund and Kongsfjord.

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The potential for multiple feedbacks between climate and ocean processes has been confirmed by recent data sets and models, but many aspects of such interactions are still not well understood. The studies of the Arctic should be focused on climate-sensitive regions and climate-sensitive aspects of this environment. In the presentation, there were discussed long-term changes in air temperature (AT), humidity (H), wind speed (WS) and direction (WD) in the three Arctic fjords: Porsanger, Hornsund and Kongsfjord.

To compare meteorological conditions in different stations there have been used data from those three meteorological stations. The data were provided by the Norwegian Meteorological Institute. In this presentations, it has been estimated the multiyear trends of air temperature and humidity based on one per day data measured always at the same hour. Additionally, we have estimated the trends using three per day data, always at the same hour in every station. The trends presented in this study have been calculated using linear regression analysis (statistically significant at 95% confidence level).

In addition, we have carried out a statistical analysis of the last 10-year time-series of AT, H, WS and WD with hourly resolution. There has been used these data to show seasonal variability and differences between fjords. To compare all results there have been discussed how climate-related trends and atmospheric conditions were changing in time and seasons of the year.

2. The application of high performance liquid chromatography coupled with mass spectrometry for non-targeted and targeted screening of drugs and psychoactive substances in biological samples.

Justyna Aszyk, Agata Kot-Wasik

Department of Analytical Chemistry, Faculty of Chemistry, Gdansk University of Technology, Poland

Over the past several years, the number of non-controlled psychoactive substances also called “legal highs” or “designer drugs” constantly emerging on the illicit Internet drug market has tremendously increased. The spreading of new psychoactive substances (NPS) throughout many parts in the world has become an issue regarding health particularly of young people. The identification of large number of new continuously and increasingly appearing designer drugs on drug market is challenging due to their fast transience on the drug scene and states currently as a major priority for forensic laboratories [1].

Non-targeted screening of drugs present in biological samples was accomplished with the use of high pressure liquid chromatography coupled with quadrupole time of flight mass spectrometry (HPLC-Q-TOF-MS). In total, 30 therapeutical drugs and psychoactive substances/metabolites were detected in investigated biological specimens. We demonstrate that the HPLC-Q-TOF methodology seems to be a powerful tool in qualitative non-targeted analysis applied in identification of designer drugs, thus enabling a laboratory to stay-up-to-date with the drugs that are being sold as legal high products on black market. Additionally, targeted analysis involving use of HPLC-MS/MS for the determination of two designer drugs available on black market was performed.

[1] Fattore L, Fratta W (2011) Front Behav Neurosci 5:60

3. How to see what can be seen in a fjord? Field bio-optical experiment in Porsangerfjorden (Norway).

Jagoda Bialogrodzka

*Marine Biophysics Laboratory, Marine Physics
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Academy of Sciences, Poland*

Color of the sea depends, aside from the geographical situation, on many temporary factors. Season, time of the day, presence of clouds or waves – that are the external conditions which can influence the color of seawater. But it is also determined by everything that is in the water – living and non-living, suspended and dissolved – all such components affect what can be seen in a color photo of the sea. To “measure” that color one can use satellite observations – peek at the sea surface remotely, another can go to the seaside and board a ship to watch the sea closer and deeper. By immersion of bio-optical equipment and sampling sea water, scientists analyze composition of sea water, and thus know which component influence color of particular basin the most.

In summer 2014 and 2015 the NordFlux Project team headed for the North to find out the impact of some of the sea water components on the color of Porsanger Fjord (Norway) water. The measurements during cruises were performed at previously set list of stations – for that reason a set of consistent data to be analyzed has been collected. Because of the shape of the fjord it could be divided in three sub-basins, each with different optical conditions.

The results of these analyses will be detailed during the presentation.

4. The influence of parentification on young adult's self-esteem.

Judyta Borchet, Aleksandra Lewandowska- Walter

Institute of Psychology, University of Gdansk, Poland

Parentification is a form of distorted division of the roles and responsibilities in the family. It means reversing the roles between parent and child. The amount of child's responsibilities is excessive in relation to its age or the child takes on adult roles and responsibilities. A child is providing care to his or her caregivers instead of being given concern and attention by them. Parentification may manifest itself in two ways. The first one is emotional parentification, when the child is caring about the emotional and social needs of the family members. The instrumental parentification refers to caring about the family living conditions manifested by manual work that a child gives to his family members.

Parentification may have either negative or positive impact on child's development and future life. Parentification may be seen as an act of emotional violence because a child overwhelmed with the family duties of an adult person is not able to perform his or her own developmental tasks and simply enjoy the childhood. On the other hand, parentification may be beneficial when it gives a child space to develop self-reliance without excessive emotional or physical burden.

According to Rosenberg's theory, people express their attitudes towards various objects and Self is also one of them. Therefore, self-esteem is generally defined as one's attitude to himself/herself - the positive or negative attitude towards 'Me'. Accordingly, self-esteem is a subjective construct based on perception and self-assessment. Due to Rosenberg, high self-esteem means that someone considers that it he/she is 'good enough' rather than someone feels better than others. In turn, low self-esteem according to Rosenberg is understood as rejection of Self and dissatisfaction with themselves.

The aim of presented research was to define the relation between the direction of parentification (towards siblings or parents), its perceived benefits and self-esteem. There were 264 late adolescents who voluntarily took part in the research. In order to evaluate parentification they filled in experimental version of polish adaptation of Hooper's Parentification Inventory made by Lewandowska-Walter and Borchet (2015). The polish version of Rosenbergs's Self-Esteem Scale by Łaguna, Lachowicz-Tabaczek and Dzwonkowska (2007) was used to evaluate self-esteem.

5. Sulforaphane activates autophagy via AMPK-mTORC1-S6K1 pathway in normal human fibroblasts.

Joanna Brokowska, Anna Herman-Antosiewicz, Aleksandra Hac

Department of Molecular Biology, University of Gdansk, Poland

Autophagy is a process of lysosomal degradation of bulk cytoplasmic contents, protein aggregates and excess or damaged organelles. Autophagy activation is attributed to beneficial effects of caloric restriction and exercise on human health as well as improvement in the metabolic conditions in obese individuals. At the molecular level such conditions induce autophagy via activation of AMP-activated protein kinase (AMPK). It was demonstrated that in cancer cells autophagy can be induced by sulforaphane (SFN), a natural agent present in cruciferous plants. However, little is known about its impact on normal, non-cancerous and non-immortalized cells. Therefore, we investigated the effect of SFN on the induction of autophagy in normal human dermal fibroblasts (HDFa).

Our study reveals that SFN efficiently induces autophagy in HDFa cells which is accompanied by an inhibition of a major negative regulator of autophagy, mTORC1. It is evidenced by a drop in phosphorylation of its substrates, Ulk1 and S6K1, as well as S6 protein, and block in protein synthesis. Activation of autophagy and mTORC1 inhibition is preceded by activation of AMPK kinase, a known inhibitor of mTORC1 and thus autophagy activator. Interestingly, treatment with SFN allows to reduce the level of exogenous mutated huntingtin in HDFa cells which might result from autophagy induction.

Concluding, our study shows that SFN induces autophagy as well as inhibits protein synthesis in fibroblasts via modulation of AMPK-mTORC1-S6K1 pathway and suggests that SFN can be used as potential therapeutic in diseases characterized by dysregulation of these processes.

6. Geological structure and hydrogeological conditions of Olsztyn city in the context of heat pumps performance.

Emilia Bubliewska, Anna Porążyńska, Żaneta Kłostowska

University of Gdansk, Institute of Oceanography,
Poland

The combustion of fuels classified as conventional energy is currently the main source of energy in Poland. Conventional fuel resources are limited, however, the possibility of total use is not the main threat to humanity, it is pollution. Through membership in the European Union Poland was forced to significantly increase the share of renewable energy in total energy consumption.

The only known device allowing the use of low-temperature energy is heat pump. The primary role of the pump is the absorption from low temperature source heat and submit it to the source of the higher temperature. The study is based on data obtained for the capital city of Warmia and Masuria region, Olsztyn.

Paper proposes and describes optimal geological and hydrogeological conditions that are required to use heat pump systems easily and economically as well as those that can be expected in Olsztyn and its immediate surroundings. Based on the analysis of 39 drilling and 8 heat pumps projects a zone map which described the usefulness of exploitation of heat pump systems was created. Power of thermal installation depends on conductivity and heat capacity of rock. The worst ground conditions occurring the city of Olsztyn have dry sandy-gravel deposits, better clay-loam grounds. Watered deposits have better resource sustainability. Occurrence of deposits which can be used in low-enthalpy geothermal energy is common in conditions of Olsztyn area.

7. The use of membrane separation in the protection of the aquatic environment.

Arkadiusz Drost, Filip B. Harasimiuk, Arkadiusz Nędzarek

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In drinking water treatment are mainly used membrane techniques, which is the driving force of the pressure difference across the membrane, but are taken into account also other processes such as electrodialysis, and Donnan dialysis. Choosing the right membrane process depends on the size range occurring and removed from the water impurities and additives. Membrane techniques can be used to remove contaminants from the water as a stand-alone processes or in conjunction with a supplementary process unit, to form a purification process line. Integrated processes / techniques including hybrid membrane is used to treat drinking water and wastewater treatment in combination with coagulation, adsorption on activated carbon, oxidation or membrane bioreactors. The presented results related to the possibility of removing heavy metals from water using membrane techniques. The experimental work was associated with the use of ceramic membrane with cut-off of 450 kDa. Heavy metals are one of the most dangerous contaminants found in drinking water. They are removed from the waste water using processes which could include the coagulation-sedimentation-filtration, adsorption, chemical precipitation, ion exchange, solvent extraction classical and others. More often, to remove heavy metals from the aqueous medium used on an industrial scale membrane techniques: reverse osmosis (RO), nanofiltration (NF), ultrafiltration (UF) and electrodialysis (ED), and liquid membranes. The use of high pressure techniques membrane (RO, NF) and electrodialysis (ED) for removing metals from an aqueous medium is related to the fact that the membrane used therein immediately stop the dissolved salts containing heavy metal ions. Studies of heavy metal removal by RO and NF showed that the removal efficiency of heavy metals by each RO is high and amounts to 98 - 99%, while in the NF average more than 90%. Separation efficiency depends strongly on the energy of hydration and the nature and valency of the cations of heavy metals, as well as the applied pressure and pH. Experimental studies covering the use of ceramic membrane process to remove Zn, Cu, Fe. During testing, a reduction in the retention of 74%, which indicates the possibility of removing metals from aqueous matrices.

8. The role of *orf61*, *orf73*, *ea22* and *ea8.5* genes from the *exo-xis* region in the development of λ and $\phi 24B$ phage mutant.

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Enterohemorrhagic *Escherichia coli* strains are carriers of genes coding for Shiga toxins, which are located in genomes of lambdoid prophages. Their genomic organization and lifecycle are similar to phage λ , which is the best investigated member of lambdoid phages family.

Pathogenicity of EHEC depends on lambdoid prophage induction and subsequent production of toxins. In this report, we would like to point out the region between *exo* and *xis* genes of phages λ and Stx phage - $\Phi 24_B$, which function is not yet clear.

Our previous results presented evidence for the relation between the *exo-xis* region and phage development. In the light of this, we decided to determine the role of the deletions of *orf61*, *orf73* and *ea22* and *ea8.5* genes from the *exo-xis* region in the development of recombinant lambdoid phages. The recombinant prophages were constructed by homologous recombination using the λ Red system.

The deletions of *orf73* and *ea22* gene resulted in a decreased efficiency of lysogenization by tested mutants of phage $\phi 24B$. Interestingly, higher number of cells survived after infection of phage $\Phi 24_B$ bearing the deletion of *orf61* or *ea22* gene. Moreover, the deletion of the *ea8.5* gene resulted in earlier induction, while *orf61* and *orf73* delayed the induction of λ prophage after treatment with mitomycin C. Surprisingly, all tested deletions resulted in a delay in prophages inductions with H_2O_2 and faster initiation of their lytic developments with use UV-irradiation.

9. Assessment of inorganic compounds in the Toulon's Bay.

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The Toulon's Bay is situated in the north of the Mediterranean Sea. It is divided in two different parts the Small and the Large bay. The Small Bay is surrounded by military harbour (the second largest of France), a tourism harbour and cities. It is also cross by bus-boat lines to link cities on each parts of the Small Bay. The Large Bay is separated from the small one by a sea wall and connected on the south with open waters of Mediterranean Sea. Along the Toulon's Large Bay coast, smaller towns live thanks to tourism.

The Biogeochemical properties of Toulon's Bay are driven by anthropogenical activity and the hydrology, what implies high influence of pollutants such as metals, nitrates and phosphates on the marine environment.

This work presents the sampling method and the analytical tools which are use by the PROTEE laboratory to study the metals, nitrates and phosphates into the sea water. Finally, a spatial distribution of inorganic compounds in Toulon's Bay will be show.

10. Otoliths microstructure of larval pike (*Esox lucius* L.) - record of early life history .

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Pike (*Esox lucius*) is one of the most valuable predatory species for fisheries and angling in lakes, rivers, and in the coastal zone of the Baltic Sea. It also plays an important ecological role in regulation of the smaller fish species populations. Despite the prevalence in occurrence, Baltic Sea populations of the northern pike have declined since the 1990s significantly. The reasons for this are irrational fishery, poaching and the destruction of coastal zone, which is of crucial importance for spawning of the species. Particularly important for maintaining individual fish populations are processes occurring in spawning period, at hatching, and during the first weeks of life. Mortality of early life stages of fish can be up to one hundred percent. Hence the need to research the ecology of early life stages of pike and the need to find appropriate tools. One such tool is the analysis of the microstructure of otoliths, which allows to get the information on age, date of hatching, growth, condition, and migration of larvae and juveniles. Currently, we begin a study to determine the effect of environmental variables on the growth, condition, mortality and cannibalism of pike larvae in experimental conditions. Apart from the above ecological issues, we intend to verify the frequency of microincrements deposition on pike larvae otoliths. The present work provides introduction of the subject and first results of the otolith microstructure analysis.

11. From registered inhabitants towards urban civic stakeholders.

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The environment around us is changing rapidly. It is particularly noticeable in urban settings. We have to face the problems we did not know so far. In the context of the transformation of modern cities where most of population already lives, the essence of problem is not just the increasing number of people but their movement. Massive growth of mobility is one of the major challenge that current urban policy have to deal with nowadays.

The issue is particularly complicated as cities still have to struggle with outdated administrative borders and obsolete urban policy, which does not correspond to the current social relations. With the increasing number of population in cities and intensified migration processes we have achieved a situation in which our cities are inhabited by thousands of people who are deprived with a right to be a part of urban community, because they do not have legal right to participate in it. This disjuncture between legal citizenship and current daily life need to be restructured.

Who has a legal access to be called as a citizen? Who is now an urban citizen? Who has the right to the city? Should citizenship still base on the law regulation only? Are the current conditions appropriate and sufficient? And where our cities are heading? Those are the question that need to be put in global urban discurs.

12. Influence of ClpB protein on the survival of *Escherichia coli* treated with thyme oil.

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Thymus vulgaris (common thyme) is the plant known in ancient and mediaeval days due to its medicinal properties. It was used as a fumigator to cure respiratory infections and as a great source of the concentration improving invigoration. Results of many studies confirm the antibacterial, antiviral and antifungal properties of thyme oil.

ClpB protein belongs to the family of heat shock proteins. It requires cooperation with the DnaK/DnaJ/GrpE chaperone system and plays a key role in the reactivation of aggregated proteins in bacteria during stressful conditions.

The aim of this project is to determine the effect of ClpB protein on the survival of *E. coli* treated with thyme oil.

Thyme oil was obtained by steam distillation using the Deryng apparatus. The distillation of 630 g of thyme herb resulted in 12 mL of thyme oil.

The MIC (Minimal Inhibitory Concentration) values for the *E. coli* MG1655 (control strain) was 0.042 mg DW/mL and 0.053 mg DW/mL (culture in liquid and on solid medium, respectively). The *E. coli* MG1655ΔclpB strain MIC values were 0.021 mg DW/mL and 0.026 mg DW/mL. In addition, a 10-minute culture of the *E. coli* MG1655ΔclpB strain showed significantly lower survival rate (of 25-30% compared to the control strain).

The results suggest that ClpB protein is important for the survival of the bacteria treated with thyme oil. This may be due to the chaperone function of ClpB and/or its disaggregation properties both restoring the proper conformation of stress aggregated proteins.

13. Physical and chemical parameters of groundwater in Hel area.

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The aquifers on spits are not rich in water. They have the shape of a lens of freshwater, which are supported by salted sea water. Their supply is held by the infiltration of rainwater. The research has been subjected to the first aquifer in Hel on the Hel Peninsula. Monitoring groundwater chemistry is extremely important, because of their exploitation and later use. This layer is very specific because it is under a lot of pressure from natural factors (precipitation, evaporation) and anthropogenic. The main factor influencing the susceptibility to changes in physical and chemical parameters is small depth of the mirror and the free water-table groundwater. Samples of groundwater of the first aquifer (Holocene) were taken in the years 2015-2016 with a piezometer located at the Marine Station of the Institute of Oceanography in Hel. The water samples were subjected to chemical analysis to determine the content of the main ion (HCO₃⁻, NH₄⁺, Mg²⁺, Mn²⁺, Ca²⁺, Fe²⁺, Cl⁻, F⁻, SO₄²⁻). Analysis of the different parameters was performed using spectrophotometric techniques, which are based on the quantitative measurement of the transmission or reflection of light through the sample. On the basis of data made balance ion and statistical analysis. The effect of precipitation and evaporation was observed in each month for the supply of the Holocene aquifer, which is related to the depth of the water surface.

The keywords: Hel Peninsula, Holocene aquifer, lens of freshwater, pollution, ion balance

14. Characteristics of fatty acid content of selected species green algae and their potential use in mass cultures.

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Microalgae are a rich source of compounds used in various fields of biotechnology. At present research is focused on the characteristics and fatty acid content in different species of microalgae that have the potential to give rise to the next generation biofuel. However, knowledge of the content of these compounds in the Baltic microalgae is still insufficient (Gram et al. 2014). The main objective of this study was to determine and compare the rate of cell growth and fatty acid composition of the elected representatives of the Baltic green algae and the indication of the species with the greatest potential for commercial use. The material used in the experiments were the Baltic strains of green algae that has been isolated from natural assemblies waters of the Gulf of Gdansk. Currently, these strains, as monocultures are held in the Culture Collection of Baltic Algae (CCBA) located in the Laboratory of Plant Ecophysiology Marine at the University of Gdansk (Latała 2003; Latała et al. 2006).

The results demonstrated that the species with the most optimal growth rate and the content of fatty acids in the cells were: *C. vulgaris* and *Monoraphidium* sp. The research results can provide an important contribution to the knowledge on the fatty acid content of the Baltic green algae, which will be able to in the future, used for the production of biofuels.

15. Characteristics of growth rate and lipids content in the selected species of green algae and their potential use for biofuel production.

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Keywords: green algae, lipids, biofuel production

Microalgae are a rich source of compounds used in various fields of biotechnology. At present research is focused, among others, on the characteristics of fatty acid profile and lipids production rates in various species, pointing at those that have the potential to be used for commercial purposes. Therefore, the main objective of this study was to determine and compare the growth rate and lipids content of selected representatives of green algae to indicate strains with the greatest potential for the biofuel production.

Green algal strains used for this study were isolated from natural planktonic communities of the Gulf of Gdansk. Currently, they are maintained, as monocultures in the Culture Collection of Baltic Algae (CCBA) at the University of Gdansk. The total number of 17 strains was analyzed and their growth rate and lipids content during the exponential growth and in the stationary growth phase were determined.

The results demonstrated that among analyzed species there were three outstanding strains, namely: *Chlorella vulgaris* BA80, *C. vulgaris* BA167 and *Monoraphidium* sp. BA165. Those strains did not show the highest lipids content per cell (i.e. 2.48 pg cell⁻¹, 4.89 pg cell⁻¹ and 6.26 pg cell⁻¹, respectively, as comparing to e.g. *Oocystis submarina* BA1 with lipids content of ca. 16.2 pg cell⁻¹), but with the highest growth rates their overall lipids production (i.e. 75.90, 80.53; 81.13 mg lipids L⁻¹ culture, respectively) was most effective.

16. A/T-rich sequence boundaries and transcriptional slippage effectiveness .

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By using NGS approach we have analyzed the polymorphism of a T7 RNA polymerase-generated mRNA of *mbolIM2* gene. We have found that RNA polymerase exhibits relatively high level of template-dependent transcriptional infidelity (RNA editing). The multiple insertions in A- and T-rich tracts of homopolymers in mRNA cause the epigenetic changes resulting in site-dependent rescue of a single or even double InDel frameshift mutants. It increases the repertoire of phenotypic variants. Moreover, the production of the mixture proteins consisting of functional and non-functional variants creates a heterogeneous pool of proteins of almost the same molecular mass, indistinguishable to each other upon ordinary analysis. 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 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 in gene overexpression potential system based on bacterial host *araBAD* arabinose operon has relatively low ability to repair mutations by editing mRNA and thus may be the system of choice in all such cases, when interpretation of the behavior of cells treated as null controls of the given experiment must be clear.

17. The influence of hydrostatic pressure on sorption process of pentachlorophenol (PCP) on marine bottom sediments.

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Pentachlorophenol (PCP), and its salts and esters, is included to the persistent organic pollutants (POPs) group characterized by a strong sorption on solid particles and ability to bioaccumulate (Stockholm Convention 2001, United Nations Environment Programme 2015). The sorption phenomenon, of this hardly water-soluble substance, is one of the most important processes influencing its movement in the marine environment.

The research was undertaken to investigate the sorption process of PCP, initially on a laboratory model of bottom sediments. The test results made it possible to follow the changes in the concentrations of PCP in bottom sediments core at atmospheric pressure.

In the second part of the research the main goal was to evaluate the influence of hydrostatic pressure on the sorption process. In reference to the dangerous substances from the group of POPs, such as dioxins, dioxin precursors (pentachlorophenol, polychlorinated biphenyls) and organochlorine pesticides, the impact of this phenomenon is not efficiently recognized. This research was made possible thanks to the cooperation with the Department of Underwater Works Technology of the Polish Naval Academy of Gdynia, where experiments in hyperbaric chamber were conducted. The increased pressure of 5 bars was applied; which is equivalent to the hydrostatic pressure at the depth of 50 meters. Variables were also physico-chemical parameters of sediments and dosed concentration of PCP.

18. Allelopathic effects of *Synechococcus* sp. on blooms of filamentous Baltic cyanobacteria.

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Production of active organic compounds is an important adaptation, by which some cyanobacteria can achieve a competitive advantage over other primary producers (Legrand et al., 2003). It has been proven that changes in the composition and structure of phytoplankton community are due to the different composition of allelopathic compounds affecting various targets organisms (Mulderij et al., 2003).

The main aim of this study was to determine the influence of allelopathic compounds produced by picocyanobacterium *Synechococcus* sp. on growth and pigment contents of *Nostoc* sp., *Rivularia* sp. and *Aphanizomenon* sp. The experiments were conducted on the picocyanobacterium *Synechococcus* sp. and the filamentous cyanobacteria *Nostoc* sp., *Rivularia* sp. and *Aphanizomenon* sp. Allelopathic activity was studied adding the cell-free filtrate obtained from picocyanobacterial culture to the tested filamentous cyanobacteria. Changes in cells concentration was measured after 1, 3, 7, 10 and 14 days of exposure on allelopathic compounds. Moreover, concentration of photosynthetic pigments was analysed after 14 days of experiment.

These studies indicate that Baltic *Synechococcus* sp. affects growth of two of analysed filamentous cyanobacteria - *Nostoc* sp. and *Aphanizomenon* sp. Moreover, statistically significant changes were observed in concentration of chlorophyll *a* in *Rivularia* sp. cells.

According to the latest research, allelopathy is believed to be one of the most important factors by which many of marine algae species are maintaining their domination in environment (Legrand et al., 2003; Gross, 2003). However, its mechanisms are still insufficiently investigated and more research is needed to fully understand this phenomenon.

19. Deletions in the *exo-xis* region effect on the induction of prophage and survival of host cells after infection with regard to λ and ϕ 24B phages.

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The family of lambdoid bacteriophages include bacteriophage λ and Shiga toxin-converting bacteriophages (Stx phages) like ϕ 24B (vb_EcoP_24B). These group of viruses in prophage stage can be found in the genomes of enterohaemorrhagic *Escherichia coli* (EHEC) and after prophage induction produce Shiga toxin, major virulence factor of EHEC. The *exo-xis* region located in lambdoid bacteriophages genomes participates in modulating host genome functions and contains highly conserved genes of largely unknown functions. For bacteriophage λ identified two genes (*ea8.5* and *ea22*) and five open reading frames (ORFs) which four ORFs: *orf60a*, *orf63*, *orf61*, *orf73* are highly conserved sequence in lambdoid bacteriophages genomes (λ and Stx phages exhibit >80% sequence similarity).

We constructed recombinant phages devoid of all genes between *exo* and *xis* (called Δ *exo-xis*) or four ORFs (*orf60a*, *orf63*, *orf61* and *orf73*; called Δ *orfs*). The absence of genes from the *exo-xis* region caused delayed induction of both prophages following stimulation by various agents (mitomicyn C, hydrogen peroxide and UV irradiation). Both types of deletions in this region resulted in changes in efficiency of lysogenization by both ϕ 24B mutants. Survival of cells after phage infection differed between bacteriophages with Δ *exo-xis* and Δ *orfs* mutation. Our results demonstrated that the *exo-xis* region played an important role in the regulation of development of lambdoid bacteriophages, including Stx phages.

20. What future for planktonic communities?

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The Toulon Bay (northwest Mediterranean Sea, central point Lat. 43° 5' N and Long. 6° 0' E) is divided into two basins by an artificial breakwater to protect marine structures from the south-east winds and currents: the western basin (Little Bay) and the eastern basin (Large Bay). Little Bay contains a major commercial and military port, while the outside bays (i.e. La Garonne and Le Niel Bays) are much less affected by human inputs.

The 3-D primitive equation ocean model SYMPHONIE is used to compute the circulation and the evolution due to the hydrodynamics of the planktonic pelagic ecosystem.

The sea water was collected through Niskin bottle with a capacity of 10 liters at a depth of 3 m.

The zooplankton samples were collected vertically from the bottom to the surface, with a plankton net General Oceanic 5125 (0.5m of opening diameter, 2.5 m long, 90µm vacuum mesh) equipped with a flow-meter electronic and mechanical check.

This work highlights the importance of the zooplankton community in Toulon's Bay and its interaction with environmental factors (or response to environmental factors). Crucial questions are being exposed and answered e.g.: What kind of organisms can be found in Toulon's Bay waters? How anthropogenic inputs of Toulon area affect the zooplankton community? How important is the impact of climate change on the Northwestern Mediterranean Sea planktonic ecosystem?

21. Lysosomal degradation of the mutant huntingtin protein in genistein-treated human cells as a novel approach for the treatment of Huntington's disease.

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Huntington's disease (HD) is a genetically determined neurodegenerative disorder. Its main symptoms are dementia and movement dyscoordination. The direct cause of HD is a mutation in the *HTT* gene, coding for the huntingtin protein, causing CAG expansion. Due to appearance of a long cluster of glutamine residues, mutant huntingtin tends to aggregate inside neurons. Currently, there is no effective treatment of HD. One of potential therapeutic strategies involves accelerated degradation of the mutant protein. Genistein, a natural isoflavone, was found as a compound that activates lysosomal biogenesis and activity. In our research, we used human embryonic kidney cells transfected with a plasmid bearing the first exon of the gene that codes for a huntingtin with 74 glutamine repeats. We have shown that genistein increases both the number and size of lysosomes in treated cells. This leads to 4-fold reduction in the number of aggregates of the mutant huntingtin and 2-fold decrease in their volume. Moreover, the amount of total mutant huntingtin is 10-fold reduced in the genistein-treated cells relative to control cells. By increasing concentration of genistein, we observed colocalization of lysosomes and huntingtin aggregates. Finally, we have shown approximately 3-fold increase in cell survival after addition of the isoflavone to cell culture. These results suggest that genistein might be a potential drug for treatment of Huntington's disease.

22. Application of GIS in the elaboration of reinterpretation key of agricultural soil maps to evaluate the transformation of soil erosion.

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The soil cover of young morainic areas is characterized by a high degree of transformation due to accelerated erosion. This process is highly noticeable in hummocky or undulating morainic plateaus used for agricultural purposes. The aim of the study was to use the existing cartographic materials to evaluate the extent and degree of soil truncation.

Soil-agricultural maps (scale 1:25000) were examined. Topographic maps and GIS techniques have been used to prepare digital soil map for 5 areas (1km² for each study area) situated in the highly exposed to potential erosion slopes of the Noteć-Warta ice-marginal valley. The data contained in the soil-agricultural maps were analyzed for information about the sequence of genetic horizons, texture and systematic position of pedons. On this basis, correlation between individual soil contours with predetermined erode stages of clay-illuviated soils and rusty soils was developed.

Application of developed interpretative key enabled the elaboration of soil erosion maps for the analyzed study areas. The largest area of eroded clay-illuviated soils were observed on Trzeciewnica, Dębowa Góra and Ślesin study areas. Therefore the biggest erode stages are correlated with slope and arable land. The results and their preliminary field validation leads to the conclusion that the developed reinterpretation key will be in future a valuable tool in the study of soil erosion within young morainic areas of northern Poland.

23. Spatial fluctuations of calcium carbonate in surface sediments of the Gdansk Basin.

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Calcium carbonate plays a fundamental role in the proper functioning of organisms, which build their shells. By human the main use of calcium carbonate is in the construction industry, medicinally as an inexpensive dietary calcium supplement or gastric antacid or in metallurgy to purification of iron. The aim of study was to determine the spatial variability of calcium carbonate in the surface sediments of the Gdansk Basin. Calcium carbonate in the marine environment are deposit in bioorganic and anthropogenic way. The study was conducted in the area of Gdansk Basin in 2015. Surface sediment samples were collected by using a Van Veen grab sampler, during research cruises. The concentration in samples was determined by using Scheibler's apparatus in the presence of 10% hydrochloric acid. Additionally size distribution and total organic carbon (TOC) were marked. In surface sediments in the basin of Gdansk spatial variability of calcium carbonate were observed. It was conditioned mainly by shells of organisms that live there and proximity of Vistula estuary and pollution which carries.

This study was financed by the Polish National Science Centre (grant DEC 2012/07/B/ST10/04080, 2013–2016).

24. Using two for the price of one: molecular and micromorphological data in plant taxonomy exemplified with family Orchidaceae Juss.

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One may say that taxonomy is one of the most important disciplines in life sciences. Indeed, it provides tools useful for any further research. The knowledge concerning identification and classification of different taxa is essential in many areas of our life, e.g. medicine, pharmacy or agriculture.

Classical taxonomy procedures embrace investigation of morphology of vegetative and generative features, visible to the naked eye or more often by means of light microscope. The rapid development of modern techniques provide other sources of evidences, such as molecular and micromorphological data.

Phylogenetic studies enable creation of the classification which leads to a correct distinction between species. With the methods of molecular biology (nucleic acids isolation, PCR, sequencing) reconstruction of phylogenetics has become a supportive tool for the taxonomy, but also provide more questions for resolving research problems.

Studies conducted since the middle of XX century revealed great diversity of labellar epidermis in many groups of orchids. Such characters as papillae and trichomes could potentially be used to advantage as taxonomic character. The importance of foliar micromorphology is well known and has already been utilized in taxonomy of Orchidaceae. In contrast, SEM studies on labellar epidermis are still quite neglected.

In our research we are looking for proofs of the utility of molecular and micromorphological data as supplementary tools in the classical taxonomy.

25. Allelopathic activity of picocyanobacterium *Synechococcus* sp. on selected microalgae and pelagic larvae of benthic invertebrates.

Amanda Sobczyk, Sylwia Śliwińska-Wilczewska, Jakub Maculewicz, Marek Klin, Adam Latała

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Allelopathic cyanobacteria have been responsible for harmful incidents with severe ecological impacts in many parts of the world. The increasing cyanobacterial blooms are changing the structure of the aquatic communities in the Baltic Sea (Stal et al., 2003; Suikkanen et al., 2005). In this study the influence of allelopathic activity on the green algae *Stichococcus bacillaris* and red algae *Porphyridium purpureum* was investigated by single addition of a cell-free filtrate of picocyanobacterium *Synechococcus* sp. In this work, the influence of allelochemicals on the growth and pigment contents of microalgae was investigated. Moreover, the effect of cell-free filtrate obtained from *Synechococcus* sp. on the survival of pelagic larvae of benthic invertebrates was investigated.

These studies indicated that the picocyanobacterium *Synechococcus* sp. reveals allelopathic activity on the analyzed microalgae and nauplius larvae (*Amphibalanus improvisus*). Addition of cell-free filtrate from *Synechococcus* sp. cultures inhibited red algae *P. purpureum*. The study also showed that *Synechococcus* sp. had no allelopathic effect on growth and pigment contents of *S. bacillaris*. Moreover, these study indicated that the cell-free filtrate influenced on survival nauplius larvae. Our results suggests that allelopathic substances produced by analyzed picocyanobacterium may be a chemical defense to their competitors and predators.

26. Seasonal variability of chemical parameters of seepage water on the selected slopes of the cliff on Polish coast.

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Water is one of the basic, essential elements of the environment in which we live. The environment is not encountered as a pure chemical substance, but the aqueous solution of inorganic and organic compounds derived from natural sources or introduced by anthropogenic factors. Industry and agriculture are considered to be the most important cause of water pollution.

The aim of this study was to locate seepage water of the selected slopes of the cliff on Polish coast, and then to determine their chemistry. One of the tasks was also to nominate potential sources of pollution and to register any seasonal changes in concentrations of the individual substances.

This work provided information on the factors generating processes of landslide on the slopes of the cliff, which information is important in times of general interest in the dynamics of the seacoast. The physical and chemical analyzes of seepage water from the Polish coast cliffs that were carried out allowed us to estimate the degree of pollution in this extremely important area. The study pointed out the main local factors, both environmental and anthropogenic, that influence the chemistry of seepage water.

In 2015-2016 the research was conducted on the cliffs forming the rim of the coast land from both the open sea and the Gulf of Puck. Several series of water sampling were made, and then the chemical composition of material was determined using volumetric methods and the spectrophotometric methods.

The changes that were observed in the concentration of particular components of the tested samples of seepage waters are probably caused by the variability of atmospheric factors.

27. Impact of ionic liquid [BMIM]Cl on microphytobenthos communities of Gulf of Gdańsk in toxicity tests.

Zuzanna Sylwestrzak, Aleksandra Zgrundo, Katarzyna Lejk, Filip Pniewski, Adam Latała

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In aquatic ecosystems, chemically synthesized substances may reduce environmental quality and may influence on ecosystem functionality. Cultures of the whole community are rarely grown and only for specific purposes, for example, ecotoxicological tests. The widespread detection of anthropogenic substances in the aquatic environment has raised concern about their potentially toxic effects on plant microorganisms. The main aim of this work is to provide a toxic effects of ionic liquid [BMIM]Cl on microphytobenthic communities from Gulf of Gdańsk.

Microphytobenthos was collected from experimental panels which were exposed for 14 days in the coastal zone of Gulf of Gdańsk in July 2015. The developed communities were transferred to the laboratory, scraped and homogenized, and then acclimated for 72 h. The effect of [BMIM]Cl at two concentrations were tested for a period of 7 days. To assess of the condition of microphytobenthos communities used indicators such as: abundance, community biomass, concentration of photosynthetic pigments and maximum efficiency of photosystem. A new and rarely use indicator which was used in the study was the change in the shape of chloroplasts in microphytobenthos cells.

During the experiment, changes in the structure of communities, decrease in abundance and biomass upon the application of ionic liquid, were observed from the first day. After seven days the change was observed that in solution $0,00113 \text{ g}\cdot\text{dm}^{-3}$ abundance was smaller 50% comparing to the control solution. In the test communities, the concentration of chlorophyll *a* also decreased over time. [BMIM]Cl negatively affected to maximum efficiency of the photosystem, at a concentration of $0,0175 \text{ g}\cdot\text{dm}^{-3}$ affected was smaller comparing to $0,01113 \text{ g}\cdot\text{dm}^{-3}$. Ionic liquid at a both concentration from

the first day was causing an increase in the number of cells with damaged or dead chloroplasts. Based on obtained results it was demonstrated that ionic liquid has negatively affects microphytobenthos communities. Induced changes can be observed at cellular and population level. Hence, there is a need to investigate and understand processes driving tolerance in microorganisms and their communities in more detail in order to verify existing methods used in ecotoxicological studies.

28. The neurocybernetic perspective of reshaping the future of humankind.

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Along with recent rapid development of technology, visions of our near future start to imitate those depicted in science-fiction novels. The increasing number of things that used to be just a content of our pure imagination, now turn out to be real possibilities of the nearest future. Very likely the most spectacular breakthroughs await us at the interface of modern technology and our biological bodies. Our brains in particular.

There has been a lot of research on how neuroprosthetics can create better life conditions for people with CNS and related impairments, but also how they can alter our intrinsic human form. New technologies are able to enhance and augment primal abilities of our minds, providing us with an opportunity to perceive and comprehend more. Therefore philosophy is struggling with redefinition of „limits of humanity”.

In this poster, we would like to present some of the recent neurocybernetic advances and conclude a wide-ranging issue what does “revised human” mean in the physical and philosophy of mind terms

29. Underwater noise generated by capillary-gravity waves.

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Within the past few decades, process of generation of the underwater noise emitted by breaking waves has been well recognized. It is known that this relation is a result of production of bubbles and bubble plumes by wave breaking events.

The wave breaking events take part in processes of transport of heat and gases on the air-water boundary and thereby are crucial for the biochemistry of the water and generation of the marine aerosols. Present state of knowledge, gives information about generation of the underwater noise emitted by various types of breaking waves in different environment properties. Unfortunately, because of its less dramatic character, the part of the underwater noise spectrum generated during the microbreaking events, has been rarely taken as a research subject. However, to obtain the whole spectrum of the underwater noise generated during breaking wave events, not only the most energetic ones should be studied, but events that occur in smaller scale must also be included.

Aspects mentioned above, led to put hypothesis that aimed to investigate spectrum of the underwater noise emitted by microscale wave braking events dependence on different environment properties. To test these hypothesis, a laboratory experiment with low intensity wave breaking simulation has been carried out in a small tank. Underwater noise emitted by microbreakers has been registered simultaneously with optic recordings. Gathered signals have been analyzed and some of the results are presented in this paper.

30. The role of the open reading frames: orf60a and orf63 from the *exo-xis* regions of λ and ϕ 24B phages in their development.

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Shiga toxins are the main virulence factor of a group of Shiga toxin-encoding *Escherichia coli* strains responsible for human infections that. Shiga toxins are encoded by genes, located in genomes of a lambdoid bacteriophages that are related to nontoxic coliphage λ . Efficient expression of Shiga toxins is stimulated upon lambdoid prophage induction.

Although lambdoid phages and their developmental pathways have been investigated in details, functions of some of their genomic regions are not yet clear. In this report we pay attention to the *exo-xis* region, which is located in the central part of λ phage genome and consists of several open reading frames (ORFs). It was found that four of the ORFs are highly conserved among λ and ϕ 24B phages. Interestingly, previous studies indicated that presence of the whole *exo-xis* region on multicopy plasmid results in impaired lysogenization of *E. coli* bacteria and more effective induction of λ and ϕ 24B prophages.

31. Host's antiviral features depend on balance between DNA methylation and restriction.

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The restriction-modification (R-M) systems are generally known as the antiviral defense mechanism of bacteria. Mutual level of expression of endonuclease and cognate methyltransferase has significant influence on the antiviral features of the host. However, the efficient restriction of the foreign DNA has some limitations. We compared the wild type and the elevated levels of EcoRI R-M genes expression and found the efficiency of DNA restriction as: high and significantly low, respectively.

These results suggest, that the balance created by R-M system elements is very sensitive to changes in protein concentration. Our results provide further insight into a type II R-M system maintenance and the potential conflict with the host bacterium.

32. Variability in time the content of petroleum substances in the surface layer of bottom sediments in estuary of Vistula.

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Petroleum substances – hydrocarbons, naturally present in crude oil and products derived from processing it. In the marine environment they are of natural origin as well as anthropogenical origin. They are a real threat to the marine ecosystem, where penetrate mainly by exploitation of the port areas as well as by ships. The increase in the content of petroleum substances in the Gulf of Gdansk, mainly is caused by inflow with waters of the Vistula River, surface runoff, trouble-free exploitation of ships or accidents and failures. The aim of the study was to determine the spatial variability and fluctuations in time of the content of petroleum substances in the surface layer of bottom sediments of the Gulf of Gdansk. These substances are a significant threat to ecosystems due to physical and chemical processes which are subject to in the marine environment. They may also be adsorbed on solid grains, form colloidal systems, be subjected to oxidation or present in occluded forms of the mineral and organic compounds. The study was conducted in the area of the Vistula estuary in 2014-2015. Three transects were selected in respect of transport with currents of the river water masses. Samples of the surface layer of bottom sediments were collected during the cruise, using the Van Veen grab. The sum of petroleum substances in sediment samples were determined by gravimetric method. Samples were extracted with petroleum ether in a continuous manner, using a Soxhlet apparatus. During the study reported the variability in the content of petroleum substances in time and space, in the Gulf of Gdansk. The measured values were probably conditioned by the hydrological regime of the river Vistula. The increase in concentration values in the studied region may be caused by the investment of flood protection of Żuławy (2012-2015).

33. Foraminifera – a sensitive indicator for climate changes in the Arctic and Antarctic

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Analyses of marine sediment records can provide knowledge about the past environments and climate history and, thus, contribute to a better understanding of forcing mechanisms behind natural variability. Such knowledge is highly valuable to predict future climate development, particularly in polar regions that typically are affected stronger than lower latitudes. Assessment of past natural environmental changes beyond instrumental time series can only be estimated using proxies. One key proxy in the marine environment is foraminifera, i.e. microfossils that comprise the most diverse group of hard-shelled protists. Reconstructing paleoceanographic changes using foraminifera, however, strongly depends on how well their relationships with changes in biological, chemical, and physical surroundings are known.

The overarching main objective of this study is to improve our knowledge about the ecology and distribution of the foraminiferal faunas through the analyses of seafloor-surface sediments from two polar regions, the European Arctic (Kongsfjorden, Svalbard) and western Antarctica (Pine Island Bay, Amundsen Sea), as well as further integration of foraminifera, sediment properties and oceanographic data. I will present the most important polar foraminiferal assemblages and how their distributions in the Arctic and Antarctica was affected by the retreat of glaciers/ice sheet, as well as by recently increasing inflow of warm water masses.