



## FACULTY CHRISTMAS GATHERING



This year the special Christmas meetings of the Faculty community was held very early; on the 17<sup>th</sup> of December. Augmented by new young voices, the Faculty choir under the direction of Damian Ryszawy gave a concert of carols. The audience were especially impressed by their performance of South African Trilogy. The concert was followed by breaking of the Christmas wafer and wishing each other all the best. Gorgeous decorations and delicious food – above all borscht with ear-shaped small dumplings – raised the Christmas spirit.

Students of biophysics, members of the Student Research Club 'Nobel', traditionally performed a play of their own authorship. This year, they performed 'Scientists' Letters to Santa Clause'. It was a story about busy Santa who saw scientists in his office. They asked him for research grants, discoveries, better students. Santa Claus offered a kind word and some good advice to everyone.

The team of screenwriters and directors consisted of Katarzyna Lichańska, Paulina Nowak, Alicja Cieślewicz and Katarzyna Radoń. These people, together with Maciej Bratek, Joanna Czarny, Magdalena Firlej, Artur Kowalik, Daniel Krochmal and Zuzanna Pakosz, were also involved in featuring and technical support. The play elicited a burst of spontaneous applause.

## NEW DEPARTMENT

According to the Regulation No. 104 of the Jagiellonian University Rector of 1 October 2015, a new unit was created within the Faculty of Biochemistry, Biophysics and Biotechnology. The Department of Comparative Biochemistry and Bioanalytics was started on 1 October 2015. Dr Maria Rapała-Kozik became the head of this department which consists of four staff members (three researchers and one technical support employee) and three PhD students.

The research conducted at the Department of Comparative Biochemistry and Bioanalytics has been focused on two main areas: (1) pathogenesis of infections caused by opportunistic yeasts of the genus *Candida*, in the recent years increasingly important pathogens that can cause not only superficial mycoses, but also systemic candidiases which are often serious or fatal, and (2) continuation of rese-

arch on the role of vitamin B1 in response of bacteria, yeasts and plants to stress.

The following issues will be investigated in detail:

- role of *Candida albicans* aspartyl proteases in the pathogenesis of yeast infections,
- adaptive responses of yeast transcriptomes and proteomes to variable environmental conditions in the site of infection,
- adherence and invasion of selected host cell types by pathogenic yeasts,
- mechanisms used by the human immune system cells, mainly the neutrophil extracellular traps (NET), to defend fungal infections,
- interactions between yeasts and opportunistic pathogenic bacteria in mixed-species biofilms,

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- structural and enzymatic characterization of proteins that take part in biosynthesis of thiamine in plants and microorganisms,
- role of vitamin B1 in the protection of plants and yeasts and their adaptation to stress conditions.

The research of the yeast agents and host proteins that interact with each other will be carried out using various methods of recombinant protein production (bacterial and yeast overexpression), isolation (high-performance liquid chromatography) and identification at the levels of particular genes (real-time PCR) and proteomes (mass spectrometry). We will also analyse possible intermolecular interactions based on measurements of the surface plasmon resonance (BIACORE 3000 system),

fluorescence anisotropy and dynamic light scattering.

In answer to the lack of effective drugs for yeast infections, we have studied thoroughly not only the virulence factors of these microorganisms and the mechanisms of host-pathogen interactions, but we have also searched for new therapeutic solutions. Mixed-species biofilms of yeasts and opportunistic bacteria are potential sources of fungistatic or fungicidal agents or may reveal mechanisms of how is the growth of yeasts controlled. Analysis of such biofilms is currently considered as a promising direction of antifungal therapy. In the nearest future, the new department's focus will be on research into these areas.

## REPORT OF THE WEEK OF EDUCATION QUALITY AT THE FACULTY OF BIOCHEMISTRY, BIOPHYSICS AND BIOTECHNOLOGY



At the Jagiellonian University, the week between 30 November and 5 December was dedicated to the quality of education. The University-wide programme of over fifty workshops, lectures and discussion panels was accompanied by local events organized by faculties including the Faculty of Biochemistry, Biophysics and Biotechnology.

As in the previous years, the local programme contained separate trainings for students and teachers. The university teachers and PhD students had an opportunity to attend a seminar *Innovative Approaches to Teaching Natural Sciences at the University Level* conducted by Dr Iwona Maciejewska, Head of the Centre of Excellence for Academic Teaching and Learning – Ars Docendi UJ. The Faculty staff could also participate in a workshop *Modern Academic Etiquette Based on the Diplomatic Protocol* which was run by Dr Brygida Kuźniak from the Department of Public International Law, Jagiel-

lonian University Faculty of Law and Administration.

Doctor Kuźniak also conducted a workshop for students: *University Savoir-Vivre or Fine Feathers Make Fine Birds*. Another meeting – *Student Activity and Position in the Labour Market – What You Can Do Now to Make Your CV More Attractive to Employers* – was also addressed to students. It was attended by the Faculty coordinators for international student mobility within EU and USA, a representative of the Jagiellonian Centre of Innovation (JCI), potential employers (Jagiellonian Centre for Experimental Therapeutics (JCET), Selvita), and six students from the Faculty of Biochemistry, Biophysics and Biotechnology: two MSc and four PhD, who took part in an international student exchange programme, studied abroad or completed an internship in a research institution or company, either in Poland or abroad.

Almost fifty people participated in these events and all of them (both Faculty staff members and students) described the meetings as useful, interesting and very well prepared.

## Summary of the project

### 'Cell Metabolism and Toxic Agents'

Last year in November, the joint project of the Faculty of Biochemistry, Biophysics and Biotechnology and the August Witkowski General Education Secondary School No. 5 in Cracow, entitled 'Cell Metabolism and Toxic Agents' was completed. This project was implemented under the University of Young Inventors programme of the Ministry of Science and Higher Education (in collaboration with the Ministry of National Education) and financed by the European Regional Development Fund (Innovative Economy Operational Programme).

The aim of this project was to encourage and promote scientific activities among secondary school students. According to the plan developed by Dr Beata Myśliwa-Kurdziel and Dr Monika Rak from the Faculty of Biochemistry, Biophysics and Biotechnology, the students had a unique opportunity to participate in practical classes, conduct experiments and use modern measuring equipment. During the classes and lectures, special emphasis has been placed on presenting the results of scientific investigations and demonstrating how new discoveries in biochemistry, biophysics or biotechnology can change the world through their use for everyday purposes.

This project was selected by means of a competition and lasted eleven months, from December 2014 till November 2015. It contained six one-hour lectures, twelve one-hour demonstrations and eight three-hour workshops. Furthermore, during the project closing conference, held 4-5 November in the Witkowski Secondary School, seven twenty-minute oral presentations were given and two poster sessions were organised. The project participants had the opportunity to develop independent thinking, analytical skills and the ability to search and select information.

The ten most active participants were offered the chance to conduct their own experiments in labs of the Faculty of Biochemistry, Biophysics and Biotechnology. It was so attractive for the school students that they devoted a part of their summer holidays to work on the self-chosen research questions. Time at the

## COLLABORATION WITH SCHOOLS

Faculty has enabled them to gain an understanding of what it means to be a scientist and become familiar with methods used in scientific investigations.

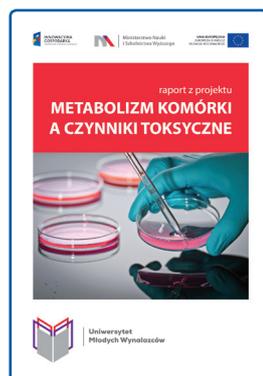
Twenty-nine people from the Faculty of Biochemistry, Biophysics and Biotechnology were involved in a wide range of activities within the project, whereas the August Witkowski General Secondary School No. 5 was represented by three teachers. The project was selected by means of a competition in which 116 second-year school students participated, all from classes with extended curriculum in biology and chemistry. There were ten winners. The students prepared 14 posters and 16 scientific articles. The closing conference was attended not only by the 116 students directly related to the project, but also almost 300 other students.

Detailed information concerning the completed project, as well as articles written by the school students in collaboration with the Faculty of Biochemistry, Biophysics and Biotechnology staff members or PhD students, were published in mini-book form (online version is available from the Faculty web site). A perfect opportunity to present this publication arose during a meeting organised by the Ministry of Science and Higher Education in Warsaw on 14 December. The meeting was attended by the participants of just completed programmes: *University of Young Inventors and Academic Centre of Creativity*. During the meeting, representatives of universities from across the country (among them Dr Beata Myśliwa-Kurdziel), not only have summarised the outcomes of almost a year-long collaboration with school students, but could also exchange experience and notes on programmes whose end-users are schools.

### Workshops under the 'High Noon' Meetings with Biochemistry, Biophysics and Biotechnology

It was the first time the programme of the 'High Noon' Meetings with Biochemistry, Biophysics and Biotechnology which included only lectures, was supplemented with forty-five minute workshops. Initially scheduled for 21 November, it eventually took place also on the next Saturday (28 November) due to a strong response from schools. The workshops were attended by nearly 160 high school students from Gorlice, Dębica, Skała, Krynica-Zdrój and Bochnia.

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## ► COLLABORATION WITH SCHOOLS cont. from p. 3

The classes were grouped into blocks so that each student had the opportunity to learn about two quite different scientific problems.

- BLOCK 1: *Biophysics around Us, 'Green' Genome*
- BLOCK 2: *Testing of Cell Viability after Alcohol Treatment, Protein Crystallisation*
- BLOCK 3: *Mysterious World of Colours, Colourful Experiments with Plant Pigments*
- BLOCK 4: *GFP – Green Fluorescence Protein, Observation of the Activity of Purple Bacteria Nitrogenases*

Students, both graduate and PhD, together with the staff from the Departments of: Biophysics, Cell Biology, Plant Physiology and Biochemistry, Plant Biotechnology, Microbiology and the Department of Plant Physiology and Development were involved in preparing the demonstrations for the school students.

Students have enjoyed the workshops so much that possibly it will be a permanent part of the autumn 'Meetings'.

### **Adventure with Biochemistry**

Can you imagine work of scientist? It seems that school students find this question difficult to answer. It does not help to decide whether a degree programme suits them or not. It is commonly thought that programmes available at the Faculty of Biochemistry, Biophysics and Biotechnology are highly specialised. For these reasons, we started a series of workshops named '*Adventure with Biochemistry*'. It was possible due to the financing provided under the KNOW programme; some of the funds could be allocated to collaboration with schools.

Under the collaboration with the Private Academic Secondary School No. 8 in Cracow, a series of workshops for the school students

were carried out at the Faculty of Biochemistry, Biophysics and Biotechnology on six Saturdays between November and January. The workshops have been run by the staff members and students, both PhD and graduate, from the Department of Plant Physiology and Biochemistry who had previously proven to be enthusiastic popularisers of science: Paweł Jedynak, MSc, Bartosz Pluciński, MSc, Justyna Kocik, Anna Kowalczyk, Katarzyna Lenart, Stanisław Listwan and Wiktor Tokarek.

The school students were eager to become acquainted with various laboratory techniques and career perspectives for graduates in biochemistry or biotechnology. All workshop topics are outlined below:

- Principles of pipetting, preparation of solutions, extraction of plant pigments, analysis of the composition of plant pigments using absorptiometric methods.
- Pipetting, extraction and buffer solutions.
- Carbohydrates – properties and methods of detection.
- Properties of aminoacids and proteins. Methods of detection. Electrophoretic separation of proteins – principle and applications.
- Basic microbiological techniques – streak plate method, selective growth media. Establishment of cultures of the selected microorganisms.
- 'Close encounters' of bacteria, algae and cyanobacteria.
- Properties of enzymes, substrate specificity. Use of enzymes and microorganisms in biotechnology.
- Use of fluorometry and EPR for scientific research. Photosensitiser (chlorophyll) and singlet oxygen formation (TEMPD).
- Harmful free radicals and methods of their detection.

## RESEARCH GRANTS

In November, the National Science Centre announced the results of the 9<sup>th</sup> edition of the PRELUDIUM and OPUS competitions. Among the winners, there were eight scientists from the Faculty of Biochemistry, Biophysics and Biotechnology. The following people received funds from the PRELUDIUM programme:

- **Ewelina Chrapusta**, MSc from the Depart-

ment of Plant Physiology and Development (*Ecological Significance and Comprehensive Characterisation of Mycosporin-Like Compounds in the Lichen *Cladonia arbuscula**, 150,000 zł);

- **Aleksandra Twarda**, MSc Eng from the Department of Microbiology (*Hyaluronic Acid Receptor Stabilin-2: Crystallographic Determination of the Structure and Bioche-*

*mical Characterisation of Stabilin-2 Binding to Hyaluronic Acid, 50,000 zł);*

- **Mateusz Tomczyk** MSc from the Department of Medical Biotechnology (*The Role of Tissue-Resident Macrophages in Remodelling and Regeneration of Cardiac Muscle. Contribution of Haem Oxygenase-1, 99,960 zł);*

and from the OPUS programme:

- Dr **Jarosław Czyż** from the Department of Cell Biology (*Impact of Fenofibrate on Invasive Potential of Prostate Cancer Cells Modulated by Chemotherapeutics, 749,800 zł);*
- Dr **Marta Michalik** from the Department of Cell Biology (*Phenotypic Transitions of Bronchial Fibroblasts to Myofibroblasts – the Role of Different Activation Patterns of the*

*TGF-beta/Smad Pathway in Cells Derived from Asthmatics in Comparison to Healthy Individuals. in vitro Studies Using the 2D, 3D i EMTU Models, 952,000 zł);*

- Dr **Maria Rapała**-Kozik from the Department of Comparative Biochemistry and Bioanalytics (*New Approach to the Role of Mixed-Species Biofilms Containing Candida Strains in the Development of Periodontal Diseases, 396,000 zł);*
- Dr **Martyna Elas** from the Department of Biophysics (*Ultrasound-Sensitive Oxygen Nanobubbles: Applications in Cancer Therapy and in Situ EPR Imaging, 940,491 zł);*
- Prof. **Jolanta Jura** from the Department of General Biochemistry (*Regnase-1 – analysis of structure and identification of matrices degraded by this Enzyme, 654,260 zł).*

### Best Poster Award

Marta Adamiak, a PhD student from the Department of Cell Biology, took the Best Poster Award at the World Conference on Regenerative Medicine which was held in Leipzig, 21-23 October. The winning article was entitled: *'Transcriptomic and Proteomic Profiling Identifies Extracellular Vesicles from iPS Cells as Potential Therapeutic Tool for Cardiovascular Disease'.*

The young researcher presented the results of her investigations conducted as a part of a project entitled: *'Bioactive Stem Cell-Derived Microfragments as a New Tool in Tissue Regeneration'* which has been supervised by Dr Ewa Zuba-Surma and financed by the Foundation for Polish Science under the TEAM programme.

## AWARDS AND FELLOWSHIPS

### Scholarship of the Minister of Science and Higher Education

Paulina Nowak, a fifth-year student of biophysics, won a Scholarship of the Minister of Science and Higher Education for outstanding achievements made throughout the academic year 2014/2015. She was amongst 744 students recognised with this prestigious award (the list was published by the Ministry on 18 December). It is worth pointing out that Paulina Nowak is also a winner of this year's edition of the *'Diamond Grant'* competition (see *'Triplet'* No. (31)4/2015).

**Katarzyna Zabiegło** – *'SLPI as a Factor Regulating Formation and Functioning of Neutrophil Extracellular Traps'* Supervisor: Prof. Joanna Cichy. 27 November 2015.

**Maciej Cieśla** – *'Role of Haem Oxygenase-1 in the Development of Rhabdomyosarcoma'* Supervisor: Prof. Alicja Józkowicz. 27 November 2015.

**Danuta Bryzek** – *'Induction of Inactive Bactericidal Neutrophil Extracellular Traps (NETs) by*

*Gingipains as a New Mechanism of Porphyromonas gingivalis virulence'* Supervisors: Prof. Jan Potempa and Dr Joanna Kozieł. 3 November 2015.

**Ewa Błasiak** – *'Fluorescent Examination of Dopamine Receptor Interactions in an in Vitro Model System – Role of Single-Nucleotide Polymorphisms of the D2 Receptors'* Supervisor: Prof. Marta Dziedzicka-Wasylewska. 9 October 2015.

## PHD THESES

The most important tasks implemented between October and December 2015 under the Cell-Mol-Tech Consortium were: launching a scholarship programme for MSc and PhD students and settlement of a competition for the non-professors (either title or position) over 35 years of age, aiming to support their scientific activities (Programme 35+).

According to the decisions of the competent committees, 59 PhD and 95 MSc students were awarded for their learning and scientific achievements, among them 47 students of the first three years, both BSc programme and BSc and MSc combined programme and 48 students of the fourth and fifth years of the BSc and MSc combined programme and the first and second year of the MSc programme. The amount of Professor Jan Zurzycki scholarship for PhD students depends on the number of published papers whereas the JUNIOR and MASTER scholarships offer a fixed sum per year.

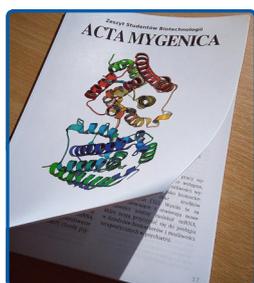
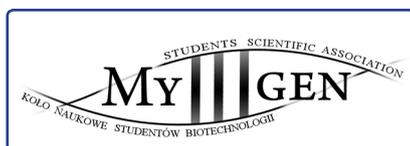
The Programme 35+ call for proposals was launched on 15 October, to which 20 doctors and 9 holders of the degree of Doctor Habilitatus responded. The submitted proposals were assessed independently by three external experts in biochemistry, biophysics and molecular biology. On the basis of points awarded, it has been decided that the following scientists will receive funding from the KNOW programme: **Dr Agnieszka K. Banaś** (*Characterisation of the Arabidopsis Photoliasases: AtUVR3 i AtPHR2*), **Dr Małgorzata Bzowska** (*Mechanism of the*

*HSP90 Surface Activity in Recognition of the Molecular Patterns by Macrophages*), **Dr Grzegorz Dubin** (*New Hexokinase Inhibitors: a Structural Analysis*), **Dr Andrzej Górecki** (*Role of the YY1 and YY2 Intrinsically Disordered Protein Fragments in the Recognition of Specific DNA Sequences*), **Dr Katarzyna Miękus** (*Molecular Analysis of the Role of MCP1 Protein in the Inhibition of Epithelial-Mesenchymal Transition*), **Dr Marcin Sarewicz** (*Rapid Freeze-Quench Technique and Pulse EPR Spectroscopy as Tools for Investigating Magnetic Interactions between the Metastable Semiquinone SQo and Metallic Cofactors within the Qo Catalytic Centre of the bc1 Cytochrome*), **Dr Joanna Skrzeczyńska-Moncznik** (*Isolation and Purification of Extracellular Neutrophil Networks (NETs) Using Immunoprecipitation and Assessment of their Immunoreactivity*), **Dr Agnieszka Łoboda** (*Synthetic Lethality of Haem Oxygenase or Nrf2 and Fumarate Hydratase – a New Mechanism of Tumour Cell Death*), **Dr Paweł Mak** (*Modulating Mechanism of Action of the Peptide Bacteriocin BacSp222 in Eukaryotic Cells*) and **Dr Przemysław M. Płonka** (*Mixed Tumours as Models for the Growth of Heterogeneous Populations of Neoplastic Cells and Interfering Tumours*).

The other decisions taken in the last quarter concerned financial support of the following activities:

- attending scientific conferences, trainings, workshops and short or long study trips,
- work of the Student Research Club 'N.Zyme',
- organisation of a new course *Genetics for Biotechnologists* (coordinator: Dr Wojciech Branicki, Department of General Biochemistry).

## MYGEN



After the summer break, the Student Research Club 'Mygen' has started up again under the leadership of the new Council which was elected in June. In the beginning of October, the

General Meeting was held which was to present a detailed schedule of the activities to be developed this academic year.

At the beginning of the academic year, we organised a meeting which was a way to get acquainted with each other. The new students could learn how to benefit from studying at

the Faculty of Biochemistry, Biophysics and Biotechnology.

At the middle of October, we went to Mszana Dolna for a study trip combined with team-building activities. We had two special guests: Prof. Jonathan Heddle and Dr Sebastian Glatt, who have been carrying research at the Małopolska Centre of Biotechnology.

The last 'Mygen' seminar, during which our Faculty students talked about the experience they gained during trainings abroad, also raised much interest.



A lot has happened in 'N.zyme' over the last few months. One of our goals was to receive funding for furniture and equipment for our Club room. We succeeded, the financial support came from the KNOW programme and now we have a nice place to study and read, for meetings and social activities.

In the beginning of December, a meeting of the series *ScienceCorner* was held. The 'N.zyme' Research Club members Michał Kołtun and Przemysław Dutka told us about their summer internships under ERASMUS+ and Vienna Bio-

center Summer School. They also discussed the projects in which they participated.

Moreover, 'N.zyme' members took part in the Noble Box Project (Szlachetna Paczka). For three weeks we collected gifts for a family, according to their specified needs. We managed to gather all the items that 'our' family wished to get.

We said goodbye to the old year during a before-Christmas meeting of the 'N.zyme' Club.

Justyna Macina

## GUESTS OF THE FACULTY

6 September – 18 December 2015

**Pablo A. Zambrano, MSc** (PhD student from the Faculty of Pharmacy, University of Concepción, Chile). Guest of the Department of Plant Physiology and Biochemistry.

15 October 2015

**Prof. Witold K. Subczyński** (Department of Biophysics, Medical College of Wisconsin, Milwaukee, USA). Lecture entitled: *'The Importance of the Lipid Bilayer Portion of the Lens Fiber Cell Plasma Membranes in the Maintaining Lens Homeostasis, and thus Protecting Against Cataract Development'*. Guest of the Department of Biophysics

28 October 2015

**Prof. Julian Kinderlerer** (President of the European Group on Ethics in Science and New Technologies, EGE). Guest of the Department of Biophysics

16-18 November 2015

**Prof. Lionel Bretilion** (University of Burgundy, Dijon, France). Series of lectures entitled: *'Lipids: from Analysis to Clinical Aspects'*:

- 16 November – *'Basic Principles in Lipids; Lipidomics in Ocular Samples: Methodological Concerns'*,
- 17 November – *'Lipids in the Retina; Cholesterol in the Aging Retina'*,
- 18 November – *'Nutrition and the Aging Retina; Nutrition and the Aging Retina'*.

Guest of the Department of Biophysics

9 December 2015

**Dr Melissa LaJevic** (Palo Alto Veterans Institute for Research, USA). Lecture entitled: *'Chemerin/CMKLR1 are Required for Maximal Skin Disease in Experimental Psoriasis'*. Guest of the Department of Immunology.

10-17 December 2015

**Prof. Alexander Henning Ulrich** (University of São Paulo), Series of lectures and seminars entitled: *'Receptors and Ligands as Molecular Targets'*:

- 10 December – *'Aptamers as High-Affinity Ligands in Diagnosis and Therapy'*,
- 11 December – *'Introduction to Stem Cells and their Therapeutic Applications'*,
- 14 December – *'Neural Development and Neurogenesis'*,
- 16 December – *'Calcium Signalling'*,
- 17 December – *'Kinin and Purinergic Signalling'*.

Guest of the Department of Cell Biochemistry

**Tea meetings at Gronostajowa – lecture series of the Kraków Branch of the Polish Biochemical Society:**

28 October 2015

**Dr Joanna Kargul** (Solar Fuels Laboratory, Centre of New Technologies, University of Warsaw). Lecture entitled: *'Biomimetic Production of Solar Fuels Using Artificial Leaf Technology'*.

25 November 2015

**Prof. Agnieszka Chacińska** (International Institute of Molecular and Cell Biology in Warsaw). Lecture entitled: *'Role of Mitochondria in Maintaining Cell Homeostasis of Proteins'*.

16 December 2015

**Dr Marcin Nowotny** (International Institute of Molecular and Cell Biology in Warsaw). Lecture entitled: *'Mechanism of Structure-Selective Nucleases Involved in DNA Repair'*.



Prof. Bretilion with listeners of his lecture. Phot. by J. Bazak

## IT'S PAST BELIEF!

### 'Star Wars' of biophysicists: episode.... the next

It is hard to say what does biophysics deal with, but 55 years ago, two prominent biophysicists had a verbal skirmish around the subject of the future of biology<sup>1</sup>. In 1961 it was biology which triumphed (as it seems now) and no one could ever expect that those statements would remain valid after 55 years!

Barry Commoner, already known to us from previous columns (*Triplet* 1(16), 2012), was actually a plant physiologist but he was the first to apply the electron paramagnetic resonance technique to biological systems. In his article<sup>1</sup>, Commoner criticised certain views put forward in the book '*The Intelligent Man's Guide to Science. Volume 2 - Biological Sciences*', published a year before and written by another biophysicist, Isaac Asimov primarily known for his science fiction writings. By the way, the last year's premiere of a new '*Star Wars*' episode is an excellent opportunity to mention once again the main Asimov's work: '*The Foundation Trilogy*', containing ideas later used for '*Star Wars*' and other works (*Triplet* 2(9), 2010).

This time probably DNA gave rise to the dispute between the two biophysicists. Asimov has believed that life can be brought down to what is written in the DNA – a molecule that can be fully investigated with chemical methods. Commoner has argued that not everything is written in the DNA. Asimov has thought that the so-called 'classical' biology is simply a description, something like 'collecting of postage stamps', whereas Commoner has said that biology deserves a place in the science system. Asimov has insisted that the only boundary in the modern science can be drawn between living organisms and lifeless things, but the border is purely formal and will be eliminated (most likely by chemistry). Then biology will no longer be a separate field of science. Commoner has answered that the boundary is real and is becoming more and more real! Asimov has predicted the replacement of biology with chemistry and physics and Commoner has foreseen the dawn of a new era with close alliance of chemistry, physics and computer science with biology and development of the borderline disciplines which support biology, i.e. biochemistry, biophysics and bioinformatics. Although the scholars took epistemological issues as their primary focus, the extreme emotions could be felt in their statements on DNA, especially when Asimov<sup>2</sup> commented... Was he right? We know that ... yes and no. There is no doubt that structural and functional features of organisms are determined by information stored not only in DNA (e.g. - what about 'genes' coding for dermal papillae? - asks Walter Elsasser<sup>1</sup>, another famous biophysicist and one of the fathers of complex system biology) but gene mapping is still the central task of modern biology.

In a polemic published in another issue of *Science*<sup>2</sup>, Haig H. Najarian, parasitologist and nematologist, also known as the author of '*Sex Lives of Animals Without Backbones*' presents his views. He supports the defenders of 'classical' biology and criticizes disrespect shown by 'modern' biologists to the traditional biological disciplines (who reject the necessity of learning taxonomy but require the Krebs cycle reactions to be learnt by heart, ignore the name of amphibian species under investigation and much more<sup>2</sup>). All these Najarian's statements are still true. The scientific world was surprised by the enormous success of an inconspicuous nematode *Caenorhabditis elegans* not in parasitology, but in neuroscience. There are also other evidence that Najarian was right. Let's take for instance an ascomycota fungus *Pestalotiopsis microspora* (Speg.) G.C. Zhao & N. Li, which was identified in fallen foliage of common ivy. *Pestalotiopsis microspora* proved to be an endophyte. Microorganisms colonise not only our bodies, but also grow inside plants: in intercellular spaces, on cell walls, inside vessels. These are mainly fungi and the relationship is often, but not always symbiotic. As many other endophytes, *Pestalotiopsis microspora* can produce melanin<sup>3</sup> but its role remains unclear. Sophisticated genetic investigations<sup>3</sup> has shown that melanin is synthesised by the polyketide synthase-1 multienzyme complex. Recently, it has been revealed that *Pestalotiopsis microspora* is capable of breaking down polyurethane and this fact is attracting significant attention due to possible applications in bioremediation. What is even more fascinating is that *Pestalotiopsis microspora* converts polyurethane to taxol, a valuable antineoplastic agent which until recently has been believed to be synthesised in only one species of yew growing on the west coast of North America. Strictly speaking, this does not have to be a direct metabolic pathway but *Pestalotiopsis microspora* undoubtedly can synthesise taxol as like as

the yew. Bioinformaticists can explain these processes and, in collaboration with biotechnologists and biochemists, program the fungal cells to perform the requested functions<sup>3</sup>. Perhaps one day biophysicists will get the answer to the question of what do fungi need melanin for. But one thing is certain – these scientific problems would not have arisen without apparently uninteresting, classical mycological knowledge.

We should be happy to have the opportunity of working at the Faculty of Biochemistry, Biophysics and Biotechnology where the demands of Commoner and his (a bit angry) contemporaries, who investigated the fundamentals of life in the early 60s of the last century, are implemented.

The decision about the establishment of the Jagiellonian University Institute of Molecular Biology was taken four years after the series of articles discussed above was published (see *Triplet* 1(8), 2010). As Commoner writes: 'Bright young biologists, if they are good enough, become biochemists and biophysicists'. Today we should add 'and bioinformatics' and do our utmost to attract the finest young minds to the Faculty. Maybe then it will be possible to implement one more demand of Barry Commoner the biophysicist – contribute to human well-being which is, in his opinion, the primary goal of science<sup>1</sup>.

Writing these words on New Year's Eve 2015 and wishing for all the demands come true in 2016 and subsequent years.

Przemysław M. Płonka

<sup>1</sup> Commoner B. *Science* **133** (1961) 1745-1748

<sup>2</sup> Asimov, I., Najarian H.H., Commoner B. *Science* **134** (1961) 1020-1024

<sup>3</sup> Yu X., et al., *Microbiological Research* **179** (2015) 1-11.



The Student Research Club 'Nobel' launched this year's activities with the traditional MIB (Mountain Integration of Biophysicists) trip. We went to Nowy Targ and climbed Turbacz where, after listening to presentations of the 'Nobel' members, we felt ready to start working. Right after the return, the General Meeting was held which elected the new Council: Katarzyna Lichańska (President), Alicja Cieślęwicz (Deputy President) and Karolina Korpanty (Treasurer).

Oskar Szelest appeared in a radio programme on UJOT FM Radio in which he talked about our activities. We hope it will help the University community to get acquainted with enthusias

ts of biophysics.

We enjoyed very much preparing a Christmas play in collaboration with members of 'Mygen'. The play was presented during the Faculty annual informal meeting and received very enthusiastic feedback from our audience. The next day we gathered to celebrate the 'Nobel Christmas Eve' in a narrow circle, partying and sharing best wishes to each other.

In January, we will start a series of meetings under the *Student Science Salon*, a lecture competition for enthusiasts of science. We are also about to begin organisation of the 5<sup>th</sup> International Student Conference on Biophysics which will be held in May 2016.

Katarzyna Lichańska

**NOBEL**



### Supplement 1 - 3<sup>rd</sup> quarter 2015

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