

PUBLIC LECTURE EVALUATION

Masaryk University

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| Faculty | Faculty of Science |
| Procedure field | Genomics and Proteomics |
| Applicant | Mgr. Petra Procházková Schrupfová, Ph.D. |
| Lecture date | February 27, 2024 |
| Lecture topic | The Hidden Functions and Power of Telomeric Repeats |
| Persons present (number) | 33 |
| Designated evaluators (board members) | prof. Mgr. Martin Lysák, Ph.D., DSc. <i>CEITEC and NCBR FS MU (on-site)</i> prof. RNDr. Zbyněk Zdráhal, Dr. <i>CEITEC and NCBR FS MU (on-site)</i> prof. RNDr. Viktor Žárský, CSc. <i>FS Charles University (on-site)</i> |

Prof. Zdráhal briefly introduced Dr. Petra Procházková Schrupfová to the audience.

She structured her lecture into two parts. In the first part, she focused on general introduction of the biology of telomeres - i.e. physical ends of linear chromosomes and how the telomeres are shortened during the replication. Differences of telomeric sequences in both plants and animals were described, and their possible origins in evolution were outlined. Furthermore, the enzyme telomerase, a reverse transcriptase, which is able to elongate shortening telomeric repeats was presented. Telomerase activity in various tissues in both plants and animals was presented. The question of whether telomeres can function as a biomarker of aging in animals was raised, and it was concluded that although telomeres are an important marker of cellular aging, they cannot be used to measure lifespan. It was also presented that telomere length is not related to longevity in plant organisms. She demonstrated that e.g. telomere length in long-lived sequoias is not significantly different from telomere length in annual herbs. She summarized that telomere length in plants is highly variable, unrelated to genome size, plant longevity, or chromosome number, and that unfortunately telomere length in plants with the highest/lowest chromosome number is still unknown.

In the second part of her lecture, the biogenesis of the enzyme telomerase was discussed in more detail. The biogenesis was described from the transcription of individual subunits, through their association with other proteins to the transport of telomerase through the nucleus to the telomeres. The current knowledge of telomerase biogenesis in humans was also compared with the limited knowledge of biogenesis in plants. Subsequently, she presented her results regarding telomere binding proteins (TBPs) associated with telomeric repeats. It was shown that TRB proteins bind not only to long telomeric sequences localized at the ends of

chromosomes and long interstitially localized repeats (ITRs) but also to short telomeric repeats called telo-boxes. Individual proteins of this family were introduced and their evolution from early diverging plants (*Klebsormidia*, Bryophytes, or Lycophytes to seed plants) was described. These telo-boxes are not randomly distributed in the genome but are often localized in the promoters of different genes. Furthermore, the program GOLEM (Gene regulatory elements) developed in her group was presented, which help to visualize the distribution and frequency of any motif of interest - including telo-boxes - in promoters of the genes transcribed only in certain tissues. At the end of the talk, the functions of both long and short telomeric sequences in the genome were summarized, and the current knowledge of the protein complexes associated with these sequences was reviewed.

In her lecture (lasting about 50 min), Dr. Procházková Schrupfová acquainted the audience with the current state of knowledge in the field of telomere biology. She managed to appropriately combine the general introduction in the field with her own research work showing clearly her contribution to the area of plant telomere research.

During following discussion, Dr. Procházková Schrupfová answered the questions of present reviewer, prof. Marec. Then followed questions of the committee members (see below). Dr. Procházková Schrupfová answered all raised questions satisfactorily and in an understandable form providing evidence of both her general knowledge and detailed orientation in her research topic. Based on decision of the present committee members, Dr. Procházková Schrupfová answered the questions of the other two reviewers in written form.

Committee questions:

Prof. Žárský – Discussion about origin of telomere-binding proteins in the phylogenetic context of land plants and about presence of histones and G-quadruplexes in telomere and subtelomere region.

Prof. Lysák – Why telomeres are associated with the nucleolus in *Arabidopsis thaliana*?

Prof. Zdráhal – What methodical approaches are most efficient for characterization of telomere-binding proteins?

Conclusion

The lecture delivered by Petra Procházková Schrupfová, entitled “The Hidden Functions and Power of Telomeric Repeats” and delivered as part of the habilitation procedure, **demonstrated** sufficient scholarly qualifications and pedagogical capabilities expected of applicants participating in a habilitation procedure in the field of Genomics and Proteomics.

The lecture took place on-site at 2 pm in the lecture room No. 205, pavilion B11, University Campus in Brno - Bohunice, Kamenice 5. The above-mentioned members of the board attended the lecture and provided its evaluation. Both reviewers, prof. Smýkal and prof. Tomáška, expressed satisfaction with written answers of Dr. Petra Procházková Schrupfová by e-mail. All designated evaluators are familiar with the text of the evaluation and agree with it.

Date: Feb 27, 2024

prof. Mgr. Martin Lysák, Ph.D., DSc.

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