

FEBS Workshop on Molecular Life Science Education

September 18-19th, 2014

Belgrade, Serbia

Hosted by Serbian Biochemistry Society (SBS) (President: Professor Dr Mihajlo Spasić)

Coordinator from SBS: Prof. Marija Gavrovic-Jankulovic

Venue: Faculty of Chemistry University of Belgrade, Studentski trg 12-16

From FEBS Education Committee:

Prof. Keith Elliott (Manchester, UK) Prof. Gül Güner Akdogan (Chair) (Izmir, Turkey)

With Kind Support of Prof. Mathias Sprinzl, Chair, FEBS WGI (Bayreuth, Germany)



The Workshop was well-attended, with sixty participants from all over Serbia with a ratio of about 1/3rd professors and 2/3rds post-graduate students and post-docs.



Programme

DAY 1	Thursday, September 18th	
08:30-09:00	Registration	
09:00-09:30	Opening of Workshop	
09:30-10:00	General Discussion: " Issues on Molecular Life Sciences Education in Serbia"	Moderator: Prof. Mihajlo Spasic
10:00-10:30	"Skills and Key Knowledge Expected from a Molecular Life Sciences Graduate-FEBS Education Comm. Project"	Keith Elliott
10:30-10:45	Coffee and Break into Groups	
10:45-11:45	Small Group Discussions	Sprinzl/Elliott/Güner/Gavrovic-Jankulovic
11:45-12:45	Report from Groups	
12:45-14:00	Lunch	
14:00-14:45	"How to Write a Project Proposal"	Gül Güner-Akdogan
14:45-15:00	Discussion	
15:00-15:30	"Funds and Programmes"	Keith Elliott
15:30-16:00	Coffee Break	
16:00-16:45	"How to Read and Write a Scientific Article"	Mathias Sprinzl
16:45-17:00	Discussion	

DAY 2		Friday, September 19th, 2014	
09:00-09:30	Designing Laboratory Practicals: Introduction and General Concepts	Keith Elliott	
09:30-10:00	Applications: “An Innovative Laboratory Research Practice in a Medical School”	Gül Güner-Akdogan	
10:00-10:30	Coffee and Break into Three Groups		
10:30-12:00	Small Group Sessions with rotation-(Each session -30 minutes)		
<i>In Silico Practicals</i> <i>(Gül Güner-Akdogan)</i>	Dry Practicals <i>(Keith Elliott)</i>	Wet Practicals <i>(Mathias Sprinzl)</i>	
12:00-12.30	General Discussion on Practicals	Güner/Elliott/Sprinzl	
12:30-14:00	Lunch		
14:00-14.45	“Molecular Life Sciences Education for the Needs of Industry”	Mathias Sprinzl	
14:45-15:00	Discussion		
15:00-15:30	“How to Make the Best of Yourself: How to Write a CV”	Keith Elliott	
15:30-16:00	Coffee Break		
16:00-17:00	General Discussion and Close		



Discussion Group Reports:

The reports below have been composed by the Reporters selected in each discussion group.

Group Report 1

Moderator: Gül Güner

- *Is it worthwhile to apply for an EU project “What Skills and Core Knowledge Expected from a Molecular Life Scientist”?*

We believe it is.

Molecular life sciences graduates (both bachelor and master) would benefit from the European level project related to the subject. The main outcome of such project would be a set of standards in the field of molecular life science education that would promote mobility of molecular life science graduates. Such standards would, of course, be introduced and accepted on voluntary basis.

What basic skills should graduate have at the end of 1st and 2nd cycles?

We concluded that, so called, transferable skills are as important as practical skills. Team work, time management and communication skills (oral, written, electronic communication) should be introduced at bachelor level. We emphasized the importance of the promotion of molecular life science in the community (e.g. Festival of science) and in the population of undergraduate students (e.g. Student congresses). Bachelors should also adopt practical skills such as basic principles and techniques required for laboratory work. They should be introduced to the principals of dealing with biological samples and corrosive, toxic and flammable chemicals, as well as their disposal, laboratory safety hazards and measures. They should also be informed about the work in specific (e.g. sterile) conditions and with techniques that are used to maintain those.

Bachelors should also adopt basic laboratory techniques and methods such as pipeting, solution preparing, pH measuring, weight measuring, spectrophotometry, light microscopy, chromatography etc.

Skills regarding writing scientific paper and statistics should be introduced at master level, and skills such as project writing and fund management are in our opinion appropriate for PhD level. Practical skills that in our opinion should be adopted at master level are specific laboratory techniques such as PCR, blotting, electrophoresis, flow cytometry, HPLC, LC MS. However, in our opinion they should be introduced in general (core modul) and further specialization should be in the field of the methods required for the thesis.

What core knowledge should they have?

In our opinion, interdisciplinary approach is the key in teaching and understanding molecular life science. Bachelor should adopt general knowledge about the normal structure and function of the living cell (biomolecules, enzymes, cell organization, organelles, metabolism, cell signalisation and communication, ECM, nuclear processes, cell cycle and apoptosis), tissues, organs, systems and organism as a whole and about disturbances in the structure and function that represent molecular basis of disease itself. We found the theoretical knowledge crucial for understanding cellular processes and molecular life science.

What are the problems in delivering these?

We found the structure of curricula and interpretation of Bologna process to be the problem. Burocracy and the structure of the administration in the field of education that prevent collaboration and interdisciplinarity, as well as the lack of funding are the crucial obstacle in the development of molecular life science in Serbia.

Group Report 2:

Moderator: Mathias Sprinzl

Life science education in Serbia that we discussed is organized in three levels (4+1+3) at Faculty of Chemistry (Biochemistry) and Faculty of Biology (Molecular biology) University of Belgrade. We decided to accept the model 4+1 for graduate studies due to employers' attitude not to hire Bachelors with 180 ETCS. Having in mind that more than 50% of both Bachelors and Masters pursue scientific career in Serbia or abroad, we concluded that basic Life science curriculum and obtained skills should be strongly science oriented. The beginning of curriculum should include all natural sciences, before focusing on life sciences. The core knowledge with special attention on accepting scientific critical thinking, rather than reproduction of facts, should enable young colleagues to solve problems and to be successful in any area they chose during MS studies. The knowledge and specific skills that a molecular life science student must have are presented elsewhere, but simple reproduction is useless without deeper understanding, ability to collect, analyze and report data. However, the main problem in achieving this goal lies in the lack of critical thinking of students-to-be. Fact based learning is widespread in both elementary and high schools, so to fulfill the goal we need to encourage teachers (at all levels) to insist on problem solving approach. We hope that the Society can provide a frame for such an activity.

Group Report 3

Moderator: Keith Elliott

1. Basic skills

BSc

Students should be acquainted with:

1. Basic skills such as: making solvents, dilutions, proper pipetting, pH measurements, chromatography techniques, electrophoresis, spectrophotometry
2. Handling biological materials:
Macromolecule solutions (e.g. protein)/cell cultures/animals
3. Good laboratory practice (GLP)
4. Communications skills
5. Presentation skills
 - a. Abstracts
 - b. Poster presentations
 - c. Oral presentations
6. Management in Science

7. Skills of self-reflection – what do they want to after obtaining BSc – career in academia or non-academia sector

MSc

Students will develop specific skills (practical) depending on MSc projects they will choose. During Master studies students should be introduced to Writing projects.

1. Core knowledge

Students are coming to University with different backgrounds, so core knowledge among them differs. Although, they pass exam (which is consisted from basic of Math, Biology and Chemistry) to enroll University, often they are not able to show that when courses at University starts, which brings us to problems in education starting even from primary school. This is global problem and requires serious reorganization of total education system.

In the meanwhile, we have to encourage our student to use their capacities and develop critical thinking.

In order to adjust differences among student (their previous knowledge) we agreed that basics in Mathematics, Physics, Chemistry and Cell Biology should be mandatory at first year of studies. Regarding Basic in Biochemistry, focus should be on Integration. They should be able to use their knowledge operatively to cross Biology and Chemistry easily, in order to understand fundamental principles easily.

- 4 types of macromolecules
- Structure – function relationship
- We used proteins as example:
 - o Group of proteins – They should be able to recognize group of proteins, how they work e.g enzymes – structure, structure-function relationship (example: pH optimum, T optimum, inhibitors) Great example of showing how chemistry influence biology and vice versa
 - o Genetics
 - o Integration – metabolism! All this molecules work together, even our investigation approaches are usually focused on particular ones.

2. Problems

We discussed about current problems regarding career future of Biochemists (From Faculties of Natural Sciences) since they are not able to join medical laboratories (even they finish PhD at Medical faculty or Faculty of Pharmacy - purpose of doing those PhDs?). This is a rare opportunity for biochemist to work in Serbia, due to lack of industry etc. This discussion emphasized problem of University structure, isolation of Faculties and future of Biochemistry as individual discipline in Serbia. Consequently, young people nowadays decide not to study Molecular life sciences (for comparison number of students enrolled at Faculty of Belgrade-Biochemistry is around 40-50) due to their uncertain career prospective. We believe that this issue is worthwhile to be solved and the contribution of FEBS as well as FEBS constituent societies may be of crucial importance.

Feedback from the Participants:

From the written feedback taken, 90 % of the participants rated the workshop as “excellent” and 10%, as “very good”.

Some of the comments and suggestions:

- “Very inspiring and useful. Thanks”
- “The talks were very useful to me as a PhD student”
- “I got a lot of information regarding methods in teaching that will be very helpful in work with students. Thank-you”
- “Hope that your next workshop will be successful as this one! Thank-you!”
- “Thank-you all, you were very good! I cannot agree more about the way how a biochemist should be educated.”
- “I learned so much from you; thank-you for your time. It is very important for PhD students to visit this workshop because it is very helpful and inspiring.”
- “The Workshop covered a broad range of topics regarding education in life sciences, although it was mixed for those who teach and who are students. I would like to suggest a Workshop for PhD students and post-docs where it would be more words about mobility and opportunity for career development.”
- “More on how to get students interested in biochemistry and less on how to organise practicals, would be my suggestion”.