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# "e-FACTORY OF SCIENCE"

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# THE BOOK OF ABSTRACTS

# National Scientific Conference

# „e-Factory of Science”

**V edition**

## The Book of Abstracts

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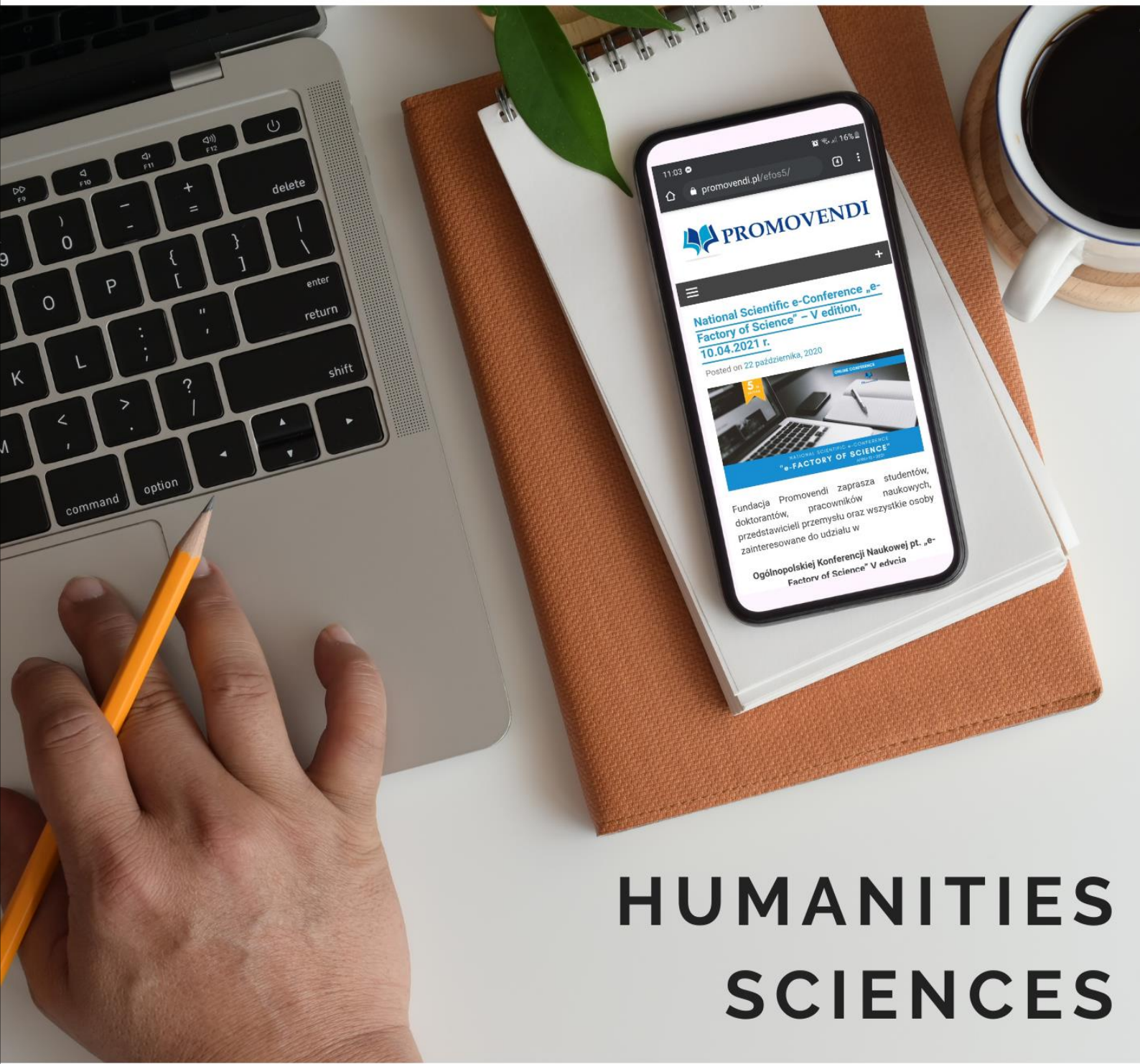
ABSTRACTS OF

# PRESENTATIONS




# HUMANITIES SCIENCES


# THE INFLUENCE OF FRAMING EFFECT ON THE WILLINGNESS TO PAY FOR CONSUMPTION GOODS IN REALISTIC SHOPPING SETTINGS

**Magdalena Brzozowicz**

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**A few words about the author(s):**

I am a PhD student at the University of Warsaw (Faculty of Economic Sciences). I am interested in experimental economics, behavioral economics and marketing.

**Abstract:**

I examined the influence of the framing effect on the valuation of consumption goods in realistic shopping seetnings. In four field experiments in a shopping centre (with over 1600 participants in total) I elicited willingness to pay (WTP) for consumer products manipulating framing conditions (positive vs. negative framing). Although my four experiments involved two different types of products (durable and fast-moving), two different types of framing (attribute and goal) and two different valuation procedures (hypothetical and with real transactions), their results were remarkably consistent. I observed that the framing effect had no impact on WTP for presented products. In the light of this study and existing literature, I suspect that the framing effect is more likely to show up in solely hypothetical judgement and assessment tasks than in the context of eliciting consumer WTP.

This work was supported by the National Science Centre, Poland, grant number UMO-2017/27/N/HS4/02116.

**Keywords:**

framing effect, field experiment, willingness to pay, WTP


# EFFECT OF THE CHANGE OF CIRCUMSTANCES ON THE OBLIGATION

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I am a third-year law student at the Faculty of Law and Administration of the University of Warmia and Mazury in Olsztyn. I am interested in civil law and in the future I would like to become a great lawyer and solve people's problems.

**Abstract:**

The aim of my work is to demonstrate that the "rebus sic stantibus" clause is applicable during the COVID-19 pandemic. The condition for its application is the fulfilment of certain prerequisites, which I have analysed in detail. I based my assumption on the decision of the District Court in Warsaw of 7 January 2021. I confronted the results of my research with the doctrine. I hope that my work will turn out to be practical and useful in such a difficult time for us.

**Keywords:**

commitment, COVID-19


# "OUR ROLE IS TO PROVIDE KNOWLEDGE AND OUR EMPLOYEES TO TRANSFORM IT INTO INNOVATIVE SOLUTIONS." HOW DO THE ORGANIZATION'S PERSONNEL POLICIES AFFECT THEIR INNOVATION?

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PhD student at the Faculty of Sociology of the University of Warsaw and an expert of the Integrated Qualifications System at the Educational Research Institute.

**Abstract:**

A key that determines the success of an organization is to transform knowledge and talents into innovative solutions.

The vast amount of research proves that employee skills and knowledge management are considered to be a significant correlate of companies' innovation. However, we still do not know how the Human Resources policy which is applied to all employees (including line employees) affects the innovation of the organization.

To answer the question, in the second half of 2019 a team of researchers of the Educational Research Institute conducted significant analysis in the automotive and chemical industry sectors. As a result, 5.000 questionnaires were carried out with both the representatives of the staff and line employees of the companies. The quantitative analysis was supplemented with the results of case studies run in 12 organizations of the mentioned industries in the years 2019-2020. Both studies were conducted as part of the implementation of the Integrated Qualifications System in Poland.

The results of the study showed a relationship between the company's innovation and the manner of conducting personnel policy. Employees of companies classified as bringing new solutions are recruited to work on the basis of substantive criteria and more often rewarded for raising qualifications in various ways, not only financially. In addition, they learn in a more systematic and varied way in the workplace.

**Keywords:**

innovation, human resources management, skills of future, Integrated Qualifications System


# THE OCCURRENCE AND COURSE OF ANXIETY DISORDERS IN PEOPLE WHO HAVE LOST THEIR FINANCIAL CONTINUITY UNDER THE INFLUENCE OF THE COVID-19 PANDEMIC IN POLAND

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**A few words about the author(s):**

I am Third-Year B.A. student of Forestry at the University of Lodz, Branch in Tomaszów Mazowiecki. I am interested in social sciences, particular psychology, and this is what I want to do and study in the future.

**Abstract:**

Despite the availability of many studies on anxiety disorders, there is no accurate data on how the COVID-19 pandemic has influenced the emergence of anxiety or the course of pre-existent anxiety in people who are at a higher risk during particular COVID-19-related circumstances. Fear is an indispensable element of everyone's life. An anxiety disorder, however, is when fear takes a pathological form and severity, making everyday functioning difficult. This problem is timeless because of the stress and problems of life today, but also extremely aggravated by the current situation in Poland and globally.

During the presentation, I will present the general characteristics and profile of anxiety disorders, and refer to the results of a survey research I conducted. The survey was conducted electronically specifically among people who lost their financial continuity as a result of closing economy sectors in the period from March 2020 till now. The aim of the study was to determine whether there was a direct relationship between the difficult situation and the onset and diagnosis of anxiety disorders, and – in the case of people who have been struggling with them for a long time – whether the changed financial situation influenced the course of the disease. My intention was to describe how the prevailing pandemic has left its mark on mental health of selected groups and individuals, and how serious the problem of legal and economic restrictions introduced in Poland really is.

**Keywords:**

anxiety disorders, COVID-19 pandemic, financial discontinuity, employment loss, Poland


# RESEARCHING SOCIAL ATTITUDES TOWARDS WILD ANIMALS EXISTING IN POLAND

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Second-year B.A. student of Forestry at the University of Lodz, Branch in Tomaszów Mazowiecki. I am interested in sociology, environment, ecology. I would like to combine these fields and do more sociological research in the future.

**Abstract:**

How much do animals mean to people in the modern world? Social attitudes towards different species have changed dramatically over the years. Difference in attitudes to animals and the increasingly common discourse on this subject is the basis for the creation of further divisions in the Polish society. During the presentation I will focus on wildlife. Despite their ability to separate from humans, wild animals often choose to be synanthropic; thus, they have become an integral part of human life. By means of an electronically-conducted survey research I have verified social attitudes towards wild animals existing in Poland, as well as the ability of society members to behave properly towards them. In this context, it is important to learn how to feed the animals or how to be careful when coming into contact with them. In my presentation I will also consider the emotional attitude of people towards wild animals present in Poland, and recommend further areas of research. The presentation is interdisciplinary, drawing on sociological tools and considerations on the one hand, and on topics specific to forestry and environmental issues on the other.

**Keywords:**

survey research, animals, synanthropism, wildlife, social attitudes


# AUGUSTUS PFEIFFER'S TIES WITH SILESIA AND MORE

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PhD student at the e University of Wroclaw. A specialist in the field of Silesian graphics and baroque portrait. Head of the Art Department of the Museum of the Lubomirski Princes in Ossoliński National Institute.

**Abstract:**

August Pfeiffer was born on October 27, 1640 in Lauenburg on the Elbe. He was the son of customs officer Philipp Pfeiffer and his wife Maria Schneider. He went down in history as a Lutheran theologian and orientalist. He died on January 11, 1698 in Lübeck. This extremely interesting figure was associated with Silesia for four years. It was here that he became a teacher of Andreas Acoluthus, with whom he developed a passion for oriental languages. It resulted, among others, the translation of the Koran into Latin.

An important element for getting to know this outstanding figure is sixteen graphic portraits. They were created between 1667 and 1801. These portrait prints allow the viewer not only to get to know August Pfeiffer better, but also the dominant tendencies in the graphic style of Baroque portrait art.

**Keywords:**

graphic portrait, August Pfeiffer, Lutheran theology, baroque, Silesia


# THE PROCESS OF SHAPING THE DRAMATIC STRUCTURE (STORY ARC) IN A FILM NARRATIVE

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**A few words about the author(s):**

Artur Borowiecki, MA – PhD student and lecturer at the Faculty of Philology of the University Lodz (Institute of Contemporary Culture). A graduate of the Faculty of Film and TV Directing (specialization: screenwriter) of the Lodz School of Film.

**Abstract:**

In film practice, scriptwriters and directors often refer to the patterns according to which the course of fictional events in films is constructed. These plot development patterns, called story arc are discussed on a case by case basis in each script writing handbook. Most screenwriting theorists propose their own diagrams for the dramatic development of film history. The article will define the term dramaturgical structure. The article will define the term dramaturgical structure. The history of the evolution of scenario structures and a comparative analysis of currently propagated dramatic patterns will be discussed.

**Keywords:**

plot structure, pardigm, turning points, narrative scheme, plot outline, story arc


# COVID-19 PANDEMIC DISCOURSE(S), PANDEMIC IN DISCOURSE. RESEARCH PROJECT PRESENTATION

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**A few words about the author(s):**

Beata Duda − PhD, Academic interests: discourse analysis, corpus linguistics, digital humanities. Ewa Ficek – PhD, Academic interests: discourse analysis, corpus linguistics; therapeutic discourse and peri-pandemic discourse related to COVID-19.

**Abstract:**

The speech will be devoted to a research project related to the linguistic elucidation of the (sub)space of discourses on the SARS-CoV-2 pandemic. The currently experienced health crisis − like many other global crises of this kind − is conducive to the formation of discursive communities within which certain (worth considering) systems of meaning are revealed. Their circulation within the "pandemic" logosphere (as a promising area of humanistic thought) is today increasingly popular with representatives of various disciplines.

The following are the most important goals of the conference presentation: 1. initial identification of pandemic discourses, as well as justification of the choices leading to the collection, selection and review of source material (cf. corpus research); 2. presentation of the project's scientific background, specifying the assumptions and methods of description (tools /methods of discourse linguistics, corpus linguistics and others); 3. assessment of the possibilities and limitations related to the exploration of the outlined field of analysis or the application of research results; 4.indication of key cognitive problems − general and/or specific ones (e.g. axiological and ideological aspects of the epidemic visions re/constructed by social actors, discursive image of the world, epidemic flagship words, discourse threads /bundles, metaphors, reasoning and toposes, communication or nomination strategies).

**Keywords:**

pandemic, linguistic analysis of discourse, corpus of COVID-19 texts


# HAPPINESS, HARD WORK AND TALENT - HOW TO BECOME AN ARTIST IN TANZANIA. THE CASE OF GEORGE LILANGA

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**A few words about the author(s):**

PhD student of the 3rd year of humanities at the University of Lodz, Africanist specializing in the study of contemporary art of East Africa, with particular emphasis on Tanzania.

**Abstract:**

In this work, I would like to recall the figure of George Lilanga, a genius Tanzanian artist, an advocate of great changes that are taking place today in the world of contemporary art in Africa.

Almost overnight, Lilanga from the lowest-level employee of NyumbaYaSanaa, at that time a prestigious center promoting contemporary representatives of the world of contemporary art, became a participant and beneficiary of art workshops organized in the center. It was no coincidence that he came from the Makonde people. For a recipient skilled in the perception of East African works of art, this fact alone is reason enough to take a closer look at his work. The inhabitants of this part of the world believe that Maconde lineage is an expression of great artistic and craft skills. Therefore, it can be assumed that its roots undeniably prove its artistic abilities.

The presentation will present the artist's biography so that the artist from a distant part of the world becomes closer to Polish audiences. The story of George Lilanga is a valuable lesson in humility, teaching us to believe that if we only work hard and believe in our skills, the impossible does not exist.

**Keywords:**

George Lilanga, East Africa, Tanzania, modern art


# CREATIVE POSTURE CHILD'S IN KINDERGARTEN

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**A few words about the author(s):**

I am mgr Natalia Jeżewska. I study on the Uniwersity of Katowice. I'm PhD student. I study Pedagogics. I'm a Teacher in Kindergarten. I'm interested in intersemiotic translation, creation and literature children in Kindergarten.

**Abstract:**

Z. Pietrasiński points out that "the essence of the creative process consists mainly in reorganizing the previous experience and creating new combinations of and new lists. J. S Bruner gives the conditions for creative activity, the occurrence of which has a stimulating dimension, these are the guidelines for organizing creative opportunities for students at an early school age: entering into their own individuality, readiness to depart from the obvious, detachment from existing forms, freedom to submit to the object of creation and finally, the emotional attitude to action and its spontaneity. Creativity, on the other hand, is potential, the lowest level of creativity that can be revealed by an individual, but it may just as well become an "unfulfilled promise". Such a distinction implies the recognition of creativity as a specific element necessary for creative functioning, "not every creative person, however, is creative". In order for this potential to be actualized, motivating factors and the environment are necessary. In my speech, I would also like to show the ways of stimulating the potentiality of children, i.e. examples of creative activities that should be part of school education. He will show creative activities using literature, art, music and theater.

**Keywords:**

creation, intersemiotic translation, literature


# POLISH CONSTRUCTION LAW

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**A few words about the author(s):**

Lawyer, PhD student of Cardinal Stefan Wyszynski University in Warsaw, businessman and developer.

**Abstract:**

Construction law is a branch of law including building construction, engineering, and related fields. Construction law affects many participants in the construction industry, including financial institutions, architects, builders, engineers, construction workers, and planners. Construction law builds upon general legal principles and methodologies and incorporates the regulatory framework.

Construction law is one of the most important law nowadays. American International Trade Administration says that develop business will increase about 85 % before 2030.

Polish construction law it's part of civil law. Polish construction law changed in 2020. Author shows this changes and also most important article.

What's more author shows how construction law works and how use it in life.

**Keywords:**

polish law, construction law, civil law


# STRESS IN THE EDUCATIONAL CONTEXT

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**A few words about the author(s):**

I am a fifth-year student of pedagogy at the University of Bialystok. I am interested in alternative concepts of education and sociology. My dream is to establish my own kindergarten.

**Abstract:**

Nowadays, the stress affects us almost every day. It has become a common phenomenon and even the youngest experience it on their educational path. The presentation deals with the topic of stress related to students at school. The presented contents aim to draw attention to the existing problem and encourage to look for new solutions and strategies to help students. The presentation was based on the literature on the subject and other internet sources.

**Keywords:**

stress, students, help


# LOCAL SECURITY ON THE CONTEMPORARY WORLD

**Kinga Majcher**

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**A few words about the author(s):**

Kinga Majcher - University of Economics and Innovation in Lublin, Faculty of Administration and Social Sciences Administration. ORCID number: 0000-0002-3299-7437. Fields of research interests: local security, CPTED, community policing.

**Abstract:**

Security is one of the basic and most important human needs. By law, state authorities should ensure the security of citizens. For this purpose, programs are created that involve the local community to care for the common asset. The assumptions of the CPTED concept are congruous with crime prevention policy in the local area.

The presentation describes local security assurance and theory and practice. The main purpose of the presentation is to describe the strategies ensuring local security in terms of restrictions related to the covid-19 pandemic.

The presentation answers the questions of how to implement the assumptions of local preventive programs in contemporary world. In addition, he points to examples of the activities of the local community during the Covid-19 pandemic.

**Keywords:**

local community, security, pandemic, prevention, CPTED


# POVERTY AND SOCIAL EXCLUSION IN THE SELECTED CENTRAL EUROPEAN COUNTRIES IN 2016-2019- THE CHOSEN ISSUES

**Michał Mrozek**

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**A few words about the author(s):**

MSc Michał Mrozek, PhD Student, Department of Economics, Institute of Economics and Finance, Faculty of Economics, Finance and Management, University of Szczecin, area: Labour market Policy.

**Abstract:**

The paper regards the assessment of the poverty and social exclusion in The Selected Central European Countries in 2016-2019 within the selected aspects. The aim of the paper is the assessment of the poverty and social exclusion in The Selected Central European Countries in 2016-2019 within the selected aspects. The following research problems were put forward: how does the diversification of the poverty and social exclusion in The Selected Central European Countries in 2016-2019 within the selected aspects look?; which of the researched The Selected Central European Countries in 2016-2019 has the lowest, middle, the highest level of the poverty and social exclusion within the chosen aspects? In the theoretical part was presented the characteristic of the poverty and social exclusion. In the empirical part were presented the results of the carried out researches. In the paper was carried out the documentation, statistical, dynamic, comparative analysis. The results showed that the researched The Selected Central European Countries are diversified between themselves depending on the particular variables within poverty and social exclusion. The inference process took place in the deductive way.

**Keywords:**

Central European Countries, poverty, social exclusion, material deprivation


# ILLEGAL TRADE OF ANCIENT MESOPOTAMIAN ARTEFACTS FROM SYRIA AND IRAQ BY THE ISLAMIC STATE

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**A few words about the author(s):**

Graduate from Warsaw University with BA in Assyriology and MA in International Relations. Passionate of Mesopotamian artefacts, who seeks to popularise the importance of culture and relics of the past from the Middle Eastern region.

**Abstract:**

The paper focuses on the illegal trade of Ancient Mesopotamian relicts from the area occupied by the Islamic State on the territory of Syria and Iraq. The dissertation touch upon not only the problem of illicit trafficking but also its routes. Prohibition of illegal looting and trade is adjudicated by the international law. The paper focuses on some of the most crucial legislatives and analyses them, such as Resolution 2199, Resolution 69/281 titled ‘Saving the cultural heritage of Iraq’ and the main pillar of international law protecting cultural heritage form theft and illegal trade - Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property from 1970. The income form the years of illicit exchange of ancient goods is hard to estimate. Although, the dissertation put focus also on the numbers and examples of traded Mesopotamian artefacts.

**Keywords:**

Islamic State, artefacts, illegal trafficking, ancient Mesopotamia


# THE STATE OF THE FAMINE IN UKRAINE IN 1932-1933 - CAUSES AND EFFECTS

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**A few words about the author(s):**

Przemysław Pazder – BA in political science, MA in history. Research interests: Polish victims of the Holodomor.

**Abstract:**

The famine in Ukraine of 1932-1933 is undoubtedly one of the greatest tragedies of the 20th century. The prelude to the tragedy of the Great Famine was undoubtedly the forced collectivization of the countryside that took place in 1929-1931. The process of collectivization wreaked havoc on the peasants, both materially and spiritually. Terrorized farmers worked on nationalized farms for virtually half-free, producing grain and other agricultural products for the state.

It should be noted, however, that it was not collectivization that was the main cause of the famine of 1932-1933, but the establishment of high grain quotas for the Ukrainian countryside. Their enforcement was absolute. Penalties such as confiscation of other types of food were imposed on persons who did not comply with the obligation to grain quotas. In 1930, a grain quota of 392.9 million poods (about 6.43 million tons) was collected from a Ukrainian village (from collective farms and individual farms, without state farms), while the plan was 420 million poods. A year later, 395.6 million poods (6.48 million tons) were seized, with the plan to collect 434 million poods.

**Keywords:**

Polish, Ukraine, USSR


# POLISH MINORITY IN THE USSR DURING THE HOLODOMOR PERIOD IN POLISH HISTORIOGRAPHY

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Przemysław Pazder – BA in political science, MA in history. Research interests: Polish victims of the Holodomor.

**Abstract:**

The subject of the Polish minority in Ukraine during the Great Famine in 1932-1933 is an extremely interesting field of research. As for the state of research on the issue of collectivization of villages and the Great Famine, this issue is quite well researched at present. Among Polish historians, the greatest contribution to the above-mentioned issues was made by: Robert Kuśnierz, Jan Bruski, Henryk Stroński, Roman Wysocki, Wiktoria Kudela-Świątek, Mikołaj Iwanow, Roman Dzwonkowski and others. In addition to the post-Soviet archives, information about this tragedy is also available in foreign archives, including Polish ones. However, when it comes to research directly related to the issues of Poles during the collectivization of villages and the Great Famine, the literature in this area is not extensive. The works of Henryk Stroński should be mentioned here first. The collective monograph Hołodomor has recently been published. Poland. Polish victims 1932-1933, edited by Michał Dworczyk and Robert Kuśnierz in Polish and English versions, containing texts by experts on the subject: Stanisław Kulczycki, Jurij Szapało, Hiroaki Kuromiy, Jan Jacek Bruski, Robert Kuśnierz, Roman Wysocki, Wiktoria Kudela-Świątek, Henryk Stronski and Olga Bertelsen.

**Keywords:**

Robert Kuśnierz, Hlodomor, polish


# DEVELOPMENT OF VIEWS ON THE DIET OF HOMO NEANDERTHALENSIS AND HOMO SAPIENS IN THE MIDDLE PALEOLITHIC

**Kacper Pelczarski**

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**A few words about the author(s):**

Kacper Pelczarski – Polish archaeologist. In 2017, he defended his master's thesis entitled Musical instruments in the Palaeolithic at the University of Wrocław and since then he has been interested in archaeomusicology.

**Abstract:**

The aim of the presentation is to discuss the issues related to the development of views on the diets of Homo sapiens and Homo neanderthalensis in the Middle Paleolithic. The presentation focuses on the methods used in the study of past diets and their impact on the formation and changing of the vision of nutrition in the Middle Paleolithic. These methods are: study of fauna remains at sites, study of microtraces on tools, analysis of stable isotopes from collagen, analysis of macro- and microwear of teeth, study of plant macroremains and dietary analysis. Initially, mainly on the basis of the results of stable isotope studies, Neanderthals were considered to be the apex predators that eat only meat. Along with the use and improvement of subsequent research methods, their diet now seems to be much more varied and dependent on the environment in which they lived. In the case of the Middle Paleolithic Homo sapiens, their diets were from the beginning considered to be much more varied, including the meat of land animals, marine animals, molluscs and a variety of plants. This was seen as one of the evolutionary advantages that led to the extinction of the Neanderthals.

**Keywords:**

diet, Homo neanderthalensis, Middle Palaeolithic, microwear, traseology


# QUALITY MANAGEMENT - SELECTED CONCEPTS

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**A few words about the author(s):**

A student of the Faculty of Management, the University of Science and Technology in Bydgoszcz. The scientific interests include management studiesin details to the theory of organization and management, quality management and entrepreneurship.

**Abstract:**

Quality is present in history of human since a lot of centuries. Reasons management of this area in organisation are: growing consumer expectations, needed cost reduction and developing competition. You can find answer in this publication for question what is quality and what is its essence? Also presented chosen methods quality supportive management process in organisation. Belong to them: Total Quality Management, Six Sigma and polish conception – TROP. W XXI century quality management as only is not enough due to the growing expectations customer and development od competition. For this reason presented techniques for improvement quality and they are: KAIZEN, 5S and Benchmarking. You should remember that above management conceptions and techniques for improvement quality are not the only ones applied in companies. Science offers wide range of instruments to improvement this process. From the right quality management in organisation may be depend economic success. One of the conclusions of this paper is treat quality as way to meeting customers needs, not as the goal in themselves.

**Keywords:**

quality, management, organisation, TQM, KAIZEN


# MAP DESCRIPTIONS FOR BLIND PEOPLE

**Mateusz Ruszaj**

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**A few words about the author(s):**

Graduated from Geographic Information Systems specialization at the Institute of Geography and Spatial Management, Jagiellonian University in Krakow. Currently I am a PhD student, interested in cartography and geoinformatics.

**Abstract:**

The study concerns a current progress in research focused on preparing web maps for blind people, which are the most popular form of maps nowadays because of the internet accessibility. This topic refers to interdisciplinary studies on social problem such as the blind people accessibility to information. Cartography, linguistic studies, communication and computer sciences are the main areas that overlap in this study. The main technic used in the map creation process is description, which provides information about map in a textual form or by an audio description. The presentation is about the basic principles of constructing descriptions based on the past research focused on the expectations that blind people have. The author of this study wants to point what the possibilities are for the future research and how the prepared descriptions should be implemented into the web pages.

**Keywords:**

web maps, maps for blind people, audio descriptions, accessibility


# THE IMPACT OF TELLING ABOUT YOUR LIFE ON MAKING SENSE OF IT

**Monika Strzelecka**

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**A few words about the author(s):**

A third-year doctoral student in psychology. Research interests: identity, narrative identity, adulthood, self-efficacy belief. Professionally involved in psychotherapy of children, adolescents and adults.

**Abstract:**

By telling the story of one's life, we organize experiences, giving coherence and meaning to seemingly disordered events. This can lead to making sense of one's life. The study involved two groups: an experimental group (telling a life story and completing a questionnaire) and a control group (completing only a questionnaire). Both groups were tested with the Oleś Sense of Life Scale. The experimental group was studied with the McAdams Life Story Interview. The telling of life story influences the meaning of life in the subjects. The control group also shows a significant difference between the first and second study. Thus, not only the telling of the life story influences the meaning of life, but the lived experience in the two-week interval between the studies. Also the activation of thinking about the meaning of life increases the level of life.

**Keywords:**

narrative identity, meaning of life


# EDUCATIONAL LAW IN THE REPUBLIC OF POLAND

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**A few words about the author(s):**

Student in the field of administration. Scholarship holder of the Prime Minister and the Minister of National Education. In 2020, he obtained a bachelor's degree with honors in the field of "International and EU administration with French".

**Abstract:**

The presentation concerns the subject of the educational law system in the Republic of Poland. The author indicates the most important legal acts on the basis of which the education system in Poland functions. He indicates the scheme of the system of education and lists the competences of the most important legal bodies of the school, such as the headmaster and the staff. The author develops the problem of professional promotion of teachers and all the requirements of this process. He develops the topic of pedagogical supervision of educational institutions.

**Keywords:**

education, educational law, professional promotion, teacher, school


# ROLE OF INTERNATIONAL QUALITY MANAGEMENT SYSTEMS IN THE MEDICAL TOURISM MARKET

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PhD student at the WSB Academy in Dąbrowa Górnicza. Lecturer, Trainer, Quality management systems advisor in healthcare sector.

**Abstract:**

The last decade has seen a dynamic development of the health tourism market, where quality and effective management begin to play a key role. Such an approach entails the increasing popularization of quality standards as a management tool on which, selection of a medical destination, reimbursement of treatment costs, but also the competitive position of the organization. The presentation discusses the role of the quality of medical services and the importance and benefits of pro-quality management with the use of quality standards. Selected international medical quality standards operating on the health tourism market were also analyzed.

The aim of the presentation was to analyze whether quality standards can serve as a management tool to confirm high-quality activities on the medical tourism market. The conclusions from the analysis of selected literature and statistical documents confirm this relationship, which results in the increasing use of quality standards among organizations focused on this type of tourism.

**Keywords:**

medical services quality, quality management, quality standards, medical tourism


# THE ROLE OF HOMEWORK IN THE EDUCATION OF CHILDREN AT EARLY SCHOOL

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**A few words about the author(s):**

I am a student of 4th year of the Pedagogy of Early Education at the University of Warmia and Mazury in Olsztyn. In the future, I want to be a teacher in primary school. My passions are travelling and dancing.

**Abstract:**

The main goal of the research was to find out about teachers' opinions on the role of homework in the education of early school age children.

The respondents were 120 early childhood education teachers from the from the Warmińsko-Mazurskie voivodeship. A questionnaire was used to conduct the research.

The analysis and interpretation of the collected research material showed that teachers use written work as the most common form of homework. The homework verification is based on revision and evaluation. The respondents indicated mathematical education as the area causing most difficulties for the students. As the objective of homework, the respondents pointed out to developing a habit of systematic work and revision of the processed material. The results of the research showed that homework is important in the educational process of students in early school age.

**Keywords:**

homework, school, teacher, children


# ARS HOMO EROTICA IN CONTEMPORARY POLISH PHOTOGRAPHY

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**A few words about the author(s):**

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**Abstract:**

The research background tells the story of art related to passion and love for the same sex. It is a theme deeply immersed in cultural tradition, but the photographs refer to the current political situation of minorities rights. Photography is meant to present a universe while showing that eroticism and desire are not only about the senses and the body, but also aspects of a person's inner life, cultural history, and politics of morality.

The point of this article is to present photographs picturing current social problems. The adopted methodology is based on recall of photographic projects that take up the subject matter.

Love against hatred is the slogan of Pamela Porwen's photographic project, in which the artist presents homosexual couples in wedding arrangements. In Poland, for same-sex couples, such celebration of love is impossible.

Photographer Paweł Barański produced a project denouncing the absurdity of anti-LGBT propaganda: LGBT is not people, it's ideology.

The Archive of Public Protests collects visual evidences of social activism, grassroots initiatives to oppose political decisions, violations of democratic principles and human rights.

Conclusions: contemporary Polish photography is a collection of images that formulate a warning against growing populism and discrimination in its broadest sense.

**Keywords:**

photography, contemporary Polish photography, homosexuality, art, LGBT


# EDUCATING ELDERLY PEOPLE IN THE USE OF MOBILE TECHNOLOGIES

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**Abstract:**

The ongoing fourth industrial revolution is the full integration of the economy with the Internet, and mobile communication plays an important role in this connection. The presence of mobile technologies, the knowledge of which determines the functioning in modern society, and also facilitates the satisfaction of many human needs, should not exclude or isolate, in particular, the elderly, who especially lack skills in the field of ICT. In the context of the above considerations, the need to educate older people in order to acquire the skills to use portable technological devices becomes important. The need to educate seniors by accurately adjusting education to their needs and expectations will help to avoid digital exclusion. Thanks to appropriate digital skills, the elderly will be able to satisfy their basic needs regarding self-fulfillment, developing passion, contact with family or taking care of their own health, and active participation in social life will increase their quality of life.

**Keywords:**

eldery people, mobile technologies, education, ICT


# ANALYSIS OF THE IMPACT OF USING SOCIAL MEDIA FOR SELF-ESTEEM

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**A few words about the author(s):**

Bachelor of Management studies with Marketing Specification, Psychology student.

**Abstract:**

Scientific research examining the impact of using social media on self-esteem was analyzed in the review. The topic was taken up due to the ambiguity of previous scientific research on this topic. An additional motivator was the social isolation caused by the Covid-19 pandemic, during which a large proportion of social contacts were transferred to the Internet, thus influencing self-perception in society. The aim of the study was to verify the characteristics, duration of social media use and the type of content viewed for self-assessment in general and its individual components. The analysis of the results showed that there is no direct correlation between the use of social media and the time spent on this activity, and the level of self-esteem. However, a clear influence of social media on individual components of self-esteem was shown.

**Keywords:**

social media, self-esteem, internet


# SCHOOL DIFFICULTIES OF STUDENTS WITH UNINHIBITED PRIMARY REFLEXES

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**A few words about the author(s):**

PhD student of The Maria Grzegorzewska University in Warsaw, Hand Therapist and Graphomotor Trainer.

**Abstract:**

Primary reflexes play an important role in the development of every human being. They play a strategic role in the first weeks of a newborn's life, facilitating its proper functioning immediately after it is born. In addition, they are the foundation of many subsequent intentional activities, including the achievement of crawling and quadruping skills. Properly shaped, they guarantee proper psychomotor development, and at the stage of school education they ensure school success. Unless primary reflexes are inhibited in time, they can cause numerous difficulties in everyday life for children, including serious problems with reading, writing, spelling and counting.

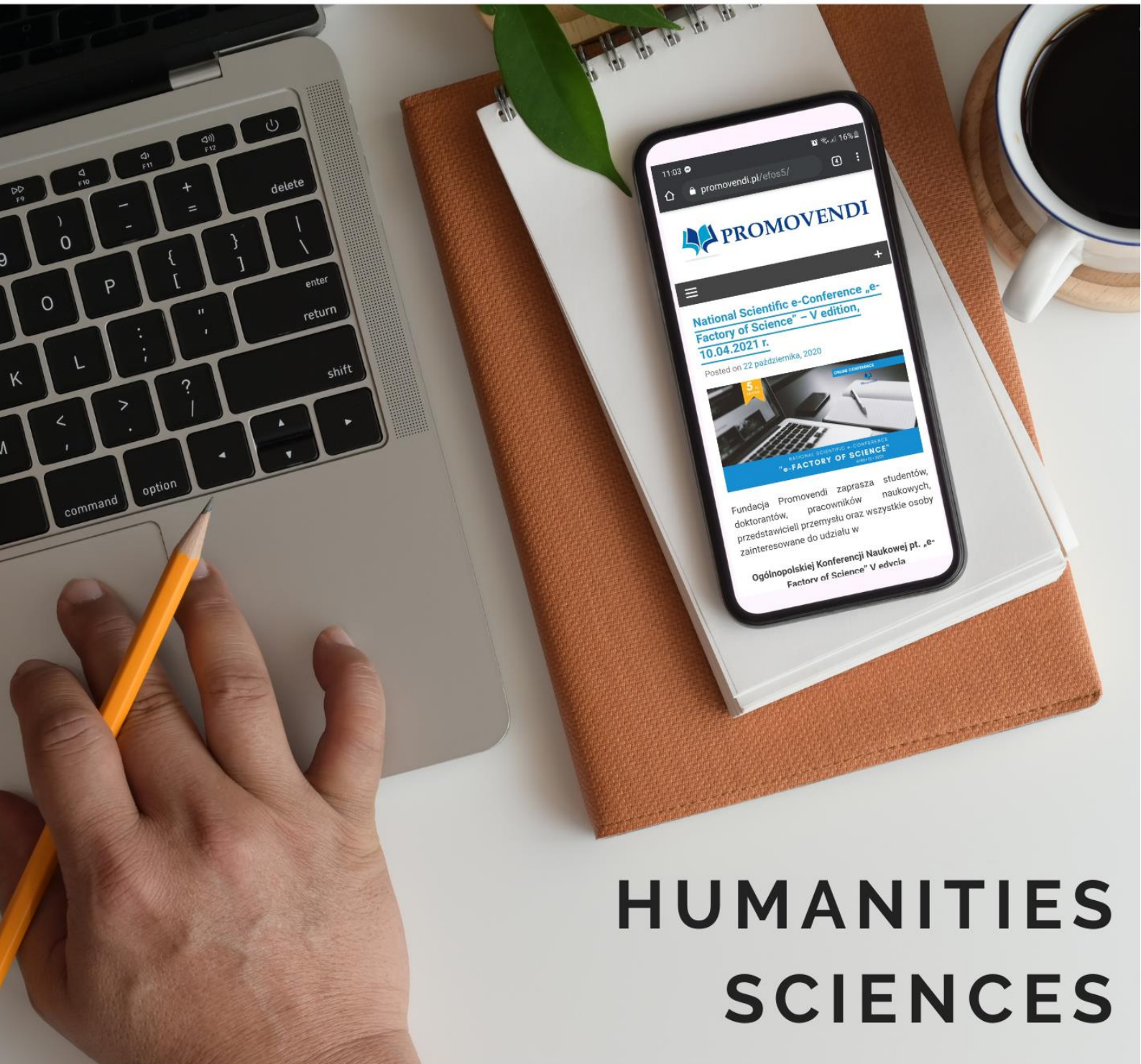
Research conducted over the last 30 years around the world shows the existence of a direct correlation between uninhibited primary reflexes and school difficulties of students in the so-called development norm.

The main purpose of the presentation is to analyze selected primary reflexes and try to relate them to the context of school education. Moreover, it is to present the most common learning problems of students with uninhibited primary reflexes. In addition to the above, the aim of the presentation is to discuss the idea of the INPP Sally Goddard Blythe's school therapeutic program as an effective and holistic method of supporting students with primary reflexes.

**Keywords:**

students, uninhibited primary reflexes, school difficulties, INPP school therapy program by Sally Goddard Blythe

# ABSTRACTS OF
# POSTERS




# HUMANITIES SCIENCES


# LIFE ATTITUDE VS BELIEFS ABOUT HUMAN NATURE AND RELIGIOUS ORIENTATION

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**A few words about the author(s):**

I'm a PhD candidate in psychology. My research interests include the areas of feedback (especially praise) and pro-environmental behaviors (determinants, reinforcement). The co-authors of the study are psychologists and work in educational psychology.

**Abstract:**

The life attitude determines the most activities that are undertaken by humans. However, there is a lack of empirical research indicating the determinants of a specific life attitude („to be" vs „to have"). Based on the analysis of the literature, it can be distinguished that there are several factors influencing the choice of life attitude.

The aim of this study was to examine whether life attitudes ("to be" and "to have") are related to people's beliefs about the constancy („fixed mindset") or variability („growth mindset") of traits and to religious orientation (external, internal and „seeking").

In the study participated men (N=96; 49%) and women (N=99; 51%) in age 16-69 (M=24.5; SD=8.13). The survey was conducted using the Interenet. Three quetionnaires were used to measure the variables: the WSS (Scale Dweck, 2000; Lachowicz-Tabaczek, 2004) to measure kind of mindset, the Attitude Scale „To Be and To Have" (Grulkowski, 2007) to measure the life orientation and the Religious Life Inventory (Batson, 1976; Socha i in., 1991) to measure the intensity of particular religious orientations.

The results indicate that the „fixed mindset" is a predictor of the "to be" life orientation.

**Keywords:**

life attitude, beliefs, religious orientations


# THE AWARENESS OF SUSTAINABLE DEVELOPMENT IN KINDERGARTEN TEACHERS AND TEACHERS IN GRADES 1-3 OF PRIMARY SCHOOLS

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**A few words about the author(s):**

My name is Katarzyna Chojnacka, I am a graduate of the first-degree studies at APS. Now I'm studying special education, specialization: education and rehabilitation of people with intellectual disabilities. I'm a teacher in the preschool group.

**Abstract:**

Sustainable development is, in other words, intergenerational solidarity, which consists in finding solutions that guarantee further growth allowing active inclusion of all social groups in development processes. As many as 193 member states of the United Nations signed a declaration of implementation of 17 goals and 169 tasks of the 2030 Agenda "We are transforming our world: the 2030 Agenda for sustainable development".

World leaders believe that the 2030 Agenda can change the fate of the world, but what do teachers know about sustainable development? This question is asked in my research project, which concerns precisely the awareness of sustainable development in kindergarten teachers and teachers in grades 1-3 of primary schools. For the research, I used an online questionnaire, the results of which are presented in a poster. The research is part of a research project on sustainable development by dr Ewa Lewandowska from the Maria Grzegorzewska University.

**Keywords:**

Sustainable development, teachers, preschool, primary school


# DEINDUSTRIALIZATION AND INVESTMENT ATTRACTIVENESS

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**A few words about the author(s):**

PhD student and employee of the Chair of Urban Geography and Spatial Planning.

**Abstract:**

The collapse of industrial facilities (as a result of the political transformation in 1989) caused significant social and economic changes in many municipalities in Poland (Karpiński et al. 2013). The aim of the study is to show the impact of the deindustrialization process in rural municipalities on their investment attractiveness, which is related both to the socio-economic characteristics of municipalities and the policy of local authorities (see Godlewska-Majkowska, Perło 2017). Therefore in this context the key is to answer the following question: did the collapse of the factory reduce the attractiveness of the unit and cause its further economic regression?

The analysis is based on a survey and statistical analysis (correlation measures, statistical tests). The starting point for the analyses is a wide group of municipalities with a local economy strongly dependent on industry. The municipalities were chosen based on the location quotient of employees in the industrial sector. A small group of municipalities was selected on the basis of a survey.

References:

Karpiński A., Paradysz S., Soroka P., Żółtkowski W., 2013, Jak powstawały i jak upadały zakłady przemysłowe w Polsce, MUZA SA, Warszawa.

Godlewska-Majkowska H., Perło D., 2017, Zastosowanie metody wagowo-korelacyjnej i modelowania miękkiego do analizy atrakcyjności inwestycyjnej powiatów w Polsce, Zarządzanie i Finanse Journal of Management and Finance Vol. 15.

**Keywords:**

deindustrialization, investment attractiveness, rural municipalities


# SUPPORTING INTERESTS OF CUB SCOUTS IN POLAND

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**A few words about the author(s):**

Student of  pedagogy at The Maria Grzegorzewska University. Scout leader of the cub scouts' group.

**Abstract:**

At the age from 6 to 10 years old, children want to get to know the world. They look for their interest, what they like to do and what is boring for them. They need help with recognizing what is developing and at the same time attractive for them. That is why Polish Scouting and Guiding Association created varied challenges based on young people's hobbies. It is a good form of self-development and it shows to the cub scouts how many things they can find out.

**Keywords:**

scouting, interests, cub scouts


# COACHING AND ITS ROLE IN BUILDING SOCIAL COMPETENCE

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**A few words about the author(s):**

Master's degree, graduate of postgraduate studies in three fields, doctoral student at the Institute of Sociological Sciences at the Faculty of Social Sciences of the John Paul II Catholic University of Lublin.

**Abstract:**

A dynamically changing environment, progressing globalisation or competitiveness of the contemporary labour market enforce the need for constant improvement of a person in order to ensure their effective functioning in the society.

One of the methods stimulating an individual to develop is coaching. This method is gaining importance more and more rapidly, as it grows out of deep-rooted human needs both to be independent and to have social competences conditioning efficient participation in social life.

Coaching is a unique process that enhances individual, comprehensive and continuous development of all human competencies. Its mechanism and effects are not only an inspiration for the individual in building valuable attitudes and activating their own potential, but they also strengthen new behavioural strategies necessary from the point of view of effective functioning in society.

**Keywords:**

coaching, social competence, development


# PRESENTATION OF CULTURALLY DIFFERENT PEOPLE AND PEOPLE WITH DISABILITIES IN INTERCULTURAL AND INCLUSIVE TEXTS INTERSEMIOTICALLY TRANSLATION IN WORKING WITH CHILDREN IN KINDERGARTEN

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**A few words about the author(s):**

I am mgr Natalia Jeżewska. I study on the Uniwersity of Katowice. I'm PhD student. I study Pedagogics. I'm a Teacher in Kindergarten. I'm interested in intersemiotic translation, creation and literature children in Kindergarten.

**Abstract:**

Intercultural and inclusive education is sidelined in the education of young children. Getting to know the world, people with disabilities (people without limbs, in a wheelchair, the blind, stuttering, with chronic diseases, AIDS, HIV, the elderly with various diseases, etc.) is very interesting and inspiring for young children.

Cultural texts are dedicated to the recipients of the preschool group: intercultural and inclusiveness translated intersemiotically into the language of art and theater. In addition to shaping tolerant attitudes and enriching their knowledge about the world, we shape the creative attitude and creativity of children, as well as improve motor behavior and the aesthetic level of artworks.

**Keywords:**

inclusive and intercultural education, literature, theater, art, music


# KNOWLEDGE OF PEDAGOGICAL STUDENTS AND TEACHERS OF PRESCHOOL AND EARLY CHILDHOOD EDUCATION ABOUT EDUCATION FOR SUSTAINABLE DEVELOPMENT

**Katarzyna Krupa**

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**A few words about the author(s):**

Katarzyna Krupa – student of second cycle studies at The Maria Grzegorzewska University on specialty: pre-school and early school pedagogy; from September 2020 early childhood education teacher.

**Abstract:**

The idea of sustainable development has been known in the world since the 19th century and in Poland only from the 1990s. The concept of sustainable development was then synonymous with ecology. The 2030 Agenda distinguishes 17 strictly defined goals that have to make changes that transform the world for more righteous for all. Nowadays, the term of sustainable development is used very often, or maybe even abused by the media, business and politicians. But what knowledge about sustainable development do students of pedagogical universities and teachers of pre-school and early childhood education have? The poster shows a fragment of the research results relating to this group. The research used two questionnaires (13 questions in each), which were posted on the Microsoft Forms platform. One was addressed to students of pedagogical universities and the other to teachers of pre-school education and early childhood education. The research is part of a research project on sustainable development by dr. Ewa Lewandowska from the Maria Grzegorzewska University.

**Keywords:**

sustainable development


# BEHAVIORAL AND PERSONALITY DISORDERS

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**A few words about the author(s):**

Angelika Lenart – family assistant in Social Welfare Centre, PhD student at the John Paul II Catholic University of Lublin, Institute of Pedagogy, Department of General Pedagogy.

**Abstract:**

Conduct disorder (CD) in children and adolescents.

The occurrence of abnormal behavior that is inappropriate for the child's age and inconsistent with social expectations. The disorder can be diagnosed if the pattern of behavior persists for six months or longer and is not simply the result of childish mischief or adolescent rebellion. Conduct disorder is a disorder that is diagnosed and treated by a child psychiatrist.

**Keywords:**

disorder, personality, behavior


# LEVEL OF SELF-CONTROL AND THE INTENSITY OF SMOKING MOTIVES

**Agata Niezabitowska*, Ryszard Poprawa**

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**A few words about the author(s):**

Agata Niezabitowska is a Ph.D. student of psychology at the University of Wroclaw. Her research focuses on the psychology of addictive behaviors, she is particularly interested in the field of cigarette smoking and nicotine dependence.

**Abstract:**

Self-control is an important component in the development of smoking dependence. It also plays an essential role in smoking cessation (Baumeister, Heatherton, & Tice, 2000). This study aimed to determine the relationship between self-control and smoking motives. It was hypothesized that the level of self-control significantly negatively correlates with the severity of smoking motives. A total of 451 smokers (aged 18-60 years, 51% female) participated in the study. Self-control was measured with the Polish version of the Self-Control Scale (Poprawa, 2015) while smoking motives were measured with the Polish version of the Modified Reasons for Smoking Scale (Niezabitowska & Poprawa, 2020). Correlation analysis showed that all motives for smoking (addictive/habitual, a pleasure to smoke/handling, tension reduction/relaxation, social smoking, stimulation) significantly negatively correlate with self-control. The results are consistent with the reports from the literature - the problem with an insufficient level of self-control manifests itself in an increased tendency to engage in risky behaviors, including cigarette use (Baumeister et al., 2000). The results extend existing knowledge by clarifying what specific motives for smoking are associated with low levels of self-control. The results can be used in further research and therapeutic and preventive smoking practice.

**Keywords:**

self-control, motives of smoking, cigarette smoking, dependence


# STACK OVERFLOW TAG PREDICTION USING MACHINE LEARNING

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**A few words about the author(s):**

Alumni of the University of Lodz on the fields of Economic analysis and Finance and accounting. Currently PhD student of Economics in the Department of Central Banking and Financial Intermediation at the University of Lodz.

**Abstract:**

Stack Overflow is the most popular site for sharing and gaining knowledge (in the form of Q&A) among programmers. Each question asked on Stack Overflow contains assigned keywords (tags) usually in the form of an abbreviation or the full name of the programming language. Tags are an important type of text classification for identifying and filtering questions. In addition, the proper matching of keywords can lead to better tailored content for users. Most often, keywords are determined by the author of the post - however, this is an inefficient and error-prone method. Therefore, automating the tagging process is a very useful solution. In my work, I tested different machine learning models for keyword assignment. The prediction of tags was made based on the content of the posted questions. The use of Logistic Regression, Support Vector Machines, Multinomial Bayes, and Neural Networks were compared.

**Keywords:**

big data, machine learning, natural language processing, artificial intelligence


# MONTESSORI EDUCATION DURING LOCKDOWN CAUSED BY THE COVID-19 PANDEMIC – IS IT POSSIBLE? EXPERIENCES OF TEACHERS FROM DOMOWY OŚRODEK MONTESSORI DOM

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**A few words about the author(s):**

Zuzanna Porębowicz is a Montessori teacher, working at Domowy Ośrodek Montessori DOM. She is a student and a tutee in the Tutoring program at The Maria Grzegorzewska University.

**Abstract:**

Last year changed a lot of areas of our lives. As a society, we had to adapt in a lot of ways we never thought possible. One of the areas that experienced drastic changes was education. Not only the lives of students, teachers and parents have changed. The Covid-19 pandemic showed all of the defects of our education system. At the same time, it gave us new tools and opportunities. Not only traditional schools had to implement distance learning. Alternative education schools (e.g., Montessori schools) were faced with an even bigger challenge. Is it possible to work online with Montessori students? When Montessori education is based on children's freedom, working with materials, relationships with teachers and among students, creating an educational environment and a learning community? DOM teachers were able to create a way of distance learning based on Montessori education principles and their student's needs. It valued student's freedom, encouraged their academic curiosity and expanded relationship between members of this learning community.

**Keywords:**

alternative education, montessori education, distance learning during Covid-19 pandemic


# SUSTAINABLE DEVELOPMENT AS ASSESSED BY STUDENTS OF PEDAGOGICAL AND TECHNICAL UNIVERSITIES

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**A few words about the author(s):**

Weronika Wojcieszek – a graduate of the 1st degree studies at the Maria Grzegorzewska Uniwersity specialisation in early childhood and correctional pedagogy; second-cycle student at APS, specialization: preschool and early school education.

**Abstract:**

The presented poster will be a visualization of research in which I compare knowledge, opinions and awareness of sustainable development among students of pedagogical and technical universities.

The subject of Polish development has been around since the nineteenth century, but in Poland only since the nineties of the twentieth century. Initially, the term was associated with ecology. Over time, its scope expanded. Currently, this field includes 17 goals, which are to ensure that the next generation will have the same opportunities for development as we, our parents and grandparents. This concept is already used in almost all versions of life. They are present in the media, we can hear them from politicians who politicians who include the term „sustainable development" into our lives. However, that is not all: companies advertise themselves by Rusing this term, ie. Ikea. Sustainable development has also been included in the constitution of the Republic of Poland.

It is interesting whether students who will soon enter the labor market, will start families and bring up the next generations, know what the principle of development is and what it is guided by. Additionally, is there a difference in the awareness of students studying in pedagogical or technical faculties? The research is an excerpt from the research project of the development research work of dr. Ewa Lewandowska from the Maria Grzegorzewska University.

**Keywords:**

sustainable development


# FOREST EDUCATION OF PRESCHOOL CHILDREN AS AN ELEMENT OF EDUCATION FOR SUSTAINABLE DEVELOPMENT

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**A few words about the author(s):**

Student of Special Education at The Maria Grzegorzewska University in Warsaw. She directs her professional development towards Early Support of Child's Development.

**Abstract:**

In response to public concerns about the dangers of the human-environment relationship, in 1969 the Secretary-General of the United Nations issued a report entitled: "The problems of human environment". This event initiated activities related to the improvement of the environmental situation - global conferences or the publication of reports. In the first half of the 1970s, the term 'sustainable development' was used for the first time, aimed at increasing people's awareness of the limited resources of the environment and taking responsibility for the manner and purpose of their use. The concept also includes the education of society about sustainable development, the needs of the environment and the methods of its effective use. These activities will favor future generations living in this environment and using the same natural resources. Forest education, as one of the elements of education, introduced at the pre-school stage, will enable shaping the attitude responsible for human interactions with the environment.

**Keywords:**

forest education, preschool education, sustainable development, human-environment relationship

ABSTRACTS OF

# PRESENTATIONS


# MEDICAL SCIENCES


# PHYSICAL ACTIVITY OF ADOLESCENTS AGED 12-14 ON THE EXAMPLE OF STUDENTS FROM THE SCHOOL AND KINDERGARTEN COMPLEX NO. 9 IN RZESZÓW

**Elżbieta Wilczyńska*, Karolina Babiarz, Patrycja Jaskierska, Jarosław Herbert**

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**A few words about the author(s):**

The authors represent the Students Scientific Circle of Travelers of the University of Rzeszów.

**Abstract:**

Physical activity is an essential factor for maintaining health and proper development, therefore it should be undertaken from an early age.The main aim of the study is to analyze the physical activity of young people aged 12-14 attending the School and Kindergarten Complex No. 9 in Rzeszów. The research used the International Physical Activity Questionnaire (IPAQ) and the "pedometer-free step and calorie counter" smartphone application. The study uses the recommendation to perform 10,000 steps a day. As shown, only 14% of the surveyed adolescents achieve the recommended number of steps per day (10,000 steps). On the other hand, referring to the IPAQ questionnaire, it was found that the physical activity of students in terms of gender and intensity did not show any significant difference.

**Keywords:**

physical activity, health, youth, IPAQ, the "pedometer" application


# DEBUNKING MYTHS ABOUT THE IMPACT OF HIGH PROTEIN DIETS ON BONES DENSITY AND KIDNEY HEALTH

**Magdalena Dul**

*Rzeszow University of Technology*

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**A few words about the author(s):**

My name is Magdalena Dul. I am a student at the Rzeszow University of Technology. My main field of interest is the impact of nutrition on the functioning of the human body.

**Abstract:**

Protein is incredibly important for good health. It must be consumed every day to meet the body's needs. The Dietary Reference Intake for protein is 0.8 grams per kilogram. However, a lot of evidence supports a higher protein intake for weight loss and other health benefits. Despite these confirmations there are many myths associated with consuming too much protein. In particular it is commonly believed that a high protein diet causes bone loss and kidney damage. The first of these misconceptions came from the belief that higher intake of protein in the diet causes a state of acidosis. To prevent the blood from becoming too acidic, it is believed that calcium is removed from bones to neutralize the acid. The second one is based on the correct, yet misinterpreted, idea that consuming more protein by patients with pre-existing kidney issues contributes to further deterioration of renal function. The aim of this work is to present a review of the literature associated with high protein intake and debunk these myths.

**Keywords:**

protein, health, renal function, bone density


# THE MEANING OF ENTEROBIUS VERMICULARIS INFECTION IN APPENDICITIS ETIOLOGY

**Izabela Gura*, Natalia Krzyżanowska, Aleksandra Machnio, Kinga Cichoń**

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**A few words about the author(s):**

We study pharmacy and medical analytics at the Medical University of Lublin. We are interested in parasitology and molecular biology, which we believe to be prospective and very important branches of science.

**Abstract:**

Enterobius vermicularis is a cosmopolitan parasite and one of the most common human-infecting helminths in temperate and cool climates, as well as in developed countries. It has a simple transmission rout, so re-infection is one of the main causes of elongation of the infection. E. vermicularis, also called pinworm, crawls itself to the lumen of the appendix, leading to the appearance of some clinical manifestations which resemble acute appendicitis. Accumulation of eggs from female E. vermicularis can lead to the obstruction and inflammation of the appendix. Globally, the reported incidence of this parasite's infections in patients with symptoms of appendicitis ranges from 0.2% to 41.8%.

This shows E. vermicularis as a factor related to acute appendicitis.

**Keywords:**

Enterobius vermicularis, appendicitis


# MULTIFACTOR ANALYSIS OF LIFE QUALITY OF ENDOMETRIOSIS PATIENTS

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**A few words about the author(s):**

The authors of the study are students and academics from the Pomeranian Medical University in Szczecin.

**Abstract:**

INTRODUCTION: Endometriosis is a common health problem affecting many women. The cause of endometriosis is not fully known, and curing this ailment is based on symptomatic treatment. Main complaints associated with endometriosis are: chronic pain located in pelvis, intensity of such pain is varying, it may prevent patients from productive and satisfactory existence. The focus of this research is a multifactor analysis of life quality of women with diagnosed endometriosis.

MATERIALS AND METHODS: 343 women qualified for this research. They have been divided in 2 groups: first is the research group comprised of 180 women and second is the control group which numbered 163 healthy women. The research tools used in the study are: Mini-COPE questionnaire, Hospital Anxiety Depression Scale, International Physical Activity Questionnaire, Female Sexual Function Index and original questionnaire.

RESULTS: Conducted research proved that there is higher frequency of depression and anxiety related behaviors among women diagnosed with endometriosis; prevalence of beforementioned behaviors is also relative to presence of clinically existent sexual dysfunctions. Furthermore, research group members presented lesser ability to cope with stress than the control group.

CONCLUSION: Endometriosis can be a serious cause of lowering quality of life of women in many aspects of life such as: frequency of behaviors associated with depression, anxiety, sexual activity.

**Keywords:**

endometriosis, quality of life, chronic pain


# THE FREQUENCY OF CHOSEN FOOD PRODUCTS INTAKE AMONGST POLISH AND TURKISH STUDENTS OF VARYING BODY MASS, BEFORE AND DURING THE COVID-19 PANDEMIC

**Barbara Janota*, Kamil Mąkosza, Natalia Zięba, Marika Wlazło, Martyna Czapla**

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Supervisor of the scientific society: dr n. med. Elżbieta Szczepańska.

**Abstract:**

The restrictions, being the results of the COVID-19 pandemic, have influenced people all around the world. The latest constraints linked to the ongoing epidemiological situation have impacted lifestyles of the students and may also have led to some changes in their diets. Conducting a study that aims to assess the frequency of the consumption of certain foods, could be helpful in introducing the nutrition education to those who are in need of improving one's eating habits, in regard to their individual needs.

The aim of this research was to compare the students' intake of particular groups of food products before and during the pandemic. The study, in which 435 students of Polish and Turkish nationality have taken part, has been conducted via an online proprietary survey during the winter season of 2020/21.

After having calculated the body mass index (BMI), the participants have been divided into two groups: with normal (n=313), and with abnormal (n=122) body mass. To test the differences of the consumption of the food products between those two groups, the Wilcoxon test has been used. The p-value <0.05 was considered statistically significant.

No statistically significant differences were observed between the two groups in regards of the frequency of the intake of recommended groups of food products before and during the pandemic. However, there are some considerable differences between the groups in consumption of foods that are unrecommended.

**Keywords:**

nutrition, students, pandemic


# THE POSSIBILITY OF COMPLETE REMISSION IN AN INOPERABLE TUMOR - A NEUROBLASTOMA CASE REPORT

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**Abstract:**

The article presents a case report of a 5-year-old-girl diagnosed with neuroblastoma -frequent tumor of childhood. It localizes in the sympathetic ganglia. Nonspecific symptoms may occur. The diagnosis is based on imaging scans. The modality depends on the tumor location and stage.

A 5-year-old girl was examined because of loose stools. By the use of abdominal USG and CT, a focal lesion was detected. It relocated the pancreas, liver, and IVC. The tumor enclosed the visceral trunk and upper mesenteric artery. The tests showed elevated NSE and DOPA. The diagnosis was: a differentiating neuroblastoma MYCN(-).

The patient underwent treatment for 10 months. Due to the location, resection was excluded. Despite intensifying chemoradiotherapy, no regression was reached.

Despite an extensive, inoperable residual abdominal mass, the girl stayed in complete remission. In follow-up imaging studies, the tumor's dimensions and nature indicated the stabilization. The observation lasted two years.

**Keywords:**

neuroblastoma, unresectable tumor, MYCN(-)


# THE IMPACT OF TREHALOSE ON INTRACELLULAR AND EXTRACELLULAR NUCLEOTIDE METABOLISM IN BREAST CANCER AND ENDOTHELIAL CELLS

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**A few words about the author(s):**

Student of 4th year of medicine in Medical University of Gdańsk, currently affiliated with International Research Agenda: 3P Medicine Laboratory, focused on breast cancer microenvironment, especially tumor associated macrophages and fibroblasts.

**Abstract:**

In this study we assessed the impact of trehalose on intra and extracellular nucleotide metabolism in 4T1 and H5V cells. Murine immortalized heart endothelial cell line (H5V) and Murine mammary gland cancer cell line originally obtained from BALB/c mice (4T1) were used. Ectonenzymes activity (eADA, CD73) was measured with appropriate substrate: adenosine for eADA and AMP for CD73. After 5, 15 and 30 minutes of incubation samples were taken to asses levels of ectoenzymes breakdown products and remaining substrates (AMP, adenosine, inosine) in high-performance liquid chromatography (HPLC). In order to measure of intracellular activity, we added HClO4. After freezing procedure, supernatant was neutralized, collected, centrifuged and analysed for the concentration of nucleotides and metabolites with HPLC. Protein concentration was measured with Bradford method. Our study revealed that concentrations of trehalose between 0,5 and 5 mM reduce the level of intracellular NAD in 4T1 cells. We also observed the decrease of intracellular guanosine level in both H5V and 4T1 cells after trehalose application. In addition, an association between trehalose and reduced activity of eADA was found in 4T1 and H5V cells. Our study indicate that trehalose have impact on extra and intracellular metabolism of 4T1 and H5V cells, but this effect is more significant in 4T1 cells. These findings suggest potential of trehalose in cancer treatment and modulation of endothelial function.

**Keywords:**

trehalose, 4T1 cells, H5V cells


# SILICONE WRISTBANDS- AN EMERGING TOOL IN HUMAN EXPOSURE ASSESSMENT STUDIES

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**Abstract:**

In this day and age pollution of the environment is considered an issue of great importance, as the list of contaminants continues to grow, along with their alarmingly high concentrations noted in miscellaneous matrices.

The extensive range of accessible sampling methods allows for exhaustive and credible measurements and analyses to be performed, even on vaguely problematic media. Indoor air and dust sampling have been proven to be prerequisites for many human exposure assessment studies, in particular research applied on semi-volatile organic compounds.

Amongst numerous explorations of said chemicals conducted with the use of advanced active samplers, and with clear prominence of these methods, the ease of employment and valuable data sets that are being obtained with the application of passive samplers need to be acknowledged. Portable passive samplers offer an insight onto a broader understanding regarding personal human exposure, as the measurements result in a time-weighted mean of exposure values across different microenvironments.

With the use of silicone wristbands as passive samplers a pilot study has been conducted, with the aim of primarily establishing the scope of usage of said sampling devices in human exposure assessment to insecticides most commonly found in veterinary pharmaceuticals. Preliminary studies confirmed the fitness of silicone personal passive air samplers for application in further research concerning the matter.

**Keywords:**

passive sampling, silicone wristbands, exposure assessment, pesticides


# OCCURRENCE OF DIASTASIS RECTI ABDOMINIS IN WOMEN IN LABOUR DEPENDING ON NUMBER OF PREGNANCIES AND ASSESSMENT OF FREQUENCY AND TYPE OF PHYSICAL ACTIVITY

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**Abstract:**

Abdominal rectus muscle dehiscence is an increasingly common postpartum discomfort. It is based on the separation of the rectus abdominis muscle in the midline of the body. It causes changes in the appearance and functioning of the musculoskeletal structures, which may change posture and muscle tension. The aim of the study was to assess the impact of the number of pregnancies on the occurrence of diastasis of the rectus abdominis muscle (DRAM) and to assess the physical activity undertaken. 354 women with recti abdominal muscle dehiscence participated in the study. Recruited on social forums for postpartum ladies. The research tool was the original questionnaire containing questions about physical activity and the size of the DRAM with the use of the Curl-Up test in the form of a self-test. Statistical analysis was performed using the Statistica program. The level of significance was $p \leq 0.05$. There was a correlation between the number of pregnancies and the occurrence of rectus abdominal muscle dehiscence ($p=0.001$). Before pregnancy, women were more likely to take up physical activity than during it. Multiplicity can be a risk factor in influencing the occurrence of DRAM.

**Keywords:**

diastasis recti abdominis, physical activity, pregnancy


# INFLUENCE OF OBESITY ON THE DEVELOPMENT OF GASTROENTEROPANCREATIC NEUROENDOCRINE TUMORS

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**A few words about the author(s):**

I am a PhD student at Ludwik Rydygier Collegium Medicum in Bydgoszcz, Faculty of Medicine. Medical biology is our passion.

**Abstract:**

Gastroenteropancreatic neuroendocrine tumors (GEP-NETs) derive from a diffuse neuroendocrine system present in the gastrointestinal tract and the pancreas. They are heterogeneous in location, malignancy potential, therapeutic options and functionality, which makes their diagnosis difficult. About 50% of them are detected accidentally during surgical procedures. Both the risk of GEP-NET and obesity increase with age. It is known that obesity and the metabolic syndrome are associated with a significant burden on the health and condition of the body, being a risk factor for both chronic diseases and cancer. The probable carcinogenic mechanisms in obesity include: inflammation, hyperinsulinemia, excessive production of estrogen, disturbed balance of biogenic amines with pro-or anti-proliferative effects. Although the influence of obesity on the development of neuroendocrine neoplasms is not entirely clear, many studies confirm the possible influence of obesity-related metabolic effects on the increase in the frequency of GEP-NETs. It has been suggested that the imbalance of the immune system (disturbed release of pro-and anti-inflammatory factors) and the inflammatory components infiltrating the tumor environment may constitute a favorable environment for the development of GEP-NETs.

**Keywords:**

inflammation, neuroendocrine tumors, obesity


# ISOTOPE DIAGNOSTICS OF NEUROENDOCRINE TUMORS WITH THE USE OF RADIOLABELLED SOMATOSTATIN ANALOGUES

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**A few words about the author(s):**

I am a PhD student at Ludwik Rydygier Collegium Medicum in Bydgoszcz, Faculty of Medicine.

**Abstract:**

Gastroenteropancreatic neuroendocrine tumors (GEP-NETs) are still rare and complex disease entities that pose many clinical challenges. The detection of neuroendocrine neoplasms has increased in recent years, which is probably due to the increased availability of a number of innovative methods of imaging and radioisotope diagnostics. The most sensitive method of radioisotope diagnostics is isotope diagnostics with the use of radiolabelled somatostatin analogues (SRI). The use of this diagnostic method was a significant achievement in the detection of GEP-NETs, increasing the sensitivity of both primary disease localization and micrometastases.

**Keywords:**

neuroendocrine tumors, radioisotope diagnostics, somatostatin, radiolabelled somatostatin analogues


# COPEPTIN – NEWLY DISCOVERED MARKER OF CARDIOVASCULAR DISEASES

**Dominik Dudek (1)*, Weronika Falęcka (1), Jan Milanowski (1), Jarosław Nuszkiewicz (2), Karolina Szewczyk-Golec (2)**

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**A few words about the author(s):**

Dominik Dudek is a fifth-year's student of laboratory medicine at Collegium Medicum, Nicolaus Copernicus University; member of Students Research Club of Medical Biology. Interested in; laboratory diagnostics, genetics and molecular biology.

**Abstract:**

Copeptin was detected in 1972 by Dirk A. Holwerda. It is a stable glycosylated peptide, which is derived from the cleavage of the precursor of arginine-vasopressin. It contains 39 amino acids and has molecular weight of approximately 5 kDa. Copeptin is hormone, which is involved in the arginine-vasopressin (AVP) system. It is cosynthesized along with AVP hormone in the hypothalamus. Copeptin's physiology is largely unknown, yet it is suggested that copeptin is involved in folding of the AVP precursor and it might have some role as a prolactin-releasing factor. Copeptin's serum concentration ranges between 1 and 13.8 pmol/L. Concentration of this glycosylated peptide is increased in several clinical conditions, such as hypertension, chronic kidney disease and also in cardiovascular diseases. This discovery shows great diagnostic and prognostic potential. It is very useful tool when combined with other markers. It might add great value in differentiate diagnosis. Newly discovered role of copeptin shows great clinical significance for treating cardiovascular diseases.

**Keywords:**

biomarker, cardiovascular diseases, copeptin, diagnostics, serum concentration


# CURCUMIN: CAN IT SLOW CANCER GROWTH?

**Weronika Dudzińska (1)*, Gabriela Ciuńczyk (1), Martyna Słowikowska (1), Joanna Kotyńska (2), Monika Naumowicz (2)**

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**Abstract:**

Cancer is the main public health and economic issue in the world and one of the most deadly diseases with growing prospects for the coming decades (population aging). Therefore the search for new effective drugs able to combat cancer diseases still represents a challenge for many scientists. Although new cancer treatments are available, many patients turn to natural products for cancer prevention as well as for the management of treatment-related symptoms. Natural products primarily target proliferating tumor cells. Chemoprevention by phytochemicals such as flavonoids or carotenoids is of great interest and is considered to be an inexpensive, readily applicable, acceptable, and accessible approach to cancer control and management. One of the promising bioactive natural compounds is curcumin.

Curcumin is a lipophilic flavonoid polyphenol with antioxidant and anti-inflammatory properties, extracted from turmeric, the rhizome of the ginger family. The therapeutic benefits of the polyphenol have been demonstrated in multiple chronic diseases: inflammation, arthritis, neurodegenerative diseases, and cancers. Curcumin exhibits anticancer ability by targeting different cell signaling pathways including growth factors, cytokines, transcription factors, and genes modulating cellular proliferation and apoptosis. The presentation shows the structure, properties, and effects of human health of curcumin including its potential role in cancer care and prevention.

**Keywords:**

curcumin, cancer prevention, polyphenols, bioactive compounds


# VITAMIN D AND ITS ROLE IN PARKINSON'S DISEASE

**Weronika Falęcka (1)*, Dominik Dudek (1), Jarosław Nuszkiewicz (2), Karolina Szewczyk-Golec (2)**

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Weronika Falęcka is a fourth-year's student of laboratory medicine at Collegium Medicum, Nicolaus Copernicus University; working for three years at the Students Research Club of Medical Biology. Interested in; cancer diagnostics and treatment.

**Abstract:**

Vitamin D or 1α,25-dihydroksycholekalcyferol (Calcitriol) is a fat-soluble secosteroid that exerts its effects by binding to the vitamin D receptor (VDR). Diet rich in fatty fish and dairy products, as well as endogenous synthesis stimulated by UVB (ultraviolet B) sunlight (wavelength, 290–315 nm) are major sources of vitamin D for humans. Vitamin D is associated not only with calcium-phosphate homeostasis but also with many other health conditions, including Parkinson's disease (PD). PD is a progressive neurodegenerative disease characterized by tremor and bradykinesia. PD is mainly described by the loss of dopaminergic neurons in the substantia nigra. The probability of developing PD increases with age. Vitamin D presents an active neurotrophic and neuroprotective effect and participates in the synthesis of glutathione. This enzyme catalyzes the synthesis of nitric oxide, a free radical that is responsible for cell damage. Neurotrophic and neuroprotective action of vitamin D suggests that this vitamin can stimulate the protection and growth of neuronal cells. Some research shows that higher vitamin D concentrations are linked to reduced risk and severity of PD. What is more, it is also beneficial for cognitive abilities. Therefore, vitamin D is potentially a great remedy to slow down the progression of neurodegenerative diseases, such as PD and can positively alter patient's non-motor symptoms.

**Keywords:**

neurodegenerative disease, Parkinson's disease, vitamin D


# ACUTE IMPACT OF BLOOD FLOW RESTRICTION ON STRENGTH-ENDURANCE PERFORMANCE DURING RESISTANCE EXERCISE

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**A few words about the author(s):**

Jerzy Kukuczka Academy of Physical Education in Katowice graduate, strength and conditioning coach and former athlete.

**Abstract:**

Blood flow restriction (BFR) is a training method that involves the use of an inflatable cuff, tourniquet or elastic wrap, applied proximally to the muscles being trained, in order to limit blood delivery to and from contracting muscles. BFR is a strategy most often used during low-load resistance exercise and has been shown to be beneficial for patients, athletes, as well as the elderly. Available scientific literature affirms the impact of BFR on the number of performed repetitions and time under tension during resistance exercise, which are the parameters used to determine strength-endurance performance. Although a few studies have demonstrated that the use of BFR may result in a decrease of the maximal number of repetitions performed during single-joint resistance exercise with low external loads, BFR has also been shown to improve strength-endurance performance. However, the acute changes resulting in an increase of the maximal number of repetitions performed, as well as time under tension occurred during multi-joint, high-load resistance exercise under BFR condition. Furthermore, high or extremely high cuff pressure was utilized. These findings suggests that the value of external load, cuff pressure and type of an exercise may impact acute effects of BFR on strength-endurance performance.

**Keywords:**

occlusion, resistance exercise, ischemia, repetition


# TREATMENT OF PATIENTS DIAGNOSED WITH GASTRIC CANCER IN THE LIGHT OF CURRENT GUIDELINES

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**A few words about the author(s):**

Justyna Jandernal – specialist in clinical oncology, dealing in the diagnosis and treatment of cancer patients for several years. Dr hab. Ewa Ziółkowska – specialist in oncological radiotherapy, professor at the Academy of Kalisz at the Medical Faculty.

**Abstract:**

Gastric cancer is a disease often extending secretly. Patients begin to show symptoms when the disease is already advanced locally and regionally, and it's also often accompanied by distant metastases. Gastric cancer metastatic is characterized by a poor prognosis, and patients do not qualify for the radical treatment. The intensive development of diagnostic methods in oncology has contributed to an increase in the detection of gastric cancer in the earlier stages of its advancement, and the combination of several therapeutic methods planned by an interdisciplinary team of specialists enables the improvement of the results of treatment in this group of patients. In our presentation, we present the current guidelines for the diagnosis and treatment of patients with gastric cancer at various stages of advancement. We also emphasize the great importance of early detection of this disease and thus enabling patients to recover completely.

**Keywords:**

gastric cancer, surgery, chemiotherapy, treatment


# ROLE OF MITOCHONDRIAL DYSFUNCTIONS IN DEVELOPMENT AND COURSE OF ALZHEIMER'S DISEASE

**Dorian Jarek (1)*, Jan Milanowski (1), Jarosław Nuszkiewicz (2), Karolina Szewczyk-Golec (2)**

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**A few words about the author(s):**

Dorian Julian Jarek is a first-year student of medicine at Collegium Medicum, Nicolaus Copernicus University, since October working at the Students Research Club of Medical Biology

**Abstract:**

Alzheimer's disease (AD) is the most common neurodegenerative disease, affecting about 5 million patients every year, 60-70% of whom suffer from dementia. Characteristic symptoms are motor disorders, such as apraxia and non-motor symptoms, including sleep disorders, disorientation, agnosia and the most recognizable symptom, memory loss. All of these are caused by amassing of neurofibrillary tangles and amyloid plaques resulting in neurodegeneration leading to macroscopic atrophy. In addition, a characteristic to Parkinson's disease structure, namely the accumulation of α-synuclein in the form of Lewy bodies, appears in AD. Mitochondrial dysfunctions (MtD) are often associated with the pathogenesis of AD. Amyloid-β (Aβ) and hyperphosphorylated Tau (pTau), proteins associated with AD, affect mitochondrial functioning, making mitophagy defective and altering many functions of these organelles. Aβ affects mitochondria (Mt) through amassing in them, decreasing mitochondrial fusion, disrupting electron transport chain, increasing oxidative stress (OS) and causing synaptic damage. Moreover Aβ, pTau tangles and MtD promote OS, which may cause Aβ accumulation in Mt, further phosphorylation of tau and loss of neurons and synapses. All of these defects have an impact on the development of AD, for example, defective mitophagy leads to the accumulation of defective Mt, which results in reactive oxygen species production and reduced cellular levels of ATP due to its impaired synthesis.

**Keywords:**

Alzheimer's disease, mitochondria dysfunction, mitophagy


# HOW CRISPR/CAS9 COULD CURE LEUKEMIA?

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**A few words about the author(s):**

Science and stregth are women. So am I.

**Abstract:**

Leukemia is the common name for several malignant disorders. This type of blood cancer arises in blood-forming tissues such as bone marrow, from cells in the lymphoid or myeloid lineage. Both leukemias can present in acute and chronic forms of leucocytes in the blood. There are some association between environmental or host factors which promote chromosome breakage like chromosomal translocation. Treatments for leukemia include chemotherapy, radiation therapy and stem cell transplant. Combinations of these treatments may be used. However, the technique of molecular genetics have enable to characterize cancers in ways that were not previously possible and they have allowed them to devise new strategies for cancer therapy. Using powerful biotechnology tools to tinker with DNA inside living cells, scientist can now manipulate and rationally modify the genetic code defines every species on the planet. Nevertheless, gene therapy, by its nature, is also ineffective for a wide range of genetic conditions that aren't caused by missing or deficient genes. New approaches including CRISPR-Cas9 are crucial for functional studies of genetic aberrations driving cancer progression, and that may be responsible for treatment resistance and relapses. By using this approach, diseases can be more faithfully reproduced and new therapeutic targets and approaches found. Therefore, gene therapy has been considered as approachable therapy for leukemia.

**Keywords:**

Leukemia, CRISPR/Cas9, genome editing, gene therapy


# ONCOGENIC VIRUSES AND HEPATOCELLULAR CARCINOMA

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**A few words about the author(s):**

Since, I learned about viruses at university and became fascinated with the way a virus can completely take over your cells and cause cancers. My focus of study and master's degree are concentrate on Vircology and Cancer relationships.

**Abstract:**

According to the Cancer Gene Theory, there are two types of cancer genes. Tumorigenesis could be driven by mutations that result in the activation of oncogenes or the loss of function of tumor suppressor genes. Approximately 12% of human cancers is attributable to oncogenic viruses, both DNA and RNA. Hepatocellular carcinoma, HCC is one of the most common malignant liver cancer. Now it is the fifth most common cause of cancer worldwide. Chronic liver disease and cirrhosis remain the most important risk factors for the development of HCC of which viral hepatitis and excessive alcohol intake are the leading risk factors worldwide. Infection of HBV or HCV is crucial in tumorigenesis. It is necessary to understand biology and theirs life cycle to develop antiviral agents. More work is needed to clarify the global goals for viral hepatitis eradication and improvements in HCC surveillance and therapy.

**Keywords:**

oncogenic virus, cancer, Hepatocellular carcinoma


# COELIAC DISEASE – DIAGNOSIS, TREATMENT AND COMPLICATIONS

**Kamil Klimas (1)*, Agnieszka Święcicka-Klama (1, 2), Małgorzata Korzeniowska (3, 4), Anna Kubica-Celińska (5)**

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**A few words about the author(s):**

All authors of the study are PhD students at Wroclaw Medical University. They conduct research in a wide range of subjects.

**Abstract:**

Coeliac disease is an autoimmune, gluten-dependent enteropathy. It affects people with HLA-DQ2 and HLA-DQ8 antigens located on chromosome 6p21. Under the influence of gluten, a group of various proteins found in wheat and in other grains such as barley or oats, anti-tissue transglutaminase antibodies, anti-endomysial antibodies and antibodies against deamidated gliadin peptides are produced. It leads to an autoimmune reaction and atrophy of the small intestinal mucosa villi. The disease can appear at any age and is often associated with other autoimmune diseases. Globally coeliac disease affects 1 in 100 people and is more often in women than in men.

The multifaceted clinical presentation leads to several phenotypes. The diagnosis is typically based on the presence of typical antibodies: anti-tissue transglutaminase antibodies (IgA), anti-endomysial antibodies (IgA), antibodies against deamidated gliadin peptides (IgG; they are determined in patients with IgA deficiency) and on characteristic histologic findings on small bowel biopsy. Negative HLA-DQ2 and HLA-DQ8 type excludes the diagnosis of coeliac disease. The current available treatment for celiac disease is life-long gluten-free diet. In the case of diet-resistant celiac disease immunosuppressive drugs are used. Untreated coeliac disease leads to serious health complications such as osteoporosis or gastrointestinal cancer. The aim of the study is to discuss the problem of coeliac disease in everyday medical practice.

**Keywords:**

coeliac disease, gluten-dependent enteropathy, villous atrophy


# AN OVERVIEW AND MANAGEMENT OF OSTEOPOROSIS – PATHOGENESIS, RISK FACTORS, CLINICAL MANIFESTATIONS, DIAGNOSIS AND TREATMENT

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**A few words about the author(s):**

All authors of this work graduated from Wrocław Medical University. Nowadays, they are the PhD candidates in 3rd year of full-time doctoral studies at Wrocław Medical University. All authors of this work graduated from Wrocław Medical University.

**Abstract:**

Osteoporosis is a state of low bone mass with microarchitectural deterioration of bone structure leading to their compromised strength with an attendant propensity to fragility fracture. The World Health Organization (WHO) has defined diagnostic criteria for low bone mass and osteoporosis based upon BMD measurements compared with a young adult reference population (T-score). It has been estimated that more than 200 million people are suffering from osteoporosis and it is the most common chronic metabolic bone disease. There are many risk factors of the illness, like aging, gonadal steroid deficiency, Caucasian race, use of drugs, immobilization, alcohol abuse, inadequate diet as well as disorders affecting the gastrointestinal, hematologic, and connective tissue.

The aim of our study was to to systematize knowledge about the illness, their pathogenesis, risk factors, clinical manifestations, diagnosis and treatment. Osteoporosis results in a decreased quality of life, it can also cause increased mortality. It is also a big financial problem to health insurance systems. A reliable and broad education of the medical community and patients should be taken to decrease the prevalence of the illness.

It enables early identification of patients from risk groups, the use of adequate preventive and therapeutic measures, ultimately achieving a reduction in the occurrence of complications and deaths.

**Keywords:**

osteoporosis, pathogenesis, risk factors, treatment


# POSTOPERATIVE PAIN MANAGEMENT IN CHILDREN

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All authors of this work graduated from Wrocław Medical University. Nowadays, they are the PhD candidates in 3rd year of full-time doctoral studies at Wrocław Medical University. The authors conduct research on various topics.

**Abstract:**

Effective treatment of postoperative pain in children is a problem often faced by pediatric anestesiologists.

In 2018, ESPA (European Society for Pediatric Anestesiology) released a set of guidelines regarding the organisation and realisation of pain therapy in children after surgical procedures. The guidlines include a three-step way of escaleting pain therapy. The basis of pain relief is a regular and precise pain level measurement. The other important part of the pain relief process is regular and effective education of medical staff responsible for the pain tratment in children.

The presentation shows the ESPA-recommended guidelines pertaining to the organisation of conducting pain therapy. Those guidelines are based on a three–step ladder of therapy methods that leads to comfortable and effective analgesia.

The first step of the ladder is a basic one , and it includes the most basic and popular methods of pain therapy that should be available in all places providing pediatric anesthesia. The second step includes more advanced methods that are not commonly accessible, but may be used when the basic therapy is ineffective. The third step offers more complicated and specialised methods which could prove effective in pain relief.

The practical aspects of the guidlines have been shown using specific examples of the treatment path in chosen cases of typical children's surgical procedures.

**Keywords:**

children postoperative pain, pain management ladder


# THE USE OF COGNITIVE BEHAVIORAL THERAPY METHODS IN THE TREATMENT OF CANCER PAIN

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Dr hab. Ewa Ziółkowska – specialist in oncological radiotherapy, professor at the Academy Kalisz at the Faculty of Medicine.

**Abstract:**

After cardiovascular diseases, malignant neoplasms are the second cause of death in Poland. A disturbing phenomenon is the steady increase in the incidence and morbidity of malignant neoplasms, progressing dynamically from year to year. One of the basic elements of cancer patient care is the effective treatment of cancer pain. Research shows that pain occurs in 30–50% of patients during active anti-cancer treatment, and in more than 80% of patients in the advanced stage of the disease. The recommended approach in the treatment of chronic cancer pain is cognitive behavioral therapy. The proposed therapeutic program emphasizes the need to increase the patient's activity and change negative thoughts about pain. CBT therapy turns out to be effective in many pain conditions. The proposed program introduces new skills that help cancer patients to cope with pain. The techniques presented include progressive muscle relaxation, cognitive restructuring, and coping strategies. CBT therapy improves the quality of life of people struggling with chronic pain and reduces their dependence on purely medical interventions.

**Keywords:**

chronic pain, Cognitive behavioral therapy, progressive muscle relaxation, cognitive restructuring


# THE ROLE OF SELECTED PRO-INFLAMMATORY CYTOKINES IN HYPERTENSION AND PULMONARY ARTERIAL HYPERTENSION

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Jan Skarbimir Milanowski is a first-year student of medicine at Collegium Medicum, Nicolaus Copernicus University, working at the Students Research Club of Medical Biology for last two years. Interested in neurodegenerative diseases.

**Abstract:**

Hypertension (HT) is a world- common disease of multiple etiology. It is defined as a persistently sustained blood pressure (BP) greater than 140/90 mmHg. Presumably, by 2025, it may affect more than 1.56 billion people worldwide. Pulmonary arterial hypertension (PAH) is most often diagnosed as idiopathic (IPAH) or in connection with connective tissue disease. Genetic aspect is also important. Mostly, PAH is associated with left heart disease or directly with lung damage. BP in PAH reaches over 25 mm Hg. Both HT and PAH are manifested by fatigue, shortness of breath, chest pains and inability to exercise intensively.

It is clinically important to link the occurrence and course of both diseases with the determination of pro-inflammatory cytokine level. The role of the immune system in the induction of both HT and PAH are not fully understood. It is known that interleukin 6 (IL-6) increases the proliferation of monocytes when elevated, the action of which determines strong increases BP. Activation of B type cells by interleukin 21 (IL-21) enhances the production of immunoglobulin G (IgG) and leads to the exacerbation of HT. Moreover, it was shown that high concentrations of IL-6 and IL-21 enhance hypoxia. The overproduction of interleukin 18 (IL-18) leads to the chronic elevation of BP and remodeling of vascular endothelium.

Understanding the role of pro-inflammatory cytokines in the etiology of HT and PAH may lead to better treatment of patients in clinical practice.

**Keywords:**

cytokines, hypertension, pulmonary arterial hypertension


# CONTEMPORARY METHODS BICUSPID AORTIC VALVE REPAIR

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My name is Marina Milona and I am a 4th-year medical student at PMU and a member of the cardiosurgical research society. My passion is rhythmic gymnastics and in the future, I would like to be a cardiac surgeon.

**Abstract:**

The bicuspid aortic valve is the most common congenital heart defect occurring in about 1-2% of patients, and it is more common in men. From a functional standpoint in BAV's significant aortic stenosis develops at the age of 50-60 years while aortic regurgitation develops at the age of 30 years. Additionally, it is tied with many complications which increase the risk of acute aortic events. Repair techniques related to BAV have been involved over the past 20 years, and BAV repair has become a better alternative with favorable hemodynamics and survival. The incidence of valve-related complications is low, with repair failure being the most frequent of such complications. Using modern repair methods such as nodules, root configuration, concomitant aortic replacement, and aortic annuloplasty most non-calcified BAVs can be preserved or repaired.

**Keywords:**

bicuspid aortic valve, aortic valve replacement, aortic valve repair


# ASSESSMENT OF THE TOLERANCE EFFORT IN PATIENTS AFTER CARDIAC SURGERY WITH TYPE 2 DIABETES AND ELEVATED LEVEL OF GLYCOSYLATED HAEMOGLOBIN (HBA1C)

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The authors of the study are students of physiotherapy at the Pomeranian Medical University in Szczecin. The study was conducted under the supervision of prof. PUM dr hab. Iwona Rotter and Aleksandra Szylińska PhD.

**Abstract:**

INTRODUCTION: One of the basic therapeutic procedures for patients after cardiac surgeries is comprehensive cardiac rehabilitation. Its course is determined by many factors. One of them is co-occurring medical conditions. The aim of this study is to determine the relationship between the occurrence of type 2 diabetes or increased levels of glycosylated haemoglobin and the results of a 6-minute walk test, in patients after cardiac surgery interventions.

MATERIALS AND METHODS: The research was conducted in the SPSK 2 Clinic of Cardiac Surgery of the Pomeranian Medical University in Szczecin. It was attended by 111 patients after cardiac surgery interventions, qualified for stationary cardiac rehabilitation. Statistical analysis was performed using the results of a 6-minute walk test.

RESULTS: On the basis of the collected analysis, it was found that patients with diabetes obtained lower results of both the 6-minute walk test before and after comprehensive cardiac rehabilitation, compared to those without diabetes. The results between the subjects with a glycosylated haemoglobin level of less than 6.5% and those with a haemoglobin level of more than 6.5% ,showed statistically significant differences in the medium result of the 6-minute walk test.

CONCLUSION: The exercise tolerance may be affected by the coexistence of type 2 diabetes and an increased level of glycosylated haemoglobin (HbA1c) in patients after cardiac surgery.

**Keywords:**

rehabilitation, cardiology, walk test


# PRINCIPLES OF PAIN TREATMENT IN ONCOLOGICAL PATIENTS.

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**Abstract:**

Pain is an inseparable part of oncological treatment which, despite the advancement of modern medicine, is still a challenge. The mechanism of its formation is a complex process, and its severity and location are influenced by the type of tumor, tumor size, presence of metastases, applied therapy and coexisting diseases. It is estimated that the prevalence of pain in cancer patients in general is approximately 51%. The most common type of cancer that causes pain is head and neck cancer (> 70%). The percentage of patients who do not receive sufficient help in the treatment of pain is systematically decreasing, but it still concerns about 1/3 of patients. Therefore, pain assessment should be performed at each medical visit, and appropriate scales and questionnaires are used to determine its severity. The basic method of pain treatment is still pharmacotherapy (opioid and non-opioid drugs, psychotropic drugs, cannabinoids, coanalgesics), as well as non-pharmacological therapies (surgical procedures, therapies).

**Keywords:**

pain, oncology, drug therapy, non-pharmacological therapy


# APPLICATION OF ARTIFICIAL INTELLIGENCE (AI) TO DIAGNOSIS OF COVID-19

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Medical students at the Medical University of Lublin. We love broadening our knowledge and gaining new experiences, especially in good company. And that's why we are here!

**Abstract:**

INTRODUCTION: COVID-19 is one of the most serious problems in medicine nowadays. Most of the courses of the disease are asymptomatic or sparsely symptomatic, but in some cases they may be severe or very severe. Some patients develop COVID-19 pneumonia first and lung lesions on chest CT are visible afterwards. Detection of SARS-CoV-2 genetic material by RT-PCR is necessary for diagnosis, however this test is slow and quite expensive. For these reasons, scientists are trying to develop faster methods. Some projects are based on using artificial intelligence and machine learning. The aim of this study was to review the literature and present potential use of AI in diagnosis of COVID-19.

METHODS: Review of articles published on PubMed in the last year.

RESULTS: 4356 chest CT scans were collected from 3222 patients (mean age 49 ± 15 years). There were more men than women (1838 vs 1484). The sensitivity and specificity were 90% and 96%. All COVID-19 cases were confirmed by RT-PCR.

CONCLUSIONS: Artificial intelligence can significantly help doctors diagnose COVID-19 pneumonia, but it cannot detect SARS-COV-2 infection without the pulmonary changes characteristic of COVID-19 pneumonia.

**Keywords:**

COVID-19, artificial intelligence, pneumonia, Computed Tomography


# POTENTIAL IMPACT OF GUT MICROBIOTA IN THE DEVELOPMENT OF OBESITY

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**Abstract:**

INTRODUCTION: More than a third of the world's population suffer from obesity or overweight, which makes it one of the most disturbing problems nowadays. Number of patients with high BMI has been increasing for last years irrespective for various conditions, e.g. sex, geolocation or age. Obesity induces dysfunctions of most biological systems and escalates mortality, encumbers health care system additively; nonetheless any strategy against raising obesity hasn't been implemented yet. One of the exploring approaches is prebiotics and probiotics use. The aim of this study was to review the literature and present the potential role of the gut microbiota in development of obesity.

METHODS: Review of articles published on PubMed in the last 5 years.

RESULTS: Prebiotics and probiotics can affect metabolism with amendments in the intestinal microbiota beneficially. RCTs of probiotics indicated significant but small impact on body mass (<3%) and metabolic parameters, whereas results of RCTs of prebiotics imply neutral influence on it. Outcomes were more visible with fermented milk or yogurt compared to capsule form, which contained plenty bacterial strains.

CONCLUSIONS: The outcomes suggest that obesity is associated with intestinal dysbiosis, which may alter of peptides related to satiety, increasing food intake. Further studies are necessary to assess the relevance of prebiotics and probiotic use in preventing obesity.

**Keywords:**

gut microbiota, obesity, prebiotics, probiotics


# WHAT DO WE KNOW ABOUT SARS-COV-2?

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**A few words about the author(s):**

The author of the article is Bartosz Omasta, a licensed lifeguard, currently a medical student at the 3rd year of the Kazimierz Pułaski University of Technology and Humanities in Radom.

**Abstract:**

The article deals with the topic of the coronavirus, and more specifically SARS-CoV-2. It contains information related to the knowledge collected from the last quarter of 2019 to the first quarter of 2021. This article covers the subject of infectivity, complications, and the effectiveness of vaccinating in Poland and Europe. How has the pandemic been developing in the world? Does the coronavirus affect the development of the conceptus? How do pregnant women experience it and how do children and adults? Problems faced by Polish health care during the pandemic, and the latest pandemic trends in Poland and Europe, with the specification of the countries surrounding Poland. What are the myths that have arisen about the coronavirus and vaccination that have become permanent in the consciousness of the Polish? How is the fight against the coronavirus going to look like in the second quarter of 2021 in Poland?

**Keywords:**

Coronavirus, SARS-CoV-2, vaccination, pandemic developed in the world


# AWARENESS OF THE PELVIC FLOOR MUSCLES WITH SPORT-PERFORMING WOMEN

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**Abstract:**

The pelvic floor muscles (PFM) can be damaged and lose their functions during sports and intensive physical activity. In order to properly care for them, it is necessary to be aware of their existence and forms of protection.

The aim of the study is to determine the level of awareness of sport training women about the pelvic floor muscles.

To check, 129 women aged 15-60 (24.9 on average), who practiced sports (volleyball, handball, running and others) were examined using the questionnaire in paper form and through the Internet.

The results showed that 86% of women have heard of pelvic floor muscles, 80% have heard about pelvic floor exercises, and 54% have had pelvic floor exercises at least once in their life. A positive correlation was detected between the age and the fact of performing the exercises ($p = 0.009$).

A test group shows a high level of awareness in case of existence of the pelvic floor muscles and how to exercise them. However only a bit more than half of the asked women ever used PFM.

**Keywords:**

pelvic floor muscles, sport, women


# TO CURE THE INCURABLE – CRIP-R

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5th year medicine student at PMU in Szczecin. Passionate of genetics, epigenetics and working at lab. Future orthopedic surgeon and marathoner.

**Abstract:**

The development in medicine has shown new possibilities, especially in genetics. One of them is a new method of gene editing – CRISP. The first mention of this procedure was in 1987, but its function was unknown. Around the 2000s Francisco Mojica perform and published effects of his research about new technology – he came up with the acronym CRISP which means Clustered Regularly Interspaced Short Palindromic Repeat. It is a sequence of DNA found in bacteria, which can destroy foreign genetic material. There are two main classes of CRISP-Cas systems. Both are degenerate nucleic acids outside an organism, but the first is composed of multiple Cas proteins, and the second uses a single large enzyme. The mechanism of CRISP is complicated and depends on the type of the system, but as a result, enzymes cut out defective DNA. In the beginning, this technic was applied to food and industry and then was used on human diseases. It can be used not only for gene editing but as a diagnostic tool for different substances or viruses such as SARS-CoV-2. This will be a ground-breaking chance for not only more effective treatment but for curing incurable diseases like genetics or neurodegenerative diseases. In 2020 E. Charpentier and J. Doudna have won Nobel Price for work on CRISPR-Cas9. It confirms how great an opportunity this genome-editing tool is and will be in the future.

**Keywords:**

genetics, genetic diseases, incurable diseases, orthopedics


# QUALITY OF LIFE AND PHYSICAL ACTIVITY OF PEOPLE OVER 60 YEARS OF AGE IN THE ERA OF COVID-19

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**A few words about the author(s):**

The author is interested in the issues of adapted physical activity, in particular in various aspects of functional training of seniors and people with disabilities.

**Abstract:**

Quality of life is sometimes defined as the state of health, both mentally and physically. Psycho-physical well-being depends on many factors, including factors such as physical well-being, sleep quality, pain, and access to health care. It is also worth realizing the importance of non-obvious factors - social relations, support for relatives or the possibility of pursuing personal interests. In own research, an attempt was made to analyze the issue of the quality of life of people over 60 years of age with the help of the WHOOL questionnaire of the World Health Organization at a specific time, which is the Covid-19 epidemic. The subject of interest in particular was the relationship between the declared quality of life and undertaking recreational physical activity. The author also looks for the relationship between the intensity and type of physical exercises undertaken and the subjective assessment of the psycho-physical state.

**Keywords:**

quality of life, physical activity, the elderly, Covid-19, lockdown


# METABOLIC SYNDROME AS A GROWING PROBLEM

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**A few words about the author(s):**

All authors of the study are PhD students at Wroclaw Medical University. They conduct research in a wide range of subjects, but this study was prepared due to a truly global problem of the metabolic syndrome.

**Abstract:**

Metabolic syndrome is the medical term for a group of conditions that significantly increase the risk of atherosclerosis, type 2 diabetes, and cardiovascular mortality. The main components of the metabolic syndrome are as follows: central obesity, insulin resistance, hyperinsulinemia, impaired glucose tolerance or diabetes type 2, atherogenic dyslipidemia and hypertension.

The aim of the study is to discuss the problem of diagnosing metabolic syndrome in everyday medical practice and to emphasize the importance of early identification of patients at risk. Prevention and early treatment of metabolic syndrome could significantly reduce the risk of developing diabetes, hypertension, organ damage and cardiovascular outcomes. The increasing prevalence of metabolic syndrome indicates the need to intensify preventive and therapeutic measures.

**Keywords:**

diabetes, metabolic syndrome, obesity


# POTENTIAL ASSOCIATION OF SUBACUTE THYROIDITIS WITH SARS-COV- 2 INFECTION -REVIEW

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**A few words about the author(s):**

Medical students at the Medical University of Lublin. We love broadening our knowledge and gaining new experiences, especially in good company. And that's why we are here!

**Abstract:**

INTRODUCTION: The SARS-CoV-2 pandemic is currently probably one of the most disturbing and rapidly evolving problems. Although the majority of post-COVID-19 cases involve the respiratory system, extrapulmonary manifestations of the disease are being increasingly reported. Subacute thyroiditis (SAT), which is self-limiting inflammatory disease of potentially viral origin, ordinarily preceded by an upper airways infection, may be one of post-COVID-19 repercussions. The aim of this presentation is to review the literature and present potential association between SARS-CoV-2 and SAT.

MATERIAL AND METHODS: Review of medical research and articles published on PubMed since COVID-19 outbreak.

RESULTS: Most cases of subacute thyroiditis appeared days to weeks after the diagnosis of COVID-19, sometimes as a solitary indication of active SARS-CoV-2 infection. Most frequent symptoms were neck pain, tachycardia, fever, overt thyrotoxicosis evinced by high FT4 and FT3 and low thyrotropin levels. Characteristic accelerated erythrocyte sedimentation rate and increased C-reactive protein levels were exhibited additionally. Organ enlargement and hypoechogenic areas have been noticed on ultrasonography of the thyroid gland.

CONCLUSIONS: The outset of SAT may be considered as a possible complication caused by SARS-CoV-2. However, this issue requires profound research, due to lack of more evidence. Thyroid function should be monitored in patients with COVID-19 during the pandemic.

**Keywords:**

COVID-19, SARS-CoV-2, subacute thyroiditis, thyroid disease


# CHANGES IN THE SURFACE CHARGE OF LIPID VESICLE UNDER THE INFLUENCE OF ROSMARINIC ACID

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**A few words about the author(s):**

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**Abstract:**

The biological membranes, due to its properties, play vital role in living organisms. They can interact with various compounds, including bioactive ones. The surface charge is an important factor affecting the membrane condition. Its observation enables us to understand how the interacting substances influence on biochemical and physicochemical processes in membranes. The rosmarinic acid is a naturally-occurring compound and belongs to the polyphenols group. Numerous studies show its remarkable biological effects, including anticancer, antiviral, antibacterial and anti-inflammatory activities. This has aroused great interest among scientists, because it could be used in the treatment of various diseases, including cancer. Finding a natural cure could be a hope for future therapies. In this study, the influence of rosmarinic acid on changes in the surface charge of lipid vesicles was examined. The liposomes were obtained by sonication. The measurements of the electrophoretic mobility of liposomes, from which the surface charge density was obtained, were carried out using the microelectrophoretic method using the Zetasizer Nano ZS apparatus (Malvern Instruments). The tests were performed as a function of the pH of the electrolyte solution (0.9% NaCl). On the basis of the obtained results, it was proved that the rosmarinic acid changes the surface charge of the lipid membrane, thus influencing the equilibria between the membrane and the environment.

**Keywords:**

rosmarinic acid, liposomes, membranes, surface charge density


# FUTURE DIRECTIONS OF NURSING RESEARCH

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**Abstract:**

Research conducted in nursing science have a great importance to this discipline and its recipients. The quality of nursing practice depends on nursing research which purpose is continuously accumulate and update nursing knowledge. Moreover, the nursing research have a very wide range of possibilities for scientific discovery, because they focus on both the advancement of nursing knowledge and nursing practice.

The tasks included in the activities of nurses are not only conducting, organizing and participating in the research, but also implementing the research results into the work and searching for the scientific reasons to improve the quality of work and increase the satisfaction from healthcare. Moreover, the nurses should follow the advancement of knowledge, but also to make an active contribution by planning and conducting research that results in the advancement of knowledge in the field of nursing.

In recent years, there has been significant development in the field of nursing research, thanks to which the staff has gained access to large resources of knowledge, ready for practical use. This research focuses on the pursuit of improving the quality of nursing sciences and the promotion of methodological education. In conclusion, professional nurses and these focused on scientific work will need to improve their research skills in order to use them to solve new problems that arise in the field of the healthcare.

**Keywords:**

nursing practice, nursing research, research strategies


# CONTRACEPTION THEN AND NOW

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4th year student of medicine, Jan Kochanowski University in Kielce.

**Abstract:**

The purpose of contraception is to prevent unintended pregnancy. The earliest forms of contraception were found in ancient times. Nowadays, natural and artificial methods are used. Natural birth control is based on ovulation cycle. The artificial contraception includes hormonal, mechanical and chemical methods. The most important criterion in choosing contraception is its effectiveness, measured by the Pearl Index. The patient's beliefs also have influence on the choice of way of birth control.

**Keywords:**

birth control, contraception, menstrual cycle


# THE FEAR OF PREGNANT WOMEN ABOUT TAKING UP PHYSICAL ACTIVITY IN THE COVID-19 PANDEMIC

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**A few words about the author(s):**

Aleksandra Żmuda is a member of the KINEZIS student research club. Magdalena Ptak is a doctor of health sciences. She works as a urogynecological physiotherapist. Hanna Mosiejczuk has been involved in scientific work for many years.

**Abstract:**

SUMMARY: Nowadays, pregnant women have many different options for taking up physical activity. Exercise performed by pregnant women during various activities has a positive effect on the course of pregnancy. In 2020, the COVID-19 disease, caused by the SARS-CoV-2 virus, appeared in the world. Aim of the study is to indicate the fears of pregnant women taking up physical activity in the COVID-19 pandemic. The study material consists of 209 pregnant women who were or are in the second pregnancy during the COVID-19 pandemic. The research tool used in the study was an online questionnaire with questions about the reasons for changing physical activity during a pandemic.

RESULTS: Among the surveyed, 13.9% of women indicated that the fear of taking up physical activity during the second pregnancy was caused by the COVID-19. On the other hand, 42.6% of the respondents indicated that the fear of wasn't caused by the COVID-19 pandemic, and 43.5% of the respondents didn't feel any fear before starting physical activity in the second pregnancy. Fears indicated before starting physical activity during the first pregnancy were: fear of miscarriage (29.2%), fear of premature delivery (23%), gestational diabetes (2.9%) and arterial hypertension (1.9%). 43% of respondents weren't afraid to undertake physical activity during the first pregnancy.

CONCLUSION: The fear of taking up physical activity among pregnant women wasn't caused by the COVID-19 pandemic.

**Keywords:**

physical activity, pregnancy

ABSTRACTS OF

# POSTERS


# MEDICAL SCIENCES


# TEMPORARY CROWNS – AN INDIRECT METHOD WITH USING ACRYLIC RESIN WITH RAPID POLYMERISATION**

**Michał Bystram (1)*, Klaudia Suligowska (2), Marta Tempińska (2), Dorota Zalewska-Kryńska (2), Patrycja Jeziorska (1), Jakub Goszka (1), Małgorzata Mateńko (1), Agnieszka Letkiewicz (1), Zofia Kuffel (1), Agata Milewska (1)**

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**A few words about the author(s):**

The members and tutors of the student scientific association at the Department of Dental Techniques and Masticatory System Dysfunctions of the Gdańsk Medical University.

**Abstract:**

INTRODUCTION: Temporary prosthetic reconstruction protects the prosthetic base from harmful chemical, mechanical, thermal and bacterial factors.
AIM: Fabrication of a temporary restoration - a prosthetic crown. It was modelled using two techniques: a segmental method and using veneer part of acrylic tooth at the university laboratory.
MATERIALS AND METHODS: Members of the Scientific Circle at the Department of Dental Techniques and Masticatory System Disorders of the Medical University of Gdańsk and their tutors modelled a temporary crown using two techniques: a segmental method and using an acrylic tooth veneer. The crown of the tooth was modelled with modelling wax and then there was made a silicone key in order to change the wax for the acrylic mass. Next, the restoration underwent mechanical treatment. In the second technique, the veneer part of the finished acrylic tooth was matched to the tooth prepared on the plaster model and the rest of the restoration was modelled with modeling wax. Subsequent processing steps were carried out in the same way as in the first technique.
RESULTS: Two temporary restorations modelled using a segmental method and a veneer part of a finished acrylic tooth.
CONCLUSIONS: Although temporary restorations are a transitional stage of prosthetic treatment, they play a meaningful role in the prosthetic reconstruction process. Fabricating restorations is a multi-stage process, and each step affects quality of work and effectiveness of a treatment.

**Keywords:**

temporary crowns, reconstruction, acrylic mass

**Poster and abstract comes from the article „Temporary crowns - direct and indirect execution with the use of fast polymerizing acrylic plastic - part I" published in the journal Nowoczesny Technik Dentystyczny 4/2020 pages 26-32.


# THE ROLE OF HELICOBACTER PYLORI AND EPSTEIN-BARR VIRUS IN GASTRIC DYSBIOSIS AND GASTRIC CARCINOGENESIS

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**A few words about the author(s):**

M. Dzikowiec: Assistant at the Department of Biomedicine and Genetics during a doctorate research. The aim of research is to look for diagnostic/prognostic noninvasive biomarkers in patients with gastric cancer, focusing on gene and miRNA expression.

**Abstract:**

The human microbiome is composed of communities of bacteria, fungi, eukaryotic parasites and viruses, that have a greater complexity than the human genome itself. The microbiome under homeostasis condition stay in a friendly mutual relationship with the host. However, the composition and diversity of this microbe community is dynamic and can be changed under the influence of environmental factors, like diet, antibiotic therapy, lifestyle, as well as host's genotype and immunity. There is strong evidence that microbiota is essential for human development, immunity and nutrition, and that dysbiosis contributes to the host's susceptibility to infection and disease. The aim of this review was the description of the gastrointestinal microbiome in health and the role of two infectious agents: Gram-negative bacteria Helicobacter pylori and Epstein-Barr virus in the development of gastric cancer. Biodiversity of microbiota of the human stomach may be more complex than we previously thought, and colonization of H. pylori is the most important pathogen with clear impact on this diversity. The co-infection with Epstein-Barr virus cause chronic gastritis, and the inflammatory process is significantly increased. It has been proven that chronic inflammatory infection caused by infectious agents increases the risk of stomach cancer. The process of carcinogenesis begins with chronic inflammation that causes atrophic gastritis, intestinal metaplasia, dysplasia, and finally cancer.

**Keywords:**

gastric microbiota, Helicobacter pylori infection, EBV infection, gastric cancer, dysbiosis


# TEMPORARY CROWNS: MANUFACTURING IN CAD/CAM TECHNOLOGY

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**Abstract:**

INTRODUCTION: Temporary crowns are an important transitory stage of prosthetic treatment. They perform protective function for grinded tooth structures while awaiting for a final restoration. Modern dental technique to manufacturing temporary crowns uses CAD technology – Computer Aided Design and CAM technology – Computer Aided Manufacturing.

AIM: The purpose of the study was to present stages of the process of manufacturing a temporary crown using CAD/CAM technology and making a temporary crown with the same method.

MATERIALS AND METHODS: There was presented methodology of manufacturing a temporary restoration of a central incisior in CAD/CAM technology. The temporary – milled crown was designed and made with PMMA discs.

RESULTS: A split model was made and next it was scanned. In order to design restoration of "11" tooth in CAD system, the preparation margin, path of insertion and contact points were determined. Subsequently proper thickness and shape were established on the basis of the adjacent tooth. Next the temporary crown was milled in CAM system using PMMA pucks. Finally the restoration was individualized using paints for PMMA.

SUMMARY: Temporary crowns are an important element of prosthetic treatment. Modern – digital methods of manufacturing temporary crowns offer a wide range of individualization of work.

**Keywords:**

temporary crown, PMMA, CAD/CAM


# TEMPORARY CROWN - AN INDIRECT METHOD USING THERMOSETTING ACRYLIC MATERIAL**

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**Abstract:**

INTRODUCTION: Provisional crowns are used while permanent restorations are being fabricated. This is a significant stage of prosthetic treatment, due to the fact that they protect both a grinded tooth and periodontium. Temporary restorations also allow the patient to maintain their mastication and aesthetic appearance.
PURPOSE: Fabrication of a temporary crown from thermosetting acrylic material, using two different techniques.
MATERIALS AND METHODS: The members of the Student Scientific Association at the Department of Dental Techniques and Masticatory System Dysfunctions together with the group's tutors made temporary crowns using an indirect method with the application of two techniques. The first one consisted in shaping the entire restoration in wax, whereas the second one involved using a facial surface of an acrylic tooth and modelling of the remaining surfaces with wax. This material was then replaced with a heat-cured acrylic.
RESULTS: Temporary crowns indirectly fabricated from thermosetting acrylic material using two different techniques.
CONCLUSIONS: Temporary restorations are an essential part of the clinical procedure. Their fabrication consists in specific processes that have to be carried out to create the designed restoration.

**Keywords:**

dental crown, temporary, acrylic material

**Poster and abstract comes from the article "Temporary crown – an indirect method using thermostatic acrylic material and CAD/CAM techniques–part II " published in the journal Nowoczesny Technik Dentystyczny no. 5/2020, pages 26-33.


# THE USE OF CLAS AND HYDROGELS IN DRUG RELEASE

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**A few words about the author(s):**

The authors of this work are representatives of The Medical University of Silesia.

**Abstract:**

Controlled release drug delivery systems allow an active substance to be slowly unblocked and released to the body. Various matrices are used to create them. Hydrogels belong to the group of materials with great potential in science, especially in biomedicine. Clay nanocomposite hydrogels have been developed in response to the growing demand for multifunctional materials with mechanical and biological products. Clays are materials commonly used in pharmacy. These hydrophilic, naturally occurring inorganic mineral salts are used as excipients or active substances. It has been observed that they may interact with drugs reducing their absorption. Such interactions can be exploited to obtain technological and biopharmaceutical benefits in the control of drug release.

**Keywords:**

clays, hydrogels, drug release

ABSTRACTS OF

# PRESENTATIONS


# TECHNICAL SCIENCES


# BIOCHEMICAL AND NANOMECHANICAL ANALYSIS OF NORMAL AND CANCER CELLS OF THE HUMAN GASTROINTESTINAL TRACT EXPOSED TO ROS BY RAMAN IMAGING AND AFM

**Karolina Beton*, Beata Brożek - Płuska**

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**A few words about the author(s):**

Karolina Beton is a PhD student at Lodz University of Technology. Her scientific research conserns Raman Spectroscopy and imaging and their applications in medical diagnostics. Her scientific work include research on cells biology and their culturing.

**Abstract:**

In recognition of importance of cancer in Poland and in the World to public health we conducted the research on medical diagnostics of cancer by Raman spectroscopy and imaging and AFM and on influence of reactive oxygen species (ROS) on cancer transformation based on nanomechanical and biochemical properties of human tissues and cells.

Tumor transformation is associated with activation of proto-oncogenes and/or inactivation of suppressor genes or abnormal cell differentiation. More and more data indicate that one of the most important factors responsible for the induction of tumor transformation are ROS. At the same time, ROS production is a natural part of oxygen metabolism. The balance between the production of ROS and the efficiency of antioxidant systems prevent oxidative stress and subsequent damage to important macromolecules such as DNA, proteins and lipids.

Spectroscopic and microscopic methods allow fast, precise and unambiguous differentiation of healthy and cancerous biological samples. Moreover, a very important advantage of Raman spectroscopy is ability to identify many individual components of biological samples in one measurement. Based on Raman spectra cell structures such as the nucleus, mitochondria or cell membranes can also be visualized.

Statistically assisted analysis of Raman spectra and AFM data such as: stiffness, Young modulus shows that normal and cancerous human cells can be distinguished based on their unique vibrational and nanomechanical properties. This work was supported by the National Science Centre of Poland (Narodowe Centrum Nauki) UMO-2017/25/B/ST4/01788.

**Keywords:**

colon cancer, Raman spectroscopy, colon cells, supplementation, oxidative stress, Raman imaging


# THE APPLICABILITY OF DISTILLATION AS AN ALTERNATIVE IN NUCLEAR REPROCESSING

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**A few words about the author(s):**

Dominik Böhm has studied chemical engineering at the Technical University of Dortmund. After his master's degree, he worked in the field of nuclear distillation at the "Institute for Solid-State Nuclear Physics" and started his PhD in 2018/2019.

**Abstract:**

Nuclear reprocessing of fuel material is one of the most important issues in the question of nuclear waste reduction. With regard to the appropriate reusability of nuclear waste, modern reactor concepts are being developed that do not operate on the basis of solid fuels as they are used today, but more advanced techniques based on molten salts. Two examples of these are the Molten Salt Technology with diluted molten salt used as fuel material and a newer concept, also known as the Dual Fluid principle, which uses two liquid process cycles of undiluted molten fuel from possible chlorinated nuclear waste fuel material and molten liquid lead for indirect cooling. For successful application, a separation unit is required in which always unburnt non-fissile material components can be fed back into the reactor. Therefore, in this study, the separation performance and applicability of distillation as a separation alternative to common liquid-liquid extraction technique have been investigated using a two-stage exemplary validated and independently designed simulation model for a total reflux distillation column under highly simplified thermodynamic conditions and assumptions.
Two representative nuclear recycling examples have been simulated, showing the great potential of high-pure uranium, thorium and plutonium separation using industrial distillation columns.

**Keywords:**

actinides, industrial distillation, nuclear recycling and reprocessing, total reflux distillation


# COULD SALIVA BECOME THE GOLD STANDARD IN CLINICAL TRIALS?

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**A few words about the author(s):**

Marta Gaweł – 4th year student of chemical analysis at the Faculty of Chemistry, University of Lodz. Justyna Piechocka - assistant professor at the Department of Environmental Chemistry, Faculty of Chemistry, University of Lodz.

**Abstract:**

Currently, blood (plasma/serum) and urine are gold standards in the field of clinical, toxicological and forensic science. In parallel, scientists have started to put considerable effort into investigating new sources of biomarkers, which can be obtained in a non-invasive and non-intrusive way in order to facilitate large scale screening of humans diseases. As a result, more and more attention has been paid on saliva as a specimen for clinical examination.

This work focuses on LC/CE/GC based methods which have been proven to be suitable for analysis of aminothiols in human saliva, namely homocysteine, cysteinyl-glycine, ɤ-glutamyl-cysteine, cysteine and glutathione. These sulfur-containing amino acids comprise one of the classes of compounds which association with development of several civilization diseases is well-established. In particular, it has been shown that they are implicated in cardiovascular, cancer and neurodegenerative diseases. In addition, pre-analytical considerations like essential sample preparation procedures steps and separation of primary aminothiols will be discussed hoping to stimulate further interest in the field.

**Keywords:**

saliva, aminothils, civilization diseases, homocysteine, cysteine


# PHASE TRANSITION AND PHYSICAL PROPERTIES OF DABCOKCL ORGANIC-INORGANIC HYBRID COMPOUND

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**A few words about the author(s):**

I am a student of last year of Technical Physics at Wrocław University of Science and Technology. I study and specialise in Nanoengineering. I am interested in physical chemistry, material synthesis, their functionalization and investigation.

**Abstract:**

The organic-inorganic hybrid of the following formula (C6H14N2)K(ClO4)3 (DabcoKCl) were synthesized using isothermal evaporation method, whereas its phase transitional and physical properties were investigated. The differential scanning calorimetry (DSC) measurements have determined the thermodynamic parameters of phase transition. The dynamic impedance spectroscopy (DIS) revealed the presence of both relaxation and conduction mechanism processes which are attributed to ordering of organic elements of this compounds. The experiments enable to study the role of organic Dabco in the structural phase transition. The switching of dielectric constant around the phase transition show promising applications in the field of electrical and electronic devices, including phase shifters and rewritable optical data storage.

**Keywords:**

organic-inorganic hybrids, phase transition, differential scanning calorimetry, dielectric spectroscopy


# SYNTHESIS OF NEW QUATERNARY ALKYLAMMONIUM SALTS OF BILE ACID DERIVATIVES

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**A few words about the author(s):**

I'm student of the last year of chemistry at the Faculty of Chemistry, Adam Mickiewicz University in Poznań. I'm planning to continue my PhD studies to be able to develop my knowledge and extend my skills in organic chemistry and biochemistry.

**Abstract:**

New quaternary alkylammonium salts of bile acid were obtained by reaction of deoxycholic acid with bromoacetic acid bromide to give bile acid 3α-bromoacetates. These intermediates were subjected to nuclephilic substitution with N-alkylamine to give the final quaternary ammonium salts. The structures of products were confirmed by spectral e.g. 1H and 13C NMR, FT-IR analysis and mass spectrometry ESI-MS as well as PM5 semiempirical methods. Estimation of the pharmacotherapeutic potential has been accomplished for synthesized compounds on the basis of Prediction of Activity Spectra for Substances (PASS).

**Keywords:**

steroids, bile acids, deoxycholic acid, cholic acid, quaternary ammonium salts, bromoacetyl substituted derivatives, spectroscopic methods


# NUMERICAL OPTIMIZATION OF GRAVITY CASTING PROCESS FOR FORGED BLANKS MADE OF ALUMINUM ALLOY

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**A few words about the author(s):**

Aleksandra Pierwoła – A graduate of Computer-Aided Engineering Processes at the Faculty of Foundry in AGH University of Science and Technology in Kraków, present PhD student of Material Engineering in Doctoral School AGH in Kraków. Michał Szucki – A graduate of Metallurgy at the Faculty of Foundry in AGH University of Science and Technology in Kraków, PhD of Material Engineering and lecturer in AGH University of Science and Technology in Kraków.

**Abstract:**

The optimization of gravity casting technology in sand mold for aluminium-copper forged blanks was carried out using the Magmasoft®. Solidification simulation for base project (castings and simple gating system) indicated significant porosity and some hot spots in castings. In order to reduce porosity it was proposed to use the side, middle and upper feeders. The selected dimension of feeding and gating system were optimized based on two-step numerical optimization. First step was based on only solidification simulations (focused only on porosity and yield), and the second on both pouring and solidification processes (focused on smooth filling, reduce air contact and still porosity). This allowed choosing the best feeders and predicting the best gating system dimensions, in a short time. Increasing the height of side and upper feeders and the diameter of middle feeder provided porosity reduction, while decreasing the diameter of side and middle feeders favoured yield. Some reduction of gating dimensions was important for smooth feeling and air contact minimisation, what is beneficial for increasing yield too. On the other hand, large gating dimensions will contribute porosity reduction. Unfortunately, simultaneous fulfilment of all objectives is not possible and a compromise is needed, but the casting soundness was found as the most important. Finally, the observation of all analyzed relationships allowed proposing the best geometry of the gating and feeding systems.

**Keywords:**

optimization, Magmasoft, forged blanks, gravity casting


# CELLULOSIC ETHANOL AS SECOND GENERATION BIOFUEL

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**A few words about the author(s):**

I am a 3rd year student of chemical and process engineering at the Faculty of Process and Environmental Engineering at the Lodz University of Technology. I am interested in environmental protection, in particular renewable energy sources.

**Abstract:**

Since the 1950s, the world's population has nearly tripled. This resulted in a significant increase in energy demand, hence the development of biofuel technology.

Biofuels are one of the renewable energy sources. They are produced mainly from plant biomass and agricultural waste, such as manure or slurry. There are three generations of biofuels, depending on what feedstock they are made of. In Poland, 79% of energy comes from fossil fuels, while renewable energy sources, including biofuels, account for 14.1%.

Cellulosic ethanol is one of the 2nd generation biofuel. It is made of waste and raw materials unfit for consumption, including grasses, corn straw and wood chips. Cellulosic biomass is problematic to process due to high content of lignocellulose, which is difficult to break down into simple sugars. Two methods of producing cellulosic ethanol have been developed: biochemical, which involves decomposition of cellulose into glucose and then fermentation, and thermochemical, in which biomass is converted into syngas.

The development of cellulosic ethanol in the United States was initiated by the introduction of the Renewable Fuel Standard (RFS) policy in 2005. Currently, despite some improvements in the production process, the production of cellulosic ethanol is practically unprofitable. Unless a breakthrough technology is developed, the future of cellulosic ethanol is in question.

**Keywords:**

cellulosic ethanol, biofuels, sustainable energy, lignocellulosic biomass


# BIOLOGICAL ACTIVITY OF NEW INDOLE DERIVATIVES

**Natalia Berdzik (1)*, Arleta Sierakowska (1), Weronika Kozanecka-Okupnik (1), Beata Jasiewicz (1), Lucyna Mrówczyńska (2)**

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**A few words about the author(s):**

Our research group from the Faculty of Chemistry is focused on the modification of natural origins compounds, mainly alkaloids. Prof. Lucyna Mrówczyńska investigates the biological activity of these compounds.

**Abstract:**

Indole is an organic chemical compound, present in many natural compounds of plant and animal origin. This compound and its derivatives have broad physiological activity. We obtained three groups of indole derivatives. The first group consisted of the conjugates containing indole and uracil moiety, which were sythesized by the reaction of indole alkaloid - gramine with appropriate uracil (uracil, 2-thiouracil, 6-methyl-2-thiouracil, thymine, 6-methyluracil and barbituric acid). The second group were indole's derivatives, containing triazole ring, synthesized through a CuAAC procedure. The last group was indole dimers. Antoxidant activities of new indole's analogues were investigated.

**Keywords:**

indole, gramine, click chemistry, antioxidant activity, haeomlysis


# PRELIMINARY RESEARCH OF THE RELATIONSHIP BETWEEN THE PARAMETERS OF CZECH LIGNITE AND THE MERCURY CONTAINED IN THEM

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**Abstract:**

Mercury is a chemical element recognized as one of the most toxic naturally occurring elements. Presence of this element in nature is a result of natural phenomena, as well as a result of anthropogenic activities. Coal combustion is the second largest source of anthropogenic mercury emissions to the atmosphere.

The aim of the study is to find possible correlations between samples of Czech lignite and their mercury content. The carbon parameters selected for the interpretation were elemental analysis and technical analysis. Technical and elemental analysis of 5 tested lignite samples was performed in accordance with PN ISO standards, while mercury content was determined by atomic absorption spectrometry from the DMA-80 Milstone analyzer.

The obtained results indicate that the mercury content is statistically significantly correlated with the calorific value. Correlations between the mercury and elemental carbon content were also noticed. The tested values didn't show the correlation between the sulfur content and mercury content. Gathered results allowed to claim a sentence, that most part of mercury is correlated to mineral fraction, albeit not for the sulfur fraction.

The taken research is preliminary and will be continued in order to understand the influence of the composition of the burned lignite on the behavior of mercury during emissions to the atmosphere.

**Keywords:**

mercury, lignite


# BOUNDARIES OF ARTIFICIAL INTELLIGENCE

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**A few words about the author(s):**

The author has majored in Applied Mathematics at Wroclaw University of Technology, he currently works as an operations analyst in the field of finance.

**Abstract:**

The incoming news regarding a rapid grow of Artificial Intelligence development combined with stunning names like „Intelligence Revolution" assigned to this process may give an impression that its effects will exceed the field of science, impacting social structure, our perception of the surrounding world or the human nature itself. The goal of this presentation is to provide a concise overview of AI's concept and mathematical methods used in its construction. We will then discuss its possible implementation and limitations by describing a real life analytical problem. Whether these limitations may be reduced or abolished will be explored next. Finally, we will see if such advancements allow us to identify any boundaries to the said process. These will include examining such problems as AI surpassing natural intelligence, gaining consciousness and performing creative actions.

**Keywords:**

artificial intelligence, machine learning, limitations


# CAPACITANCE PROPERTIES OF MESOPOROUS CARBON AND C60PD POLYMER COMPOSITE

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**A few words about the author(s):**

Izabela Cimoch is a PhD student in the Department of Chemistry at the University of Bialystok. She received her MSc degree in 2017. Her research activity are focused on synthesis and properties of fullerene polymers and their composites.

**Abstract:**

Fullerenes can be incorporated into main polymeric chain to form a ,,pearl necklace“ structure. Two-component coordination polymers of fullerenes and transition metal complexes in which fullerene cages are bonded with transition metal atoms or complexes into polymeric network are the most frequently studied system of this class of polymers. These materials exhibit electrochemical activity in the negative potential range due to the good electron-accepting properties of the fullerene moieties. Poly-C60Pd exhibits high conductivity, good electrochemical and chemical stability, and high capacitance performance. It is also easy to produce by simple chemical synthesis in solution containing C60 and zero-valent palladium complex. Poly-C60Pd can be also combined with different carbon nanomaterials (multi carbon nanotubes, nanoonions, graphene). Carbon nanomaterials exhibit large specific surface areas, high pore accessibility, good mechanical and chemical stability, and low cost of production. These composites exhibit significantly higher capacitance compared to pristine poly-C60Pd.

Hybrid materials composed of mesoporous carbon (MC) and poly-C60Pd were formed under chemical conditions. Morphology and electrochemical properties of composite MC/poly-C60Pd were studied. The most attention was paid for its capacitance properties. The MC/poly-C60Pd composite exhibits high capacitance that is several times higher compared to pure polymeric material.

**Keywords:**

conducting polymer, nanocomposite, fullerene


# MOLECULAR DYNAMICS STUDY OF THE STRUCTURE OF MONOLAYERS INVOLVING JANUS AND SPHERICAL PARTICLES

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**A few words about the author(s):**

Prof. Stefan Sokołowski, prof. Wojciech Rżysko and MSc Łukasz Baran work in Department of Theoretical Chemistry of Faculty of Chemistry of Maria Curie-Sklodowska University and BSc Karolina Dąbrowska who is a student of chemistry.

**Abstract:**

This work presents the results of molecular dynamics simulations of the systems containing Janus dimers and circular particles. Each Janus particle has been built of two circles combined together by harmonic potential. Two models have been tested, in the first one entities were tangentially jointed, whereas in the second one they were partially overlapped. The size of spherical particles was twice smaller than the size of units building Janus dimers. Interactions in the system were as follows: attractive forces between both entities forming Janus particle and one of these circles and spherical particles, repulsive forces between all the other elements. Both disordered and lamellar phases have occurred in the systems containing isotropic particles and Janus dimers. It has to be emphasized that the most pronounced ordered networks were observed in the systems including the same amount of isotropic and Janus particles, particularly when Janus dimers have been built by partially overlapped entities. We have observed that greater amount of isotropic particles has destroyed the lamellar structures.

**Keywords:**

Janus dimers, molecular dynamics, simulation, radial distribution functions, nematic order parameter


# HEALTH-PROMOTING PROPERTIES OF FERULIC ACID AND ITS USE TO INCREASE THE BIOACTIVE POTENTIAL OF STARCH

**Kamil Dędek*, Justyna Rosicka-Kaczmarek, Ewa Nebesny, Gabriela Kowalska, Karolina Miśkiewicz**

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**A few words about the author(s):**

Kamil Dędek is PhD candidate at the Institute of Food Technology and Analysis at the Lodz University of Technology. His primary interests focus on issues related to the study of carbohydrates, hydroxy acids and healthy properties of food ingredients.

**Abstract:**

Ferulic acid, FA (4-hydroxy-3-methoxycinnamic acid) is an organic chemical compound belonging to the phenolic acid with the total formula $C_{10}H_{10}O_4$. It is distinguished by a strong antioxidant effect and the ability to absorb UVA and UVB radiation. Its bioactive properties effectively contribute to combating diseases known as civilization. Due to its pro-health properties, it is readily used in the cosmetic and pharmaceutical industries.

Starch is a natural, biodegradable plant polysaccharide. In addition to synthetic polymers, it is now more and more often used natural, renewable and sustainable source for the production of materials on a micro scale. It is composed of two fractions – rectilinear amylose and helical, branched amylopectin. Due to the presence of free spaces, amylopectin can easily accept the ligand inside. The complex compounds formed in this way constitute a kind of microcapsule, protecting the ligands against the destructive effects of external factors.

This work characterizes the health-promoting properties of ferulic acid and presents the possibilities of interaction of starch with ferulic acid molecules. Additionally, the results of the conducted research showing selected properties of starch ferules are shown.

**Keywords:**

pro-health properties of ferulic acid, starch ferulates


# TESTING THE RESISTANCE TO OXIDATION OF DIESEL FUELS

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**A few words about the author(s):**

Didactic assistants of the Military University of Technology.

**Abstract:**

The paper discusses the issues related to the aging of diesel fuels during their storage. The aim of the research was to determine the oxidation resistance of diesel fuels (ON) taken at various stages of the fuel logistics chain: from refineries, through fuel bases to petrol stations and the consumer. The samples previously prepared for testing the baseline parameters were exposed to light, heat, water and oxygen for 16 weeks. The PetroOxy device was used to determine the main parameter, i.e. resistance to oxidation, according to PN-EN 16091: 2011. The final result is the conclusion that fuel oxidation deteriorates the performance of fuels.

**Keywords:**

oxidation resistance, oxidation, PetroOxy


# OVERVIEW OF SELECTED PRODUCTION METHODS AND HYDROGEN STORAGE

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**A few words about the author(s):**

Authors are young science from Military University of Technology in Warsaw. Two of them are phD students – mechanical engineering who works at university as academical teacher or technologist. They are intresting in liquid fuels.

**Abstract:**

Hydrogen economy is one of the important aspects related to the development of the global economy. Hydrogen due to its properties and global resources is a very promising energy carrier. However, the practical use of hydrogen is still underdeveloped. Although there are many methods of production and storage, many obstacles, both technological and administrative, are encountered. Additionally problematic is also the economic aspect, which limits efficient technologies in use because of the high investment costs for installation and subsequent use. The use of renewable energy sources both as a raw material for production and as an energy source in production and storage processes seems to be of key importance in the aspect of the hydrogen economy.

**Keywords:**

hydrogen, hydrogen economy, storage, production


# INFLUENCE OF VULCANISATION STATE OF EPDM RUBBER ON BLOOMING - OPTIMISATION OF INJECTION MOULDING PROCESS FOR VISUAL ASPECTS OF COATED RUBBER PARTS

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**A few words about the author(s):**

Piotr Głąb – Rubber compounds technologist, Maciej Banaszkiewicz – Special processes and automation coordinator, Tomasz Piechota – Special processes specialist.

**Abstract:**

Vulcanisation state is recognised as key factor influencing blooming of rubber. Residue of unreacted cure system ingredients migrate to surface creating solid deposition, called bloom. Blooming becomes visible a few days up to dozen months after production, making it's analysis complex. Goal of this part of study was to verify hypothesis that vulcanisation state impact blooming and develop model for optimisation of injection moulding process for vulcanisation state and for blooming. DOE planning of experiment was used to prepare experiment and analyse result's. Vulcanisation state for injection moulding increase with increase of temperature, time of injection and temperature of compound before injection, however vulcanisation time impact is significantly lower than expected. Vulcanisation state in range 63% to 93% do not influence blooming of EPDM rubber, however tested compound was new generation with reduced tendency to bloom. Additional tests with former compound generations proved impact of significant mould temperature on blooming, however with temperature changed also flow of compound in die. Further investigation of process parameters impact on blooming is necessary.

Research work has been done in frame of project POIR.01.02.00-00-0256/16-00, title: "Development and preparation for implementation within the company based on the construction and validation of the prototype innovative on a national scale paintshop for painting automotive seals".

**Keywords:**

EPDM, rubber, blooming, vulcanisation


# TRIPODAL SQUARAMIDE-BASED HETERODITOPIC ION PAIR RECEPTOR TO EFFECTIVE EXTRACTING INORGANIC SALTS

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**A few words about the author(s):**

We specialize in the design and synthesis of ion pair receptors, capable of selectively recognizing inorganic salts and extracting them from aqueous solutions. We also design and synthesize fluorescent and electrochemical sensors.

**Abstract:**

Over the recent years molecular recognition has become a frequent topic of research field of supramolecular chemistry scientists. This is confirmed by numbers of scientific articles concerning design and synthesis of compounds capable of recognizing cations, anions and neutral molecules. Special example of this type of compounds are electrically neutral ion pair receptors, which are able to simultaneously bind anions and cations. Significant increase of interest in this type of structures is due to the fact that anions and cations playing a huge role on many levels of science, such as medicine, biology or environmental protection. We have designed and synthesised new heteroditopic, tripodal, squaramide-based ion pair receptor, built of three connected arms. Each of the arms has crown ether as a cation binding domain and squaramide unit allowing for interaction with anions. Based on the spectrophotometric and spectroscopic measurements we have proved that ion pair receptor is able to bind anions more strongly in the presence of potassium cations. By 1H NMR and DLS measurements we showed that the initially formed intermolecular network of receptor in chloroform was affected upon contact with ions and formed new inorganic-organic associates soluble in organic phase. This feature was employed to extracting potassium sulphate from aqueous solutions, which was proved with ion chromatography.

**Keywords:**

molecular receptor, ion pair, squaramide


# INTERACTIONS OF THE INGREDIENTS OF THE SELECTED DAIRY INDUSTRY PRODUCT WITH POLYPHENOLIC PREPARATIONS AND THEIR INFLUENCE ON THE ANTIOXIDANT POTENTIAL OF THE ENRICHED PRODUCT

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**A few words about the author(s):**

I am PhD student at the Lodz University of Technology. My research interests lie in the fields of encapsulation of polyphenolsusing different methods and the application of the resulting preparations to food products.

**Abstract:**

Phenolic compounds are substances that have a positive effect on human health, mainly due to their antioxidant activity. Preparations of phenolic compounds can be used to enrich food poor in these compounds or food in which they are naturally absent, e.g. cottage cheese.

The aim of the research was enrichment of the cottage cheese with inclusion complexes of selected polyphenols (quercetin, (+)-catechin, gallic acid) with β-cyclodextrin (β-CD), 2-hydroxypropyl-β-cyclodextrin (HP-β-CD) and determination of the influence of these complexes on the antioxidant potential of the enriched products. The Total polyphenolic kontent using the Folin-Ciocalteau method and the antioxidant activity by in vitro tests (DPPH, FRAP, ABTS, the iron chelating activity) were determined in the enriched cottage cheeses.

The highest content of phenolic compounds was observed in the products with the addition of inclusion complexes catechin with β-CD (24-28 mg of catechin/g of sample). The enriched products had the ability to scavenge DPPH and ABTS free radicals. Products with HP-β-CD-quercetin complex showed the greatest ability to reduce iron ions (25.90 μM of Trolox/g of sample), and with HP-β-CD-catechin preparation the lowest one (16.96 μM of Trolox/g of sample). The iron chelating activity of the starting product was 18.42% while after the addition of the obtained complexes to the product it increased to 23-24% for the complexes with HP-β-CD and decreased to 4-14% for the complexes with β-CD.

**Keywords:**

inclusion complexes, dairy products, polyphenols, antioxidant activity


# CONDUCTANCE STUDIES OF SODIUM SALTS OF SELECTED DICARBOXYLIC ACIDS IN WATER AT TEMPERATURES OF 283.15K TO 313.15K

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**A few words about the author(s):**

I am a doctor of chemistry at the University of Lodz. I conduct research in the field of physical chemistry of solutions: electrical conductivity, density, viscosity, refractive index of electrolyte solutions, dielectric measurements.

**Abstract:**

The electric conductivities of aqueous solutions of sodium salts of oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, pimelic acid, suberic acid and azelaic acid were measured from T/K = 288.15 to 313.15, in the concentration range $0.0001 < c/mol \cdot dm^{-3} < 0.0150$. In order to determine the limiting molar conductivity of the tested electrolytes, Barthel's low concentration chemical model (lcCM) was used.

Based on the obtained data, the limiting molar conductance the diffusion coefficients, and the Eyring's enthalpies of activation of charge transport were calculated for the studied anions. The changes observed in the obtained values were also analyzed with regard to the numbers of -CH2- groups in the aliphatic chain of the tested acids.

**Keywords:**

electric conductivities, aliphatic dicarboxylic acids, limiting molar conductance


# LITHIUM-AIR CELLS - TECHNOLOGICAL LIMITATIONS THAT HAMPER POTENTIAL

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**A few words about the author(s):**

Denis Kopiec is a PhD student at the Wrocław University of Technology, where he conducts research on nanostructural cathode materials for rechargeable lithium-air cells.

**Abstract:**

The intensive development of mankind entails an equally dynamic increase in the demand for electricity. Combined with the increasing mobility of people and the development of electric vehicles, it is necessary to develop new electricity storage systems, in particular batteries for electrical cars. Among the proposed solutions, lithium-air cells attract particular attention of researchers. This paper presents basic information about lithium-air cells and the principle of their operation. The features of these cells, demonstrating their great potential, were discussed, and the technological difficulties that must be overcome before their commercialization is possible.

**Keywords:**

lithium-air cells, battery, energy storage systems


# INVESTIGATION OF THE EFFECT OF KAEMPFEROL AND MYRICETIN ON THE PROPERTIES OF BIOLOGICAL MEMBRANES

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**A few words about the author(s):**

Dr hab. Aneta D. Petelska, prof. University in Bialystok is a head of Bioelectrochemistry laboratory in the Department of Physical Chemistry and Paulina Laszuk is a PhD student in the same Department.

**Abstract:**

Kaemferol and myricetin are compounds of plant origin from the group of flavonoids. They show anti-cancer and antioxidant properties, support the circulatory system and prevent diabetes. To investigate the compounds' influence, as mentioned earlier on cell membranes' physicochemical parameters, studies were carried out using model membrane-monolayers at the water / air interface. Using the Langmuir method, changes in surface pressure as a function of the surface area occupied by the molecule in the monomolecular layer (π-A isotherm) were analyzed. Images of the monolayers formed at the water/air interface were recorded using Brewster angle microscopy (BAM) with simultaneous recording of the π-A isotherm. The obtained BAM images in connection with the analysis of π-A isotherms (Langmuir technique) allow for the characterization of changes in the monolayer's morphology and the formation of domains or aggregates during phase transitions accompanying the compression process of the monolayer. Based on the research results obtained, the assumption of a 1:1 complex between mixed monolayers components. The proper supply was determined, the specific surfaces of pure substances and their mixtures with phosphatidylcholine in various volumetric relationships, stability constants, and energy of complex formation the resulting complexes.

**Keywords:**

monolayer, Brewster Angle Microscopy, π-A isotherm, kaempferol, myricetin


# INTERDISCIPLINARITY AS A KEY TO SUCCESS IN DESIGNING HIGH-CLASS PHOTOGRAPHIC AND CINEMA LENSES ON THE EXAMPLE OF IRIX LENSES BRAND

**Piotr Madura (1)*, Krzysztof Holak (2)**

*(1) Irix R&D Department in Poland, Q Media Renata Adamczyk,*
*(2) AGH University of Science and Technology, Faculty of Mechanical Engineering and Robotics*

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**A few words about the author(s):**

Piotr Madura – a senior specialist in the Irix R&D department, dealing with the analysis of optical systems. Dr Krzysztof Holak – researcher in AGH, specialist in the processing and analysis of medical images and monitoring of mechanical structures.

**Abstract:**

Designing photographic and film lenses is a complex and interdisciplinary process that requires the efficient combination of optical, mechanical, and industrial design engineering with the visual arts. The presentation contains an introduction and description of the most important stages of creating high-class innovative photo and cinema lenses, on the example of Irix 150mm f/2.8 Macro 1:1 and Irix Cine 15mm T2.6, along with the results of research and development works. It presents a wide range of guidelines opening the process of designing optical systems and the criteria for assessing the obtained performance parameters in the context of their impact on the quality and aesthetics of the obtained image. The issue of the influence of mechanical and functional solutions on the precision of lens positioning, structural strength, and functional values of the designed lenses was also discussed. The work also includes an analysis of possible directions for the development of optics in relation to the changes taking place on the photographic and film market and the improvement of image sensors. The presentation also covers the deals with the search for opportunities to introduce improvements in future lens design with the use of modern materials and technologies in the field of surface engineering.

**Keywords:**

lenses, optics, design, photography, interdisciplinary


# SMART INDOOR NAVIGATION SYSTEM: INCREDISCOPE

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**A few words about the author(s):**

Project Manager at Unisystem since 2018. He graduated from the Gdańsk University of Technology Microwave and Antenna Engineering Department. Research areas include optoelectronics, embedded electronics, and electromagnetic compatibility.

**Abstract:**

The presentation describes the idea of a newly developed, innovative in global scale system for indoor navigation. Incrediscope is a fully autonomic structure using e-paper displays and Bluetooth technology. The original positioning and navigation system for people inside the building can intuitively and naturally lead a person to the desired destination.

Our presentation consists of three main parts. In the beginning, we present a short introduction and basic assumptions about indoor navigation systems in general. Then we describe the core idea of the Incrediscope system and the principles we adopted while designing. In the third part, we present some technical information about software. We prepared three different applications: for administrators, e-paper displays, and the last one dedicated to smartphone users.

**Keywords:**

e-paper, incrediscope, autonomic navigation system, indoor positioning and indoor navigation (ipin), bluetooth technology


# METHODS OF PRODUCTION SECOND GENERATION BIOFUELS

**Patrycja Nogas*, Tomasz Filipiuk, Ilona Dziobek**

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**A few words about the author(s):**

Authors are young science from Military University of Technology in Warsaw. Two of them are PhD students – mechanical engineering who works at university as academical teacher or technologist. They are interesting in liquid fuels.

**Abstract:**

The article present methods of production second generation biofuels. In this study authors focused on classification on biomass, biofuels generations and technological aspect production.

**Keywords:**

biofuels, second generation, biomass


# HANDHELD 3D LASER SCANNER IN UNDERGROUND HERITAGE DOCUMENTATION

**Agnieszka Ochałek**

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**A few words about the author(s):**

PhD student at the Department of Mining Area Protection, Geoinformatics and Mining Surveying (AGH UST). Coordinator of many projects in the field of geodesy, mining surveying and geoinformatics.

**Abstract:**

Cultural Heritage, including Underground Heritage, are constantly becoming a part of digital collections (virtual museums, scientific repositories, digital libraries). The process of collecting and managing spatial data forces engineers and researchers to constantly look for rapid and more efficient spatial mapping solutions for documentation of indoor and outdoor objects. Recently, Simultaneous Localization and Mapping (SLAM) technologies are getting more popular. SLAM allows collecting the measurement data simultaneously with the navigation data. This paper presents results of inventory measurements with the usage of a hand-held laser scanning system - the GeoSLAM Zeb Horizon - for the 3D digitization of underground drifts of Underground Włodarz Complex - one of the Riese Complexes in Lower Silesia, Poland.

**Keywords:**

SLAM, scanning 3D, underground heritage, cultural heritage, surveing


# THE OPTIMAL MEASUREMENT PARAMETERS FOR THE DIAGBELT MAGNETIC SYSTEM ON THE TEST CONVEYOR

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**A few words about the author(s):**

Dominika Olchówka received a MSc degree in 2020. She is research assistance in Department of Mining at Wroclaw University of Science and Technology. Her main research interest is non-destructive testing of conveyor belts.

**Abstract:**

The presentation shows the results of testing belt failures simulated in the belt loop. The tests were carried out with the DiagBelt magnetic system using the BeltGuard measuring bar from the Australian Company Beltscan Systems Pty Ltd. The tests were performed for many parameter settings of the measurement system. The operators changed the speed of the belt, measurement sensitivity and the distance between measuring probe and the cord. Several scanning cycles were performed for each set of parameters and 3 measurements were included in analysis. Thanks to this, it was possible to observe the influence of parameters on the measurement results. This allowed to determine values of these parameters for which test results are the most reliable. In practice this enables faster and more accurate assessment of a belt condition, which plays a significant role in the planning maintenance operations. The system supports making decisions regarding belts repairs and replacements in the mines and generate reports about the hazards related to the condition of belt sections and their splices in the belt loop. Thanks to the accurate determination of the core condition of the belt and selection of the best moment for its replacement the improvement of reconditioning process effectiveness can be achieved. The reduction of belt wastes is expected.

**Keywords:**

conveyor belt, belt damage, diagnosis, NDT method


# POLYNUCLEAR COBALT(II) COMPLEXES OF HOMOCHIRAL 3+3 MACROCYCLE

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**A few words about the author(s):**

Prof. Jerzy Lisowski is the head of the Research Group of Supramolecular Inorganic Chemistry at the University of Wrocław. Karol Wydra is a PhD student, working on a project focused on macrocylic complexes under supervision of prof. Jerzy Lisowski.

**Abstract:**

Cobalt(II) ions exhibit large magnetic anisotropy due to the strong first order spin-orbit coupling. Therefore, they are interesting candidate for the construction of novel magnetic materials. Incorporation of these ions into core of large macrocycles may result in the formation of polynuclear complexes with fascinating structure and unique magnetic properties. For instance, homochiral 3+3 macrocyclic ligand H3L composed of three phenolic and three diamine units may be used as a versitle framework for the construction of di- tri- and even tetranuclear cobalt(II) coordination compounds.

Here we present the synthesis, solution characterization and crystal structures of three novel cobalt(II) macrocyclic complexes with ligand H3L. The static magnetic properties of these coordination species was also preliminary investigated.

**Keywords:**

cobalt(II) ions, macrocycles, chiral ligands, coordination chemistry


# SELECTIVE RECOGNITION OF SULFATES USING MACROCYCLIC, SQUARAMIDE BASED ION PAIR RECEPTORS AND SENSORS

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**A few words about the author(s):**

Marta Zaleskaya received her Master's degree in Food Technology and Human Nutrition from Warsaw University of Life Sciences (WULS-SGGW), in 2017. She is currently studying for a Ph. D. degree Faculty of Chemistry at the University of Warsaw.

**Abstract:**

Within the area of supramolecular chemistry, a special trend can be distinguished which deals with more complex receptive architectures, such as macrocyclic systems. Such receptors have been found to be more effective and selective hosts than their acyclic analogues. With this in mind, we obtained macrocyclic ion pair receptors, an anion receptor, and a fluorescent sensor using a combination of particular members of simple libraries consisting of synthesized diamines and methyl squarates, respectively. The receptors were investigated in terms of anion and ion pair binding using the standard spectroscopic protocols. We found that the major contribution to the anion binding comes from the interaction with the squaramide protons rather than with the amide functions of the receptors. The receptors demonstrated the highest affinity towards benzoates and sulfates over the anions tested, and in the case of sulfate binding more complex equilibria in solution were observed. Unlike the anion receptor, the ion pair receptors were found to recognize anions in an enhanced manner with the assistance of sodium or potassium cations. Incorporation of a simple fluorophore in close proximity to the amide function resulted in an optical ion pair sensor selective towards sulfates. DFT calculations helped clarify this selectivity, showing more effective participation of tetrahedral sulfate anions in binding with the amide function than in the case of benzoates or chlorides.

**Keywords:**

macrocyclic ion pair receptors, fluorescent sensors, squaramide

# ABSTRACTS OF
# POSTERS


# TECHNICAL SCIENCES


# STRUCTURAL, SPECTROSCOPIC AND THEORETICAL STUDIES OF ADDUCT OF PYRIDOXINE WITH SQUARIC ACID AND WATER

**Karolina Babijczuk (1)*, Anna Komasa (1), Zofia Dega-Szafran (1), Mateusz Gołdyn (1), Elżbieta Bartoszak-Adamska (1), Mirosław Szafran (1), Grzegorz Cofta (2)**

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**A few words about the author(s):**

Karolina Babijczuk, Master of Chemistry; her master thesis concerns new pharmaceutical salts of pyridoxine.

**Abstract:**

Pyridoxine (4,5-bis(hydroxymethyl)-2-methyl-3-pyridinol) is one of three forms of vitamin B6, water-soluble and exogenic vitamin, which can be found in various food products. It is one of the most essential nutrients, which participates in the metabolism of all three basic macronutrients, i.e. proteins, lipids and carbohydrates. Vitamin B6 controls the functioning of the nervous and immune systems, blood pressure or muscle spasms. The proton-acceptor basic nitrogen atom make pyridoxine an active base to form salts with acidic molecules.

A new pharmaceutical salt of pyridoxine, as an active pharmaceutical ingredient, was obtained with squaric acid. The investigated salt crystallizes as a monohydrate in the monoclinic space group P21/c.

One proton from squaric acid is transferred to the nitrogen atom of pyridoxine. In the crystals, two hydrogen squarate anions form a hydrogen-bonded centrosymmetric dimer, which interacts symmetrically with two neutral water molecules and two pyridoxinium cations via O-H···O hydrogen-bonds. The three-dimensional structure of the investigated compound is mainly stabilized by electrostatic forces and charge-assisted O-H···O and N-H···O hydrogen bonds.

Pyridoxinium hydrogen squarate monohydrate was characterized by FTIR, 1H and 13C NMR spectroscopies and APFD/6-311++G(d,p) calculations.

The studied compound was also screened for antifungal activities and showed inhibiting properties against A. niger and P. placenta.

**Keywords:**

pyridoxine, squaric acid, pharmaceutical salt


# MAGNESIUM - ALTERNATIVE POWER SOURCE

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**A few words about the author(s):**

Agata Baran is a researcher, lecturer and PhD Student working at Military University of Technology in Warsaw. Her main field of study is focused on hydrogen storage materials, including synthesis and characterisation of the functional parameters.

**Abstract:**

Magnesium is the ninth most abundant element in the universe. Is also well known for the broad roles it plays in different applications and industries. Lately, clean energy sources are experiencing a global consciousness in aim to bring the world to less (or even zero) emissions in the close future. One of the most promising alternatives, clean sources of energy is hydrogen. But what makes hydrogen clean, depends on how it is made and how it is stored. Hydrogen storage is a crucial issue, or even a problem needed to be solved nowadays. There is a need of finding relatively safe storying methods. Despite those concerns, hydrogen technologies are constantly improved and developed. Magnesium turns out to be a great power source, thus many investigations are being carried out. In that case, hydrogen is stored in the solid-state in the magnesium matrix. That method is gaining more attention each year because it is safe and can ensure higher energy density in smaller tanks. Magnesium is so interesting due to the highest volumetric density (higher than other commercially available solid-state solutions and even higher than liquid or gaseous hydrogen). The poster presents the main advantages and prospects of magnesium as an alternative source of energy.

**Keywords:**

magnesium, alternative energy source, hydrogen storage, mechanochemical synthesis, ball milling; magnesium hydride


# DAPHNIA MAGNA AS VERSATILE TEST ORGANISM IN ECOTOXICOLOGICAL STUDIES

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**A few words about the author(s):**

PhD student of the Faculty of Chemistry of the University of Gdańsk at the Department of Environmental Analysis, Master of Science in Chemistry, Bachelor of Science in Environmental Protection.

**Abstract:**

Daphnia magna is indicated as a test organism in ecotoxicological experiments. The acute toxicity test, in accordance with OECD 202 guidelines, is carried out to determine the EC50, i. e. the concentrations at which half of the D. magna are immobilised. A chronic toxicity test, in accordance with OECD 211 guidelines, is conducted to investigate the long-term effects of low concentrations of chemicals on the reproductions of D. magna and to determine the lowest observed effect concentrations (LOEC). The researchers propose to update the OECD 211 guideline based on new endpoint. Induction of male offspring has been shown as a specific endpoint in studies using D. magna. It allows the detection of hormone activity that disrupts the arthropod's endocrine balance. Recently, scientists' attention has also turned to more sensitive biomarkers of toxicity, such as swimming activity in D. magna. To describe the swimming behaviour of D. magna, several parameters can be used to reflect changes induced by different compounds e. g. on the nervous system. These are, among other things: swimming time, swimming speed. In addition, recent studies suggest that there is a high correlation between the acute toxicity of some compounds to D. magna and the LD50 ratio for rats. Thus, it is possible to use acute toxicity tests with Daphnia as a screening method for mammalian lethal toxicity testing of chemical compounds, minimize the number of mammals used for testing and reduce the cost of studies.

**Keywords:**

Daphnia magna, test organism, ecotoxicological experiments


# ALKALOIDS - DEADLY POISONS OR LIFE-SAVING MEDICINAL POTENTIAL?

**Dominika Gołaszewska**

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**A few words about the author(s):**

I am a chemistry student with a specialization in analyst and diagnostics at the University of Gdańsk.

**Abstract:**

Alkaloids are naturally occurring compounds. They are produced by many organisms which include bacteria, fungi, plants and animals. The first to isolate a chemically homogeneous medicinal substance from a plant was Friedrich Wilhelm Sertürner, who became the pioneer of alkaloid chemistry [1]. Today, the well-known alkaloids are morphine, strychnine, quinine and nicotine. Scientists are very hopeful about alkaloids - they want to use them as anti-cancer drugs, drugs against mental and degenerative diseases. At current, of the pink periwinkle are used in the treatment of cancer. Quinine, which is found in quinine trees, has strong anti-inflammatory and antipyretic effects. This alkaloid has been used in the treatment of malaria. Pharmacological applications include atropine, which is essential for examining the fundus. You can also find ephedrine or piperine and many others in pharmacies. Despite their many benefits, alkaloids are very strong poisons for both humans and animals. Some of them were used for defense purposes. Indian tribes used curare to poison the arrows of bows [2].

[1] Farmakologia kliniczna. Red. A. Chodera, Z.S. Herman. Warszawa: Wydawnictwo Lekarskie PZWL, 2008.

[2] Roślinne trucizny. Alkaloidy i ich wykrywanie, Biologia w Szkole, Ples M, 2 (2018), Forum Media Polska Sp. z o.o., str. 59-63.

**Keywords:**

alkaloids


# CALCULATIONS OF THE BORN-OPPENHEIMER POTENTIAL FOR HELIUM HYDRIDE CATION

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**A few words about the author(s):**

W. Boguszyńska and M. Jędraszak are the last-year student of Chemistry Department at Adam Mickiewicz University in Poznań. Currently they are preparing their MSc thesis in quantum chemistry. J. Komasa is professor of theoretical chemistry at AMU.

**Abstract:**

The helium hydride ion, as a molecule isoelectronic with the hydrogen molecule, is important in the context of both the high-precision spectroscopy and theoretical models. In our work we compared three different exponential-type wave functions for HeH+. To get the Born-Oppenheimer potential curve we used the James-Coolidge, the Kolos-Wolniewicz, and the Heitler-London basis functions. We compared the accuracy achieved from each of the functions in different ranges of internuclear distances to create the Born-Oppenheimer potential curve with the highest possible accuracy. Reported results are the preliminary step of our final purpose which is to predict the rovibrational energy levels of HeH+ with the highest currently possible accuracy by including also the adiabatic, nonadiabatic, relativistic as well as quantum electrodynamic corrections.

**Keywords:**

Helium Hydride cation, James-Coolidge wavefunction, Kołos-Wolniewicz wavefunction, Born-Oppenheimer potential


# SPECTROSCOPIC AND STRUCTURAL STUDIES OF MONOBETAINE 1,3-BIS(3-HYDROXYPYRIDINIUM)PROPANE BROMIDE

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**Abstract:**

The main interest in bis-quaternary pyridinium compounds is due to their biological activities and potential application as inhibitors of muscle and neuronal nicotinic acetylcholine receptors. 3-Hydroxypyridine is a derivative of vitamin B6, with two ionic groups responsible for ionic and tautomeric equilibrium in an aqueous solution. 3-Hydroxypyridine reacts with alkyl halides to form quaternary salts and betaines. The molecular structure and properties of monobetaine 1,3-bis(3-hydroxypyridinium)propane bromide (3HP(3)BetBr) have been characterized by X-ray diffraction, B3LYP/6-311++G(d,p) calculations, FTIR, 1H and 13C spectra. The studied compound crystallizes in the noncentrosymmetric monoclinic P21 space group. In the crystal structure, 3HP(3)Bet cations link together to form chains using strong, very short (2.466(5) Å) O-H···O hydrogen bonds. In turn, Br anions interact with organic cations electrostatically, and additionally, through the very weak (2.59 – 3.71 Å) C-H···Br H-bonds. The FTIR spectrum shows the broad absorption below 1600 cm-1, which is typical of strong, short O-H···O hydrogen bonds.

**Keywords:**

3-Hydroxypyridine, Bis-pyridinium compounds, X-ray diffraction, DFT calculations, FTIR and NMR spectra


# THE INFLUENCE OF ACTIVATED CARBON IMPREGNATION ON THE ADSORPTION OF VOCS FROM THE GAS PHASE

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**A few words about the author(s):**

Martyna Jurkiewicz is a PhD student at the West Pomeranian University of Technology Doctoral School. Robert Pełech is an associate professor at the West Pomeranian University of Technology.

**Abstract:**

This work aimed to determine the selectivity of VOC (volatile organic compounds) vapor adsorption from gas streams onto modified WG – 12 activated carbon. The adsorption behaviors of acetone and ethyl acetate for modified by citric acid and urea-activated carbons were investigated at normal pressure in a fixed bed reactor. Breakthrough curves for each adsorbate were performed using gas chromatography analyses with a flame ionization detector (FID). The presence of surface functional groups of modified WG – 12 on the adsorption processes were clarified by FTIR analyses. Elemental analysis was carried out to determine the carbon, hydrogen, oxygen, and nitrogen contents of the adsorbents. The adsorption capacity of acetone was within the range of 60 – 82 mg/g, while that for ethyl acetate was 165 – 207 mg/g, which indicated a higher adsorption affinity of WG – 12 towards ethyl acetate. We also found that modification of WG – 12 by citric acid somewhat improves the selectivity of acetone, whereas the modification with urea improves the selectivity of ethyl acetate. The results indicate the phenomenon of competitive adsorption.

**Keywords:**

adsorption, competitive adsorption, modified activated carbon, volatile organic compounds


# INFLUENCE OF MOLD MATERIAL ON TIME AND EFFICIENCY OF THE INJECTION PROCESS

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## A few words about the author(s):

PhD student at the Silesian University of Technology. In 2017, he graduated from the 1st degree studies in the field of Management and Production Engineering. In 2018, he completed a master's degree in material engineering.

## Abstract:

In this study, the authors decided to examine the impact of the material from which the mold was made on the time and course of the injection molding process. Five different mold materials with different thermal conductivity values were included to investigate their effect on the processing cycle time. In addition, the results of the expected cooling quality, cooling distribution results and temperature distribution were also discussed. The use of material with the highest thermal conductivity shortens the cycle time six times.

## Keywords:

computer simulations, injection molding process, cooling, injection mold


# THE ROLE OF PROANGIOGENIC FACTORS AND ANTI-ANGIOGENIC FACTORS IN ANGIOGENESIS PROCESS

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**A few words about the author(s):**

Monika Kopec works in the Institute of Applied Radiation Chemistry, at the TUL in Lodz. She obtained her PhD degree in 2018. Her research concentrates on molecular spectroscopy and applications of Raman spectroscopy and imaging in cancer diagnostics.

**Abstract:**

Angiogenesis is defined as the physiological process by which new blood vessels are formed from pre-existing blood vessels. This process is strictly regulated by activity of proangiogenic and antiangiogenic factors.

The aim of this presentation is showing that Raman spectroscopy and Raman imaging are capable of monitoring biochemical composition around blood vessels in human breast tissue. This information will help understand how new blood vessels are synthesized by tumors in angiogenesis process. Formation of new blood vessel is regulated by activity of proangiogenic and antiangiogenic factors. Understanding the mechanism of activators and inhibitors functioning in angiogenesis process is very important. Deregulation of the balance between above-mentioned factors causes pathologic conditions such as cancer development. The second aim is understanding the role proangiogenic and antiangiogenic factors in angiogenesis process.

We have demonstrated that Raman spectroscopy combined with Raman imaging have potential to provide predictive Raman cancer biomarkers and treatment targets during cancer development. Based on Raman spectra for proangiogenic and antiangiogenic factors we identified the factors, which are responsible for angiogenesis process.

This work was supported by the National Science Center of Poland (grant Miniatura 4 2020/04/X/ST4/00325 and grant UMO- 2019/33/B/ST4/01961).

**Keywords:**

angiogenesis, Raman spectroscopy, Raman imaging, proangiogenic factors, antiangiogenic factors


# COMPARISON OF EFFECTS OF PHARMACEUTICALS ON CYANOBACTERIA AND GREEN ALGAE

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**Abstract:**

Cyanobacteria (blue-green algae) and green algae are two types of photosynthetic organisms that live mainly in aquatic habitat. Cyanobacteria are oxygen evolving, gram-negative bacteria. Some of cyanobacteria can be heterotrophs as well. Blue-green algae are procariota, and green algae are eucaryota. Therefore, green algae contain membrane-bound organelles such as chloroplasts unlike cyanobacteria. Nowadays, presence of pharmaceuticals in the environment is a growing threat. The pollutants can enter in aquatic environment and cause effect on organisms living there, including cyanobacteria and green algae. Due to the differences on biological organisation of these organisms, pharmaceuticals can potentially exhibit different toxicity to them. The aim of this literature study was to compared the obtained data on toxicity of pharmaceuticals to cyanobacteria and green algae. Due to the differences in laboratory tests performance, the direct comparison was unable to present for whole group of pharmaceuticals. Nevertheless, in a case of same representatives the differences were noted. For example, was found that quinolones are more toxic to cyanobacteria while estrogens is more toxic to green algae. Pharmaceuticals can also have a stimulating effect on the growth of microalgae, as in the cause of cyanobacterium Synechocystis sp., which growth was stimulated in presence on 10 ug/L - 1 mg/L ibuprofen. The same pharmaceuticals was toxic (EC50 = 71 mg/L 0.965 g/L) for green algae.

**Keywords:**

cyanobacteria, green algae, pharmaceuticals, toxicity, blue-green algae


# POLY(VINYL CHLORIDE) BIOBASED PLASTICIZERS

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**A few words about the author(s):**

I work at the Bioeconomy Department in Łukasiewicz - ICSO "Blachownia" as a specialist. My co-workers and I deal with the application of renewable raw materials for the production of a new generation of biocomponents, e.g. for polymers.

**Abstract:**

Plasticizer is one of the most generally used polymer properties modifiers. It reduces intermolecular interactions and increases the mobility of polymer chains. Currently, the largest group of plasticizers are phthalic acid esters, called phthalate plasticizers. The usage of these plasticizers in certain applications, such as toys, articles having contact with food and medical devices, is restricted due to their negative impact on human health and the environment. For this reason, the use of plasticizers based on raw materials of natural origin increases. They are characterized by low toxicity and high biodegradability, as shown by the latest trends in the chemical market.

As part of the research, a method to synthesize two types of compounds intended as plasticizers for poly(vinyl chloride) was developed. Propylene glycol dioleate (Ester 1) and epoxidized propylene glycol dioleate (Ester 2) were obtained from propylene glycol and oleic acid. Based on the application tests, it was found that only the ester additionally subjected to epoxidation can be used as PVC plasticizer and it is Ester 2. Propylene glycol dioleate containing an oxirane ring in its structure is characterized by greater resistance to migration and a similar plasticization time compared to plasticizers available on the market, i.e DINP or DOTP, while the hardness and density of Ester 2 in relation to DINP or DOTP is comparable.

**Keywords:**

bioplasticizers, oleic acid, fatty acid esters, renewable raw materials, poly(vinyl chloride)


# NEW CYCLODEXTRIN SYSTEMS WITH DIANHYDRIDES OF CARBOXYLIC ACIDS

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**A few words about the author(s):**

Jakub Łagiewka – last-year student of chemistry, interested in organic/polymer chemistry. Tomasz Girek – PhD in organic chemistry, specializes in cyclodextrin chemistry and cyclodextrin polymers.

**Abstract:**

Cyclodextrins (CDs) are a family of macrocyclic oligosaccharides mostly composed of 6, 7 or 8 α-D-glucopyranose units with α-1,4-glycosidic bonds to form toroidal structure. The CDs posses a hydrophilic exterior and a hydrophobic interior with ability to form inclusion complex, especially with hydrophobic molecules. These compounds can form more complexed structure with higher molecular weights like dimers, oligomers or polymers. Hydroxyl groups in CDs characterize with different reactivity, especially primary hydroxyl groups at position 2 in glucose units which form oxyanions with highly basic compound. The oxyanions are strongly reactive compounds which can play significant role as nucleophilic agents. For instance, the CD oxyanions react with dianhydrides of carboxylic acids and form highly anionic structure like dimers or polymers.

Our goal was to develop a method based on oxyanion-dianhydride for novel CDs structures. The applied dianhydrides were 3,4,9,10-perylenetetracarboxylic dianhydride and benzophenone-3,3′,4,4′-tetracarboxylic dianhydride. The oxyanion was formed from sodium hydride (NaH) and reacted in stoichiometry 1:4:4 corresponding to CD:NaH:dianhydride. Structures of all products were confirmed with 1H NMR. There were obtained a fluorescent dimer and a polymer which are soluble in water. Novel compounds can be considered as promising carrier of drugs, pesticides or parts of chromatography beads.

**Keywords:**

cyclodextrins, cyclodextrin oxyanions, cyclodextrin dimers, cyclodextrin polymers


# MG-BASED SOLID STATE HYDROGEN STORAGE MATERIALS

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**A few words about the author(s):**

I am PhD Student of material engineering at Military University of Technology. My research are focused on 3D printing technology of intermetallic alloys and for several years I also has been conducting research on materials for hydrogen storage.

**Abstract:**

Limited amounts of natural resources such and the growing demand for energy force us to look for new sources of energy. Hydrogen can be such a new ecological energy carrier. Metal hydrides seem to be the most promising. In particular, magnesium-based hydrides, due to the full reversibility of the reaction, its wide availability, low cost and the possibility of storage of 6.7 wt.%. $H_2$. However, magnesium hydride also has disadvantages, most notably the reaction kinetics - kinetics affect the rate of hydrogen replenishment as well as the output power. The first factor influencing this is the oxidation of the magnesium surface. The second factor influencing the kinetic reactions is the particle size and surface area A factor that also strongly influences the kinetics of hydrogenation is also the limited rate of hydrogen dissociation on the metal surface. The way to faster sorption kinetics and easier activation process can be the creation of two- or multi-component systems based on magnesium. Another problem with magnesium-based materials is the thermodynamics of the reaction. Many attempts have been made to overcome these limitations. Finding the right additives or introducing appropriate modifications can significantly affect the kinetics or thermodynamic properties of magnesium-based alloys, which allows their effective commercial application.

This work was financially supported by The National Centre (NCN) in Poland, No. 2018/29/N/ST8/01417

**Keywords:**

hydrogen storage, solid state hydrogen storage, Mg-based hydrogen storage, magnesium hydride


# IS IT POSSIBLE TO MANUFACTURE MG2FEH6 FROM AUSTENITIC STAINLESS STEEL?

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**A few words about the author(s):**

I am a PhD student. My faculty is Material Engineering. My research area is hydrogen storage, especially in solid phase. My interests are mainly science (materials science, chemistry, mechanics) but also sport and an active and healthy lifestyle.

**Abstract:**

Hydrogen is currently considered one of the alternative energy sources. However, its use in the energy industry is not as simple and obvious as it may seem. Hydrogen must be properly stored to be an energy source. Solid hydrogen storage is one such method. There are many different ways in which you can efficiently store hydrogen using this technique. Most often this happens with the use of solid materials in the form of powder, which are characterized by high ability to absorb hydrogen. One example of such a material is $Mg_2FeH_6$ ternary hydride. This material is usually manufactured from iron with very high purity and magnesium hydride ($MgH_2$) or pure magnesium. This compound owes its popularity to very high volume density of hydrogen and gravimetric density of hydrogen. This work demonstrates the possibility of producing this valuable compound from steel powder - austenitic stainless steel. The iron contained therein, unlike pure iron (alpha), occurs in the form of austenite (gamma iron). The use of steel powder instead of pure iron has many advantages, among others acceleration of the synthesis reaction, reduction of reaction costs as well as a positive ecological aspect (steel powder can be obtained in a very simple way by recycling).

Acknowledgments: This work was financially supported by The National Science Centre (NCN) in Poland, No. 2018/29/N/ST8/01417.

**Keywords:**

hydrogen energy, hydrogen storage, magnesium hydride, $Mg_2FeH_6$, austenite

ABSTRACTS OF

# PRESENTATIONS


# NATURAL SCIENCES


# THE USE OF FARMED CARP (CYPRINUS CARPIO) MEAT TO INCREASE THE NUTRITIONAL VALUE OF STARCHY SNACKS

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**A few words about the author(s):**

Master of Science in Food Technology and Human Nutrition at the West Pomeranian University of Technology in Szczecin.

**Abstract:**

Despite the growing awareness of a healthy lifestyle, consumers, especially adolescents, consume large amounts of salty and sweet snacks.

Due to such a great popularity of snack foods among this group of society, food producers are trying to expand the range of snacks. For many years, research has been conducted on enriching snack products with wholesome protein, dietary fiber, vitamins, minerals and antioxidants. One example of fortified snack products are fish chips - the so-called keropok, that is starchy snacks with the addition of fish meat. They can be a tasty and healthier alternative to the popular potato chips. On the other hand, this way you can increase the amount of fish consumed in our country, also by young people. Analyzing the supply and demand for fish in Poland, it was decided to use carp meat to increase the nutritional value of starchy snacks. Carp is one of the best-quality farmed fish, which can be additionally certified as organic food. For this reason, consumers choose sea fish more often. By adding carp meat to such snacks, the supply of easily digestible and wholesome protein and omega-3 fatty acids will be greater, and the demand for farmed carp will also increase not only during the holiday season.

The study analyzed the effect of varied addition of carp meat on the quality of produced starch snacks, as well as their health value, determined by the content of the essential amino acid - lysine, and the amount of omega-3 acids.

**Keywords:**

starchy snacks, keropok, carp, easily digestible protein, fatty acids


# ACTIVITY OF NEW DENDRIMERIC CONSTRUCTS (PAMAM G3) WITH BIOTIN AND ALPHA-MANGOSTIN RESIDUES AGAINST HUMAN SCC-15 SQUAMOUS CELL CARCINOMA CELLS

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4th year student of Biotechnology at the Rzeszów University of Technology, main interests are microbiology and chemistry.

**Abstract:**

Cancer cells have the potential to highly-efficient proliferation and spread throughout the body. Various approaches such as resection, chemotherapy, radiotherapy, and hormonal therapy are common cancer treatments, but all have significant limitations and side effects. Oral squamous cell carcinoma (OSCC) is the most common cancer of the oral cavity, accounting for over 90% of malignancies in this location and the sixth most common cancer worldwide, with an increasing incidence of 2.3% (2018 data) and a five-year survival rate despite available therapies. Most chemotherapy drugs are characterized by non-selective cytotoxicity by which they affect both cancerous and normal cells. To overcome these problems, new and more effective drug delivery nanosystems are increasingly being investigated. Poly(amidoamine) dendrimers (PAMAMs) are an example of a versatile and reproducible type of nanocarrier that can be conjugated with drugs and modified by attaching target-specific ligands that recognize receptors, which are overexpressed in cancer cells. The aim of this study was to evaluate the antitumor activity of PAMAM dendrimers coupled with biotin residues, which increases cellular uptake of nanoparticles, D-glucoheptone-1,4-lactone and α-mangostin, which has antitumor properties against SCC-15 squamous cell carcinoma cells. Results indicated that the bioconjugate was effective in destroying cancer cells and showed a strong, cytotoxic effect at low, micromolar concentrations.

**Keywords:**

neoplastic diseases, PAMAM G3 dendrimers conjugated with biotin residues, squamous cell carcinoma, alpha-mangostin


# RIVERBANK FILTRATION AS A NATURAL WATER TREATMENT PROCESS IN THE CASE OF ORGANIC MICROPOLLUTANTS ON THE EXAMPLE OF THE MOSINA-KRAJKOWO WELL FIELD

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**A few words about the author(s):**

Roksana Kruć-Fijałkowska is a hydrogeologist and PhD student at Adam Mickiewicz University in Poznań (Poland). She is interested in emerging contaminants in surface and groundwater, hydrogeochemistry and water protection.

**Abstract:**

The results of searching for emerging contaminants in surface water and groundwater will be presented. In 2017-2018, sampling campaigns for pharmaceuticals, stimulants, personal care products and pesticides (252 substances in total) in the Warta river, observation and abstraction wells of the Mosina-Krajkowo riverbank filtration well field (RBF), supplying Poznań and neighboring municipalities with drinking water, were conducted. The research has shown the occurrence of antibiotics, anti-inflammatory and analgesic, psychotropic, hormonal drugs and X-ray contrasts, as well as pesticides like herbicides, fungicides, and insecticides in sampling points. The specificity of RBF sites is

that the wells are supplied with water infiltrating from the river, which makes the quality of the RBF water strongly dependent on the quality of river waters. Substances that were detected in the Warta River water, occurred also in RBF water, but in reduced concentrations. The RBF improves the quality of river water in the context of micropollutants. In the case of some pharmaceuticals (iopromide, diclofenac, penicillin G), the removal degree is 100%, and in the case of the most persistent substances (carbamazepine, nicosulfuron) is lower and amounts to approx. 50%. Research confirms that riverbank filtration is the first, natural stage in the treatment of surface water intended for consumption.

**Keywords:**

riverbank filtration, pharmaceuticals, pesticides, groundwater contaminants


# METHODOLOGY OF DETECTING PCR-SCAR MARKERS AND DETERMINING THEIR LOCATION ON THE GENETIC MAP ON THE EXAMPLE OF RYE (SECALE CEREALE L.)

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**A few words about the author(s):**

Two students of MSc studies in Bioengineering who are actively pursuing their scientific passion in molecular biology and genetics.

**Abstract:**

Rye (Secale cereale L.) occupies an important place among cereal crops used in agriculture. It stands out from other cereals with its excellent low temperature tolerance and low requirements for the use of fertilizers. Due to the highly complex genome (~ 7.9 Gbp), any molecular research poses a major challenge to scientists working with this species. Over the years, many genetic maps have been developed and enriched with new markers based, among others, on PCR and DArT microarrays technology. The result of this work is presenting a method of PCR-SCAR markers detection and establishing their location on the genetic map of rye. SCAR markers serve as a useful tool for genetic mapping as they describe variant of a gene. To obtain SCAR markers, primers are designed to the characterised sequence of nucleotides. In order to visualise expected differences between individuals, polymerase chain reaction (PCR) and electrophoresis must be performed. Obtained results can be used to create a genetic map, which is a graphical exhibition of the order of molecular markers on the species' chromosomes. As proven, genetic maps and physical maps, containing loci of genes, are mostly colinear, thus showing an information of the possible location of the gene to which markers were obtained.

**Keywords:**

SCAR markers, genetic mapping, rye, Secale cereale


# ANALYSIS OF THE FATTY ACIDS COMPOSITION OF SELECTED FAT SPREADS FOR BREAD

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I am a second year student of master's studies at the Warsaw University of Life Sciences (SGGW), Department of Food Technology. Currently, I am focusing on preparing my master's thesis, in which I am developing the technology of dried carrot snacks.

**Abstract:**

Fats are the basic component of the human diet, and the amount of energy provided in the daily food ration as a result of their consumption by adults shouldn't exceed 30%, so it is important to maintain a proper proportion of their consumption. Fat spreads for bread account for a large proportion of this nutrient in the diet, in more or less nutritionally beneficial forms. The market of fat spreads for bread, i.e. margarines, butter and fat blends, which are a daily component of the diet for many consumers, are constantly evolving. These products are eagerly purchased by consumers.

The very wide market offer of the fatty spreads makes these products characterized by varied nutritional value. An attempt was made to analyse the fatty acids composition of selected market spreads, nutritional indices were determined and on this basis the nutritional value of the analysed products was evaluated. The analysis showed that the tested fat spreads were characterized by a very diversified fat content- from 25% (Delicious Duo) to 83% (Extra Country Butter). All the fats tested were rich in nutritionally beneficial monounsaturated fatty acids. Butter and fat blends with a predominance of milk fat were characterized by a less beneficial nutritional profile of fatty acids, which was confirmed by the values of nutritional indices.

**Keywords:**

fatty acids, fat spreads, nutritional value, nutritional recommendations


# EDIBLE INSECTS AS AN ALTERNATIVE SOURCE OF PROTEIN IN HUMAN NUTRITION IN TERMS OF CONSUMER ACCEPTANCE AND CURRENT EXPERIMENTAL RESEARCH

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I am a second year student of master's studies at the Warsaw University of Life Sciences (SGGW), Department of Food Technology. Currently, I am focusing on preparing my master's thesis, in which I am developing the technology of dried carrot snacks.

**Abstract:**

Edible insects are currently the most frequently discussed topic by the Food and Agriculture Organization of the United Nations (FAO) and the European Commission. Insects and their products are used in the food, chemical and pharmaceutical industries. The potential use of edible insects as a food source is of great interest to people in Europe. This is due to the large environmental advantages and nutritional value of introducing edible insects as a component of the human diet. The growing global population requires the search for new alternative sources of food nutrients, including complete protein. Due to their high nutritional value, edible insects are a promising and sustainable source of alternative animal protein.

A significant problem is the lack of the acceptance of edible insects as a form of food among consumers in European countries, which contributes to difficulties in placing them on the market or in food products with their addition. An element of making consumers to accept insects as a form of food may be the continuous work of food producers based on informing and promoting edible insects in the form of an interesting range of products. The use of edible insects on a large scale is difficult due to the safety of their consumption, so it is very important to continue research on the possibility of their use in human nutrition.

**Keywords:**

edible insects, alternative protein sources, nutritional value, human nutrition


# THE METHANE EMISSION IN THE UPPER SILESIA COAL BASIN AGAINST THE POLISH MINING GROUP CLOSING PROGRAM

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PhD Student of geology and mining geology, interested in world economy of the bituminous coal production.

**Abstract:**

Hard coal mining is responsible for 9% of the worldwide methane emission to the atmosphere. The biggest active coal basin in the European Union – the Upper Silesia Coal Basin is responsible for over 3% in the total greenhouse gases emission and 28% in the total $CH_4$ emission in Poland. In the Polish reality, hard coal mining is one of the most important branch of economy due to big amounts of deposited coal in numerous coal seams which is being produced by many coal companies. The state owned Polish Mining Group (PMG) – the biggest extraction company in the EU announced that all active coal mines incorporated in the Group will be closed until 2049. Hard coal extraction has been decreasing in Poland since 1997 and the amount of released methane from coal mines direct to the atmosphere exceeded 0.5 million Mg in 2015 and remains high till now. The closuring program faces with big social, industry and workers unions resistance trying to remodel or delay to idea of moving away from the hard coal extraction. The purpose of the study is to predict the results of PMG closuring program on methane emission changes in the Upper Silesian Coal Basin until 2049.

**Keywords:**

The Polish Mining Group, methane emission, coal mining, greenhouse gases


# CANINE SEPARATION ANXIETY - DIAGNOSIS AND THERAPY

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**A few words about the author(s):**

I am a young Doctor of Veterinary Medicine and a post-graduate student in animal behavior. Privately, a dog lover.

**Abstract:**

The aim of the presentation is to discuss the most common behavioral disorder among dogs, separation anxiety. The paper describes the symptoms, potential causes, and available treatments for separation anxiety in dogs. The presentation was built on the basis of the real case of a dog suffering from separation anxiety. Behavioral disturbances are deviations in the physiological behavior of animals. The most common symptoms of separation anxiety include restlessness, vocalization, and damage to objects. The main reasons include excessive attachment to the caregiver, fear of loneliness, lack of socialization in puppyhood and traumatic experiences, such as homelessness. The most accessible and effective form of eliminating the disorder is behavioral therapy (habituation), often supported by pharmacological agents. In times of ever-growing empathy for animals, the correct diagnosis and treatment of behavioral disorders is the key to the correct relationship between humans and their pets.

**Keywords:**

canine, behavior, separation anxiety


# THE EFFECT OF SODIUM ALGINATE AND CHITOSAN ON THE PROPERTIES OF INULIN GELS

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**A few words about the author(s):**

Adonis Hilal M.Sc. (Ph.D. student), Anna Florowska Ph.D., Małgorzata Wroniak Ph.D., and Paulina Mrozek M.Sc, work at the Institute of Food Sciences, Division of Fat and Oils and Food Concentrates Technology, of the Warsaw University of Life Sciences.

**Abstract:**

The aim of the study was to evaluate the addition of sodium alginate and chitosan on the properties of inulin gels. The gels were prepared by adding to the inulin solution (20 g/ 100 g) the selected polysaccharides in various concentrations (0.1; 0.3; 0.5 g/100 g). The obtained gels were examined for the degree of gelation, texture, yield stress, stability, color parameters, and microstructure. The conducted analysis confirmed that the addition of these selected polysaccharides didn't affect the gelation ability (VGI = 100 %). However, the gotten gels showed different physical properties in comparison to the sample without their addition. The addition of 0.5 % of sodium alginate and chitosan significantly decreased the yield stress of the gels reaching respectively 494 N/m and 745 N/m. Furthermore, this addition of sodium alginate allowed to obtain significantly similar and/ or smaller textural parameters comparing to the control sample. Yet, with the increase in the concentration of the chitosan addition, a significant increase in textural parameters was observed. The addition of sodium alginate in lower concentrations (0.1 and 0.3 %) lightened the tested samples, while the addition of chitosan in concentrations of 0.1 and 0.5 % darkened the gels. Although the procured microstructural images of the analyzed gels showed a more compact structure, the addition of these polysaccharides negatively influenced the gel stability by increasing the instability index.

**Keywords:**

inulin, sodium alginate, chitosan, gels, structure formation


# A RELATIVE RELATIONSHIP BETWEEN LOW-STACK EMISSION AND THE QUALITY OF FUELS USED IN HEATING BOILERS AND GRILLS

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**A few words about the author(s):**

Zbigniew Jelonek is an Industrial PhD student at the Faculty of Earth Sciences of the University of Silesia in Katowice. Iwona Jelonek is a researcher at the University of Silesia in Katowice, she specializes in the fields of organic coal petrology.

**Abstract:**

Fuel combustion conditions in modern boilers are currently fully automated. Controlling the combustion process with preset parameters (temperature and pressure sensors) with an appropriate air distribution adapted to the type of fuel ensures maximum use of fuel properties. Combustion of heating materials in such controlled conditions allows to minimally affect the environment of emitted flue gases and solid residues (ashes). Unfortunately, the best boiler with the best regulator will not provide optimal combustion conditions without good fuel quality. Contaminated biomass (pellets, wood chips, wood) with plastic, fossil coal, colored metals not only effectively affects the low emission burden, but also the failure rate of boilers. Analogically, the use of poor quality solid fossil fuels translates into the formation of smog and sometimes irreparable damage to CO equipment. According to the authors of the study, in which the combination of low and medium power boilers with dedicated tested fuels to a given type of heating installation will ensure maximum reduction of low emissions. In the summer period, we can observe the phenomenon of fog caused by the use of grill fuels to prepare dishes. In case of high insolation and accumulation of devices (grills), e.g. on plots, recreational areas, smog phenomenon may also occur. The more the grills are polluted, the more the combustion fumes are burdensome and harmful for users of both active and passive barbecues.

**Keywords:**

coal, charcoal, fuel combustion


# BERSERK MALE SYNDROME AS ALPACAS' SOCIALIZATION DISORDER

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**A few words about the author(s):**

I'm a young researcher of animal behavior. My specialization is alpacas' behavior, training and use.

**Abstract:**

Berserk Male Syndrome (BMS) is an behavior disorder observed in alpacas, related to inappropriate imprinting in early life. The aim of this study is a representation of Berserk Male Syndrome phenomenon, its causes and prevention possibilities.

Berserk Male Syndrome usually occurs in males, but it could also develop in females. The most risky period in development of Berserk Male Syndrome is early life of animal (age >6 months, called cria) and bottle feeding. The reasons may be: insufficient or no mother's milk production, cria abandonment or mother's death. Next frequent cause of BMS is too intense contact between young alpaca and humans. Poor environment is a conducive factor. Crias can be bored, contact with people is kind of environment enrichment for them. Sometimes BMS is called Novice Handler Syndrome, because its often observed in inexperienced breeders, who have small herds. Following the handler, rubbing on, nibbling on clothes, putting their nose in the face are first disorders' symptoms. Submissive crouch in relation to humans is observed over time. After reaching sexual maturity alpaca can rear and lean front limbs on people - it could be dangerous. First action after observing disturbing behaviors related to BMS must be reduction of frequency in contact with people and training to respect boundaries. Strong disorders might be impossible to reverse.

It is crucial to remember that alpacas need to spend time with herd and behave in accordance with their ethogram.

**Keywords:**

Berserk Male Syndrome, alpaca, behavior disorders


# BACTERIAL RESISTANCE

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**A few words about the author(s):**

The authors conduct research in the field of broadly understood biology at the Institute of Biology (WULS-SGGW). Particular interests relate to nanobiotechnology and their impact on microorganisms.

**Abstract:**

Common usage of antibiotics results in the increasing number of resistant pathogens. Among them, the most threatened are multidrug resistant microorganisms which are a danger to the current society. Sometimes the application of a specific antibiotic therapy is not effective enough to be sufficient to increase the dose of a given drug, but it is necessary to change to another active substance. Antimicrobial resistance is caused by diverse elements, beginning with overuse of antimicrobials, through self-medication, clinical misuse or even environment factors. Currently, production of various mechanisms that allow microorganisms to acquire resistance characteristics and survive even in unfavorable environment habitat, is the phenomenon that makes the popularly recognized term ‘multidrug resistance’ a real threat. Furthermore, bacteria can transfer resistance traits among themselves or acquire them from the surrounding environment. Some bacterial strains (like MRSA - Methicillin-Resistant Staphylococcus aureus) occur in hospitals where they cause serious infections. However, in addition to acquired mechanisms, some bacteria exhibit innate resistance, which may be a strain-specific feature. Therefore, it is necessary to search for new therapies that will facilitate the fight against drug-resistant pathogens and will not induce further features of resistance simultaneously.

**Keywords:**

resistance mechanisms, multidrug resistant pathogens, antibiotic therapy


# METALLOTHIONEIN ROLE IN PATHOLOGICAL CONDITIONS INDUCED BY METALS AND METALLOIDS IN ANIMALS

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**A few words about the author(s):**

Member of the Student's Scientific circle – Veterinary Toxicology section in Sub-Deparartment of Pharmacology, Toxicology and Environmental Protecion.

**Abstract:**

Since their isolation in 1957, metallothioneins have been the subject of numerous studies on their properties regarding the organism, as well as their correlation with heavy metals and metalloids. The presence of these elements plays an important role, especially in the nervous and urogenital systems that are important for animal health. The conclusions collected over the last few decades have allowed to prove the essence of the regulation of the concentration of metals and metalloids by metallothioneins, leading to the maintenance of the proper course of processes at the cellular level, and therefore the health of the organism. Moreover, these proteins inhibit neoplastic processes, improving the patient's prognosis and can also be used as indicator of diseases or damage to organs such as kidneys, facilitating further diagnosis.

**Keywords:**

metalloid, metallothionein, toxicology, cadmium, zinc


# ASSESSMENT AND COMPARISON OF DIFFERENT ASPECTS OF DOG NUTRITION IN POLAND

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**A few words about the author(s):**

Fourth-year student of veterinary medicine at the University of Warmia and Mazury. Author of several scientific works and active member of science clubs.

**Abstract:**

Feeding dog correctly has a huge impact on its health and quality of life. The main consequence of nutritional mistakes is obesity of dogs. Knowing the most common dietary mistakes made by owners can be helpful for a veterinarian to diagnose and treat a patient. The aim of the research was to check the diet of dogs in Poland in relation to generally accepted norms of proper nutrition of this species. One of the diagnostic survey methods was used for the study - a questionnaire, which was made available via social media. The survey was aimed at owners of dogs over 8 weeks of age. 3,268 people of all ages participated in the study. The answers of most of the respondents correspond to the current knowledge in the field of basic veterinary dietetics. However, there is a group of owners who pay little attention to the diet of their charges.

**Keywords:**

nutrition, dogs, veterinary


# CHARACTERISTICS, SYNTHESIS, AND USES OF LACTOBIONIC ACID AS A NEXT-GENERATION POLYHYDROXY ACIDS (PHA) IN THE COSMETICS INDUSTRY

**Wiktoria Piątek*, Justyna Sulej, Monika Osińska-Jaroszuk**

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**A few words about the author(s):**

My name is Wiktoria Piątek. I am a student of Biotechnology at Maria Curie-Sklodowska University and I am currently in my final year of master degree studies. I am passionate about biochemistry. I would like to continue my studies in Doctoral School.

**Abstract:**

Lactobionic acid (β-D-galactopyranosyl-(1→4)-D-gluconic acid; LBA) is polyhydroxy acid composed of a galactose moiety bonded to a gluconic acid molecule through an ether-like linkage. This bionic acid can be produced through microbial methods, where the whole microorganisms such as Pseudomonas taetrolens or Streptococcus lactis are used as biocatalysts or enzymatic approaches where proteins like glucose-fructose oxidoreductases or cellobiose dehydrogenase are capable of oxidising lactose.

The conversion of lactose to lactobionic acid consists of the oxidation of the free aldehyde group of glucose on the lactose molecule to the carboxylic group. Thanks to antioxidant, antimicrobial, chelating, stabilizer, acidulant and moisturizing properties lactobionic acid is very common used in many fields of biotechnology. In recent years, this high value-added bio-product has received growing attention from the food, cosmetology, chemical or pharmaceutical industry. This review focuses on the main characteristics, manufacturing methods, applications and future perspectives of using lactobionic acid.

**Keywords:**

lactobionic acid, enzymes, microbial methods, cosmetics industry


# THE MODIFICATION OF BEER POLYPHENOLS COMPOSITION BY LACCASE ISOLATED FROM CERRENA UNICOLOR

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**A few words about the author(s):**

I am a student of Biochemistry at Maria Curie-Skłodowska University in Lublin. My research focuse on effect of laccase obtained from Cerrene unicolor on polyphenolic compounds in wine and beer.

**Abstract:**

Beer, and specifically the hops it contains, is a valuable source of polyphenols. As you know, these compounds have health-promoting properties and a positive effect on the human cardiovascular system. However, some of these compounds may begin to oxidize over time, resulting in deterioration of mentioned benefits. The main purpose of the presented research was to alter polyphenolic compounds by adding laccase obtained from Cerrena unicolor. For the experiment, two kinds of beer were used: light premium lager and a black one. The changes in the polyphenol profile were demonstrated by means of the spectrum analysis and biochemical assays. The reaction conditions were optimized at different pH and temperature values.

**Keywords:**

laccase, beer, food industry, polyphenolic compounds


# MALONDIALDEHYDE (MDA) AS A BIOINDICATOR OF THE INTENSITY OF THE LIPOPEROXIDATION PROCESS IN DIABETES MELLITUS

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**A few words about the author(s):**

Master of Science in Biological Sciences, PhD Student. In research work, he deals with human physiology and pathophysiology, in particular with issues related to oxidative stress.

**Abstract:**

Inflammation and the related oxidative stress caused by chronic hyperglycemia play a key role in the course of diabetes. The most exposed to the destructive activity of free radicals are polyunsaturated fatty acids. Diabetes mellitus causes disturbances in the lipid profile of the body, as a result of which cells are more susceptible to the lipoperoxidation process which is a multi-radical process of oxidation of unsaturated fatty acids and other lipids. The main product of the oxidation reaction of PUFAs is malondialdehyde (MDA). It has a cytotoxic, mutagenic and carcinogenic effect, causes atherogenic properties and has the ability to inactivate enzymes. Besides that, MDA modifies the physical properties of cell membranes, disrupts the function of cells, and consequently leads to dysfunction of individual organs. A total concentration of MDA can be labeled and use as an indicator of long-term oxidative stress. A simple and highly sensitive spectrophotometric method was developed for the determination of thiobarbituric acid-reactive substances (TBARS) as a marker of lipid peroxidation from blood. The method uses the reaction of malondialdehyde (MDA) and TBA in an environment of glacial acetic acid, which is characterized by precision, high repeatability and sensitivity in the quantitative determination of MDA, and on the basis of which it is possible to conclude about the intensity of the lipoperoxidation process in the body.

**Keywords:**

diabetes mellitus, oxidative stress, lipoperoxidation, malondialdehyde, MDA


# EVALUATION OF THE PHYSICAL STABILITY AND MICRORHEOLOGICAL PROPERTIES OF EDIBLE OLEOGELS

**Iwona Szymańska*, Anna Żbikowska**

*Department of Food Technology and Assessment, Warsaw University of Life Sciences (WULS-SGGW), Nowoursynowska 159c St., 02-776 Warsaw, Poland*

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**A few words about the author(s):**

I am a PhD student at the 3st year of doctoral studies at the Institute of Food Sciences at the Warsaw University of Life Sciences. My research mainly concerns aspects related to edible oils and fats, emulsions, and oleogels.

**Abstract:**

The aim of the work was to determine the impact of candelilla wax (CW) concentration on microrheological properties and physical stability of oleogels (OGs), using modern optical methods.

The refined rapeseed oil and linseed oil mixture (1:1) was structured with CW (3, 4, 5, 6, 7, 8% w/w) by heating at 80 °C, sonicating and static cooling (24 h, 20 °C). The non-destructive MS-DWS (Multi Speckle Diffusing Wave Spectroscopy) method based on dynamic light scattering (Rheolaser Master), and the CSA (Centifugal Stability Analysis) method based on STEP technology (LUMiSizer), were used.

The oleogelling was occurred in two stages. With the increase in the CW concentration, the elasticity index (EI) and macroscopic viscosity index (MVI) values increased and the solid-liquid balance (SLB) values decreased, which indicated the enhancement of the elastic properties of oleogels. The greater content of CW also led to reduction in the duration and increase of the gelation temperature (e.g. 3OG: 392.7 min, 32.7 °C; 8OG: 227.2 min, 47.5 °C). No oil separation in oleogels centrifuged at 20 °C was noted. A significant increase in instability indexes, especially for oleogels with the lowest CW content (e.g., 3OG from 0.02 to 0.11), was observed at 30°C.

The MS-DWS method and the CSA method enabled to determine the properties of oleogels as well as tracking of changes during their structuring or destabilization. It allows for the extension of research in modern lipid systems and food design.

**Keywords:**

oleogels, rapeseed oil and linseed oil mixture, candelilla wax, diffusing wave spectroscopy, STEP-Technology


# ACTIVITY OF NISIN IN COMBINATION WITH CONVENTIONAL ANTIBIOTICS AGAINST SELECTED BACTERIAL STRAINS.

**Natalia Świerczek**

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**A few words about the author(s):**

I am a graduate of Biotechnology and an employee of Wroclaw University of Science and Technology. My scientific interests include investigation of protein and peptide properties and analysis of ligand-receptor interactions using NMR spectroscopy.

**Abstract:**

Nowadays, a serious problem that occurs all over the world is the growing problem of antibiotic resistance, because many bacteria have developed mechanisms of resistance to drugs that become ineffective. Therefore, the scientific community has become interested in antimicrobial peptides, particularly those produced by bacteria, called bacteriocins. Of the various classes of bacteriocins, lantibiotics and among them nisin are of greatest interest. This bacteriocin is currently of interest not only in the food industry as a food preservative but also as an alternative to clinical antibiotics. Researchers' studies to date have been promising in terms of the potential use of nisin as an antimicrobial agent. Additionally, there are many variants of nisin that can be combined with conventional antibiotics in order to achieve a synergistic effect. Studies conducted also suggest that nisin causes inhibition of Staphylococcus aureus biofilm growth and is also effective against species of the genus Enterococcus.

**Keywords:**

antibiotic resistance, nisin, bacteriocins

# ABSTRACTS OF
# POSTERS


# NATURAL SCIENCES


# ANTICANCER PROPERTIES OF CURCUMIN

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**A few words about the author(s):**

I am a student, who is interested in every detail of cancer.

**Abstract:**

Curcumin is the main biologically active curcuminoid of turmeric (Curcuma longa), a member of the ginger family. Turmeric is native to the South Asia. Its ground rhizome is used as a coloring and flavoring agent in many Asian cuisines, especially for curries. Curcumin has been used in the Far Eastern medicine for centuries, because of its anti-inflammatory and antiseptic activities. Some studies suggests, that it can be effective in the chemoprevention and treatment of certain types of cancer. This study reviewed several previous studies, which support the therapeutic activity of curcumin in cancer. All of the reviewed studies indicates that curcumin can exerts antitumor activities.

**Keywords:**

curcumin, cancer


# EFFECTIVENESS OF BIOSTIMULATORS IN ALLEVIATING THE EFFECTS OF BIOTIC AND ABIOTIC STRESS IN PLANTS

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**A few words about the author(s):**

dr inż. Dorota Gendaszewska – employed in Ł - Institute of Leather Industry as a senior specialist. Specialty: microbiology. dr Paulina Pipiak – employed in the Ł - Institute of Leather Industry as a senior specialist. Specialty - organic chemistry.

**Abstract:**

The quality and quantity of crops are influenced by biotic and abiotic stressors to which plants are constantly exposed. Stress from adverse stimuli can significantly reduce yields. Abiotic factors include temperature, ultraviolet radiation, unfavorable soil composition (salinity, acidity, mineral deficiency), limited water availability or its excess, and mechanical factors (e.g. wind). Biotic factors include i.a. bacteria, fungi and viruses that cause many plant diseases. Currently, much attention is paid to plant production technologies based on reducing biotic and abiotic stresses and improving the quality of crops. One of the solutions is the use of biostimulators. Due to the way they work, they are safe for the environment, replacing chemical plant protection products. Biostimulators, such as: protein hydrolysates, algae extracts, humic and fulvic acids and biological control agents, including Trichoderma fungi, have been extensively tested in terms of mitigating the effects of biotic and abiotic stress, as well as improving the quality of crops by stimulating the physiological processes of plants. Obtaining optimal crops of plants, through the use of biostimulators, as compounds that are environmentally friendly and do not threaten human health, plays an important role in integrated plant protection. The poster will present literature reports on the use of biostimulators in combating the effects of biotic and abiotic stresses in plants.

**Keywords:**

biostimulators, biotic stress, abiotic stress, plant cultivation


# FUEL AND ASH PARAMETERS IN THE LIGHT OF PETROGRAPHIC STUDIES

**Zbigniew Jelonek*, Iwona Jelonek**

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**A few words about the author(s):**

Zbigniew Jelonek is an Industrial PhD student at the Faculty of Earth Sciences of the University of Silesia in Katowice. Iwona Jelonek is a researcher at the University of Silesia in Katowice, she specializes in the fields of organic coal petrology.

**Abstract:**

The efficiency of energy production as well as the impact of the installation on the natural environment (especially on the atmosphere) depend both on the characteristics of the technology used and on a number of features of the fuel used in the combustion process. Depending on the properties of the solid products of the combustion process, the obtained products are classified as troublesome waste or as a sought-after raw material for a variety of applications.

This paper presents the characteristics of coal, coal sludge, and ashes from a fluidized bed boiler installed in southern Poland. The facility selected for the study is a modern power generation plant, which has won several awards. The solutions used in the discussed facility can be considered as model solutions.

The aim of the study was to:

● determine the characteristics of coal and coal slurry used in the energy production process,

● determine the content and properties of unburned organic matter and mineral matter in the tested bottom ashes and fly ashes in terms of their economic use.

The characteristics of fuels used in the above-mentioned boiler were obtained. The parameters of the tested ash indicate high combustion efficiency of the discussed facility. The obtained results confirm the validity of the choice of the fluidized bed combustion technology and suggest the need for further qualitative and petrographic studies.

**Keywords:**

coal, petrography, combustion


# ORGANOIDS – ORGANS ON A PETRI DISH

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**A few words about the author(s):**

Oskar Kamiński – a student of the Adam Mickiewicz University in Poznań. Interested in biology, starting from a single cell, through fully functional organisms, ending up with the whole ecosystem.

**Abstract:**

Organoids are spatial, multicellular assemblies - organs that are simplified in terms of morphology - but retain basic, both functional and structural features of the starting organs. Due to their properties, they have been widely used in biology as a better replacement for flat cell cultures or model organisms. They enable more dynamic development of research on organogenesis or the action of various active substances. They increase reliability in research on substances with therapeutic effects and they themselves are an interesting object of scientific research.

**Keywords:**

organoids, cells, in vitro, organs, organogenesis


# POTENTIAL USES OF BACTERIOPHAGE THERAPY IN THE CONTROL OF ANTIBIOTIC-RESISTANT PATHOGENS

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**A few words about the author(s):**

Mikołaj Maj – a student of two majors – BSc Biotechnology and BA Ethnolinguistics – of Adam Mickiewicz University in Poznań, connecting the best of both worlds.

**Abstract:**

Bacteriophages are natural parasites of bacteria that have long been considered as agents for treating bacterial infections. The use of them - known as phage therapy - is based on the fact that phages recognize, bind to and multiply within bacterial host cells, rapidly causing cell lysis. While antibiotics are still successful in treating the majority of bacterial infections, there are notable exceptions where frontline therapies are no longer reliable. Thus phage therapy is a debatable issue, whether it is to become the future resolution.

**Keywords:**

bacteriophage, phage therapy, antibiotic-resistant pathogens


# CHANGES OF QUALITY AND WATER CONTENT IN COLD-PRESSED FLAXSEED OILS DURING STORAGE

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**Abstract:**

The research materials were three cold-pressed flaxseed oils with different water content (520, 752 and 1134 ppm) stored under natural conditions for 3 months at room temperature (in the dark or exposed to light) and under accelerated oxidation conditions for 14 days (thermostat test at 60°C). The oil samples were taken every 5-15 days (from natural conditions) or every 12-24 hours (from accelerated conditions). The methodology included the assessment of the quality, i.e. determination of the peroxide, acid and anisidine values, the content of dienes and trienes, and the assessment of the water content in oils by Karl Fischer titration method using Coulometer 917 apparatus. The results obtained in the research indicate that storage affects both the quality and the water content of cold-pressed flaxseed oils. Generally, oils stored in the dark place results in lower values of peroxide, acid and anisidine values compared to oils exposed to light during storage. The most optimal for the quality of oils seems to be the lower water content (520-752 ppm) due to more favorable values of individual quality parameters. It was noticed that changes in the water content depend not only on the storage conditions, but also on the initial water content in oils. The water content decreased noticeably during storage under accelerated oxidation conditions, from 5% to over 45% depending on the time.

This study was funded by the National Science Centre, Poland (Project No. 2018/31/N/NZ9/01273).

**Keywords:**

flaxseed oil, quality indices, water content, natural conditions of storage, accelerated conditions of storage


# INFLUENCE OF SELECTED BIOSTIMULATORS ON THE YIELD OF MAIZE PLANTS

**Paulina Pipiak (1)*, Dorota Gendaszewska (1), Monika Skwarek (2), Katarzyna Sieczyńska (1)**

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**A few words about the author(s):**

Dr Paulina Pipiak – Specialty-organic chemistry. Dr inż. Dorota Gendaszewska – Specialty – Microbiology. Dr Monika Skwarek – Specialty-plant physiology and biochemistry. Mgr Katarzyna Sieczyńska – Specialty – analytical chemistry.

**Abstract:**

Seed coating is the process of applying substances to the surface of seeds, the purpose of which is to modify their physical properties, protect against pathogens, and deliver active ingredients. Due to their functions, the materials used in the seed coating process can be divided into binders (binders), fillers and active ingredients (protective agents, nutrients, symbionts, soil conditioners, phytoactive promoters and markers). Due to the growing interest in natural substances that stimulate plant growth, such as protein hydrolysates, humic substances, algae extracts, the aim of the work was to investigate the effect of binding agents (including collagen) on the germination and growth of maize seedlings.

In this communication, we would like to present the results of studies on the effect of the application of binders (fish collagen or polyhexamethylene biguanide hydrochloride - PHMB) on seed germination and growth of maize (Zea mays L.). We would like to present the dry and fresh mass of shoots and roots in maize seedlings (after 21 days of growth) as well as the content of selected elements determined by atomic emission spectrometry (ICP-OES).

**Keywords:**

biostimulators, collagen, seed coating, maize

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