

Evaluation of research and professional activity of research-oriented institutes of the Czech Academy of Sciences for the period 2015–2019

Summary Final Report

Name of the Institute: Institute of Biophysics of the CAS, v. v. i.

Evaluated teams and their leaders:

1. Department of Molecular Cytology and Cytometry (Eva Bártová)
2. Department of Molecular Biophysics and Pharmacology (Viktor Brabec)
3. Department of Cell Biology and Radiobiology (Martin Falk)
4. Department of Biophysical Chemistry and Molecular Oncology (Miroslav Fojta)
5. Department of Plant Developmental Genetics (Roman Hobza)
6. Department of Molecular Epigenetics (Aleš Kovařík)
7. Department of Biophysics of Immune System (Lukáš Kubala)
8. Department of Biophysics of Nucleic Acids (Daniel Renčiuk)
9. Department of Structure and Dynamics of Nucleic Acids (Jiří Šponer)
10. Department of Cytokinetics (Jan Vondráček)

Part A: Evaluation of the institute

Strengths:

- The institute has an impressively strong and inspiring director, who has a clear vision for the institute and gives very high priority to academic freedom and financial and technical support for the teams.
- A “scientific incubator” has been installed to advance the institute. This has potential for becoming a major instrument for restructuring and advancing the institute.
- In contrast to other CAS institutes known to the three commissions, the gender imbalance of the institute has been excellently addressed and adjusted by several measures in the report, e.g. excellent kids day-care facilities, although further improvements, e.g. part time jobs not only for women, but also for men, are needed. In particular, shorter-term (e.g. 5 years) goals should be defined.
- The institute is well integrated with other institutes with complementary interests and expertise. Inter-institute collaborations are highly functional and productive.
- Departments 2 „Molecular Biophysics and Pharmacology“ and 9 “Structure and Dynamics of Nucleic Acids” are scientifically strong and internationally leading.
- Most of the departments are very successful regarding research output and attraction of national funding; several of them have potential to become internationally leading in their fields.
- Ongoing renovation of the core facilities, in particular the laboratory of cell biophysics, the irradiation facility, the greenhouse and the animal breeding facility.

Weaknesses:

- The institute covers too many different research topics, and even in the individual Departments, the research activities are too broad. It will be difficult to be excellent in every one.
- The future plans of the institute are too general, not precise and not scientifically based to promote the institute as internationally leading.
- Very few patent applications have been filed, even considering the basic research character of the institute.
- Department 7 „Biophysics of the Immune System“ has a relatively weak publication track record regarding excellent publications. In combination with the heterogeneity of the department, this results in rather poor visibility of specific research lines.
- Restructuring of the institute is proposed and necessary, but the process is not yet clarified. This is a major challenge to the institute director, as this is also stated as a weakness in the report, i.e. what happens with a team if the team leader retires?

Opportunities:

- Quality of outputs should enable members of the institute to obtain EU/international larger and longer-term grants. From the documentation provided there is 1 EC grant active in the institute right now. This low level of applications and success with international/EU funding doesn't align with the high impact factors and citations of output of this institute. Central efforts should be made, not only in this institute but across CAS institutes and funded centrally by CAS, to motivate and assist scientists in applications for these types of larger and long-term international grants. One incentive that works well in many countries is to centrally grant 0.5 million EUR to any team leader who has unsuccessfully applied to ERC but got a very high score.
- Visibility on the web needs to be strengthened as a matter of urgency. This is crucial for international visibility and goes hand in hand with applying for EU funding.
- Maximising on the opportunities of having international experts presenting their research virtually at the institutional weekly seminar series. This should be designed strategically by the department heads, inviting key players from the international

community. This provides opportunities for local researchers to meet, and discuss topics of interest whilst widening your international network of collaborators and potential reviewers of e.g. ERC grants or papers going forwards.

- The female director will hopefully act as a role model for other institutes of the Czech Academy of Sciences.
- Several of the departments appear to have a number of young, often female PIs with high potential for taking responsibility and developing innovative research lines.
- Make money distribution more flexible by assessment of high quality and innovative research, instead of a “historical” money distribution.
- Encourage team leaders to report inventions and their potential for patents, and install a process for deciding which inventions will be filed as patents and subjected to efforts for collaboration with commercial partners.
- Mentorship program across the institute/across institutes, with members of entirely different areas, is key to develop leadership skills and in succession planning. The ISAB is a great addition and is being used effectively and there is good opportunity here to positively impact the development of the institute.
- Restructuring into having less and larger teams vs. departments based on scientific goals.
- Strengthen the “scientific incubator” and include the ISAB with respect to the opportunities given above.
- The proposed installation of a seminar program is strongly supported to promote not only the high-level education of doctoral researchers but also the general research staff.
- Advance interactions with local universities and increase participation of doctoral researchers in the research of the institute. This will also gain money income for scholarships and doctoral fellowships.
- Improve and advance infrastructure according to the proposals in the report (e.g. the cryoTEM).
- Strengthening of the selection procedure for new team leaders is supported. It should, however, be focused on clear and innovative scientific goals in the future.

Threats:

- Some departments rely on a rather small technological basis which may not turn out to be future-proof. Other departments are extremely diverse, some too much so.
- Lack of rigid quality management for the different departments; “historic” money distribution to the departments.
- Lack of clear and innovative scientific visions in some of the departments.
- The short term of most research grants (~3 years) makes planning of longer-term projects difficult and has the impact of making topics diverse. Although this can be an opportunity for finding new areas to explore, it is a threat in diluting focus.
- The Institute director, Eva Bártořá, runs her own department – how is this department supervised?

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
The quality of the selected outputs are consistently higher than average by all three commissions for ALL teams. There are large differences between departments. High flyer is team 2 (Department of Molecular Biophysics and Pharmacology). This is a reflection of the institute policy of placing incentives for high quality publications.	
H1.2	Contribution of workers on the outputs reached

The members of the institute made a strong contribution to the achieved output, albeit with large differences between the departments.	
H1.3	Quality of all outputs and results
It is clear that within this institute a special emphasis is placed on quality over quantity, but even so the teams are at around average on the number of outputs compared to other institutes in the field.	
H1.4	The most valuable discoveries and findings in the fields, their importance for the field
<p>The institute made major contributions to research in epigenetics, applications of CD spectroscopy for DNA structural analysis, as well as cancer and radiation biology.</p> <ul style="list-style-type: none"> • Biological action of metallodrugs in cancer biology • Identification of the telomerase RNA subunit across land plant phylogeny published in NAR. • Role of protein degradation in cancer stem cell pathways (published in Sci Rep), Genomic imprinting regulates dosage compensation (Nature Plant) • The new molecular modelling methods for nucleic acids by team 9 are extremely important and highly valuable for the field. • The electrochemical sensing of nucleic acids using modified and redox-labelled nucleotide building blocks by team 4 has a significant potential to compete with current sequencing technologies for diagnostic tools. 	
H1.5	Contribution of the participation of the authors in large collaborations
Two AV21 projects related to chromatin and food security. The Institute collaborates with a number of other academy institutes and universities. Department of Cytokinetics participates in the EU Horizon 2020 project OBERON (2019-2023). The collaborative efforts are mostly bilateral based on personal interests. The excellence of the Institute would warrant the participation in more EU projects.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
<p>Highly relevant.</p> <p>The institute has a long history in DNA structure analysis, and has become a centre of excellence in chromatin structure, epigenetics processes during DNA damage and repair, telomere structure, signalling processes, metallodrugs that all are important to understand cancer. They have introduced gene editing methods of a number of non-model crop species that has the potential to contribute to food security.</p> <p>The molecular modelling of nucleic acid structure is highly important not only to basic research but also for the development of new diagnostic tools and potential drugs. Nucleic-acid modelling is far more challenging than the better-established protein modelling field. Jiří Šponer is a world leader in this area and extremely well networked. The electrochemical sensing of nucleic acids may become relevant.</p> <p>The catalytic hydrogen evolution is highly important for exploring non-fossile energy sources.</p> <p>IBP has recently proven its societal relevance by quickly engaging in establishing nucleic acid-based test methods for COVID-19 at the start of the pandemic. Furthermore, the research on cancer and irradiation damage is of rather direct relevance as it addresses a big disease burden. The strong involvement of IBP in teaching and training is likewise of societal relevance.</p> <p>A rather weak aspect of societal relevance is the limited focus and success of commercial and economic exploitation of the scientific results and capacities of IBP. Hitherto, IP protection by patenting hardly happens, and there is hardly any commercial use of IBP expertise and infrastructure. This may be seen as a missed chance for societal relevance and impact.</p>	
H2.2	System functionality for knowledge transfer into practise, its usefulness for society. The impact of the institute's activity on proper practice in society in the area of social sciences and humanities
<p>The focus of the institute is excellence in fundamental biological processes. Nevertheless, there are projects aiming at transfer of knowledge to application, e.g. setting up of plant transformation and gene editing. By and large, however, knowledge transfer and valorisation are underdeveloped when compared to similar institutes at an international level.</p>	
H2.3	Relation to practice
<p>The Covid-19 pandemic illustrates the importance of nucleic-acid research (PCR diagnosis and mRNA vaccines) to society. However, the institute could be much more active in exploring such directions.</p>	
H2.4	Participation in AV21 strategy
<p>The institute participates in two such networks, one based around their excellence in chromatin biology, the other on food security taking advantage on their expertise in crop transformation and gene editing techniques.</p>	
H2.5	Cooperation with regions of the Czech Republic
<p>IPB has strong ties with CEITEC. Moreover, IBP has very strong collaborations with the Masaryk University, Brno, and with the Palacky University, Olomouc, and to a lesser extent with other Czech universities. This results in the contribution of IBP scientists to teach at</p>	

the Bachelor, Master and postgraduate level. Also, students at various levels perform internships under supervision of IBP scientists.

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the teams and the institute with similar international and national institutes
Very good to excellent. IBP has an outstanding position in the Czech research landscape, largely due to a number of highly respected, highly productive, and highly visible IBP scientists that have flagship function. In the period 2016-2018 the D1, Q1-Q4 distribution of the outputs from the institute is better than the EU average and significantly better than the world average based on WoS. Teams 2 and 9 set international standards by themselves.	
D1.2	Scope and quality of international and national cooperation and the role of the institute in such cooperation; engagement in broad international cooperation
All the departments of IBP have strong national and international collaborations. This is very fruitful, even though most of these collaborations are not within large, formal collaborative projects.	
D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
Strong. There is an excellent participation of the institute in advancement of science, such as organisation of conferences (24), being on grant panels, editorial panels, reviewing, EMBO member (Eva Bartova). Many of the IBP scientists are regularly asked to act as plenary and invited speakers, and have repeatedly received renowned awards. Overall, this indicates a broad and strong visibility and recognition of IBP research by international peers.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
The institute has a clear direction of moving towards the biological relevance of DNA and chromatin organisation. It is pleasing to see an excellent representation of both animal and plant science around this broad and important topic.	
D2.2	Assessment of the previous research objectives and their achievement
The research groups have clear foci and plans for themselves. They further developed what they are best at, including DNA repair, metal-based cancer therapy, sex determination in plants. They became a centre of excellence in Czech Republic for crop gene editing. An important new research direction, epigenetics, has been established and successfully pursued.	
D2.3	Assessment of implementation of recommendations from past evaluation
The institute got an excellent report in the past evaluation. Various recommendations were implemented, such as further development of infrastructure.	

D2.4	Success in receiving grants
Successful in national grants; more European and international funding would be in their grasp, such as ERC grants. They have an excellent infrastructure and work environment to attract researchers with their own scholarships.	
D2.5	Adequacy of instrumental equipment
IBP keeps investing into state-of-the-art infrastructure, and the research facilities are of outstanding quality. New instruments are suggested in the report, including a cryoTEM. This should be realized to improve the instrumentation further.	
D2.6	Effectiveness of management
The Institute has an excellent and transparent management structure with an International Advisory Board. The leadership and management are strong and effective, with a focus on the development of young talent. Under the leadership of an excellent director the Institute organisation has improved a lot, but there is still much to do. Several points of necessary reorganizations were addressed as weaknesses in the report from the institute. The three commissions encourage the director to continue the break out of the historic structure of the institute. This also includes the money distribution to the Department, which should partially be based on successful and innovative research.	
D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
<p>Exceptionally proactive to retain and attract the best scientists. Receptive for ideas to restructure. Excellent age structure with a lot of young talent. Overall excellent, and probably suitable as a blueprint for others.</p> <p>The three commissions encourage the Director to even more motivate young scientists to take even more responsibility and initiative in leading projects and grant applications.</p> <p>The institute and team leaders may wish to actively search for foreign partners in order to send there the fresh PhDs for several years of postdoc experience, and then offer them the possibility to return as young PIs.</p>	
D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
<p>Excellent focus on work-life balance, meeting the needs of employees in order to support them in combining family life with professional development.</p> <p>The gender imbalance for leading positions in the institute has been treated and addressed by several measures in the report from the institute. This stands in a very positive contrast to other CAS institutes that the three commissions know. However, more needs to be done, e.g. possibility for arranging part-time jobs to accommodate attending to children, not only for women, but also for men.</p>	
D2.9	Relation of the institute with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.
Centre of excellence in epigenetics and Food for Future with expertise in bioinformatics and gene editing.	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
All departments have well-established, fruitful collaborations with other research institutes and universities at the national and international level.	
D3.2	Effectiveness of joint research centres
IBP has been and still is involved in various highly successful national research alliances, networks and centres.	
D3.3	Success rate in supervision of PhD students
IBP researchers show extensive involvement in the supervision and guidance of PhD students, with 51 PhD defences in the evaluation period. This has to be rated as a very big achievement.	
D3.4	Participation of PhD students in the outputs
Very good, very often as first authors, sometimes even as corresponding authors.	
D3.5	Participation of the institute in master or bachelor studies
Very good participation in supervision. However, the different departments were quite divergent in this respect.	
D3.6	Assessment of cooperation intensity with universities in the form of teaching
IBP researchers made major contributions to teaching at several Czech universities, with the main contributions at Masaryk University, Brno and at Palacky University, Olomouc.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Sufficient and effective. Important issues like GMO in foods are treated well toward the general public. Various IBP researchers are involved in “Open Days” of the Czech Academy of Sciences, and in particular young audiences such as pupils and students are reached and acquainted with the scientific work and results. Also, IBP researchers are regularly present in national media talking about aspects of their work which are of general interest and societal relevance.	
D4.2	Publishing activities and its quality
The NEZkreslená věda IV, created by CAS is excellent; it would be great to have an English version.	
D4.3	Participation in professional organisations in the area of research and development
Good participation.	

Other comments of the commission:

Part B: Evaluation of teams

1. Department of Molecular Cytology and Cytometry

Strengths:

The department has a strong leader and a clear technology focus. It contributes considerably to the promotion of research careers of young scientists.

Weaknesses:

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Opportunities:

Young, capable scientists in the group can take more responsibility and increasingly contribute to the output in the coming years.

Threats:

Limited funding. The department largely depends on the department head for various key achievements and accomplishments.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
The department has a very good output.	
H1.2	Contribution of workers on the outputs reached
The team members contributed considerably to the publications in the top quartile.	
H1.3	Quality of all outputs and results
Very good.	
H1.4	The most valuable discoveries and findings in the fields, their importance for the field
The department produced a range of strong papers on histone modifications and epigenetics and their role in cellular processes and DNA repair.	
H1.5	Contribution of the participation of the authors in large collaborations
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Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
The department studies central processes of life providing valuable insights into the organization of nuclear proteins and regulation of nuclear DNA repair processes. The research is in particular cancer-related and of high societal relevance.	

H2.2	System functionality for knowledge transfer into practice, its usefulness for society. The impact of the team's activity on proper practice in society in the area of social sciences and humanities
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H2.3	Relation to practice
Medical valorisation of results is envisioned. In the current Covid-19 times the molecular biology expertise of the team proves highly valuable for setting up nucleic acid-based diagnostics.	
H2.4	Participation in AV21 strategy
The department is an active participant in AV21 programs, meetings and symposia.	
H2.5	Cooperation with regions of the Czech Republic
Link to hospitals.	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
Good, internationally competitive level.	
D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
Strong, longstanding international collaborations	
D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
The group is very active in this field, in particular the PI is an internationally visible and respected scientists with invited lectures and prestigious awards.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
Yes	
D2.2	Assessment of the previous research objectives and their achievement
The department has clear research objectives, with a strong technology focus.	
D2.3	Assessment of implementation of recommendations from past evaluation
Recommendations were implemented where appropriate.	
D2.4	Success in receiving grants
This has recently proven to be challenging. It may be advisable to apply more frequently for grants, yet this has proven difficult due to multiple other obligations of the researchers, in particular the PI and department head being institute head.	

D2.5	Adequacy of instrumental equipment
Strong technological and instrumental basis.	
D2.6	Effectiveness of management
Highly appropriate and skilled management.	
D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
Strong and healthy team that appears to be future-prove.	
D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
Excellent support to ensure work-life balance.	
D2.9	Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.
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Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
Very strong international collaborations which proved to be scientifically fruitful.	
D3.2	Effectiveness of joint research centres
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D3.3	Success rate in supervision of PhD students
Outstanding result, with 4 PhD defences in the evaluation period.	
D3.4	Participation of PhD students in the outputs
Excellent.	
D3.5	Participation of the team in master or bachelor studies
Good, there is room for growth in number of supervisions of Bachelor and Master projects.	
D3.6	Assessment of cooperation intensity with universities in the form of teaching
Teaching involvement is rather limited, and restricted to the current and previous department head. Teaching involvement of more team members would be desirable.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Several small- to medium-scale activities.	

D4.2	Publishing activities and its quality
Their research is popularized in science magazines	
D4.3	Participation in professional organisations in the area of research and development
Prominent role of the department head who is very well established and active in this respect.	

Other comments of the commission:

We hope that more junior PIs will take responsibilities in the coming years with respect to teaching activities, fund raising, and internationalization of the department.

2. Department of Molecular Biophysics and Pharmacology

Strengths:

The department has a high level of productivity and members often take leading positions on the outputs (corresponding and first authorship). The department has a large number of international collaborations, a high scientific reputation and good international visibility. The department is very well funded.

Weaknesses:

Research activities are too much dependent on collaborative projects that provide the compounds for biological evaluation. Considering the productivity of the group in the pharmaceutical field, the lack of intellectual property and patenting is unexpected.

Opportunities:

The high level of collaborative research opens opportunities for integration in large consortia and networks allowing to apply for EU funding.

Threats:

Not detected.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
Excellent productivity and excellent selected outputs (average rating 1.87, $N_{1,2}/FTE = 1.71$). Among the best parameters across the field.	
H1.2	Contribution of workers on the outputs reached
Contribution of department members on the outputs is excellent, with 1st author or corresponding author in most of the selected outputs ($FC_{1,2}/FTE: 0.85$, $N_{RP1,2}/FTE = 1.57$)	
H1.3	Quality of all outputs and results
The department has a high number of outputs in the two top quality levels. The peak productivity in terms of journal ranking is in the second quartile. The citation intensity pattern is also rather good, publications eligible for evaluation obtained citations that place them mostly in the first two quartiles.	
H1.4	The most valuable discoveries and findings in the fields, their importance for the field
Investigating the mechanism of action of metal-based compounds as anticancer and antimicrobial drugs, development of new methods at molecular and cellular level (cancer stem cells and 3D spheroids), improvement of the design of new metal-based complexes with pharmacological activity as anticancer drugs and antibiotics.	
H1.5	Contribution of the participation of the authors in large collaborations
Not applicable.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
Significant societal relevance with application for health.	
H2.2	System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team's activity on proper practice in society in the area of social sciences and humanities
None reported.	
H2.3	Relation to practice
No applied results are reported, in disagreement with the high level of potential application of the department research activities. IP and patents are not reported.	
H2.4	Participation in AV21 strategy
Not applicable.	
H2.5	Cooperation with regions of the Czech Republic
Not described.	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
Very good international recognition, very good position in international context. On the national level, across the fields of biochemistry and molecular cell biology, biophysics, and virology, the team is among the best.	
D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
Large number of international cooperations including contribution to large consortia: co-PI in ERC grant, participation in COST actions. The Team plays an important to dominant role in these collaborations.	
D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
The team organized no conference or workshop in the period of evaluation, but the team leader had strong visibility and representation via invited lectures abroad.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
Yes.	
D2.2	Assessment of the previous research objectives and their achievement
The previous research objectives were achieved.	

D2.3	Assessment of implementation of recommendations from past evaluation
The past evaluation recommended that the team be enlarged with an additional unit for synthetic chemistry. This recommendation has not been implemented due to a lack of financial resources.	
D2.4	Success in receiving grants
Good track record in receiving national funding and participation in international funded consortia and networks.	
D2.5	Adequacy of instrumental equipment
Very adequate. The team uses a very wide range of techniques and related instruments.	
D2.6	Effectiveness of management
The team is well structured and appears to have been managed effectively.	
D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
The team is well structured and balanced, with 3 senior scientists, 5 researchers or post-docs, and typically 1-2 PhD students at a time. Age structure is very well distributed and adequate to maintain vitality.	
D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
Appropriate working environment. The team is gender-balanced, with a female deputy head of department.	
D2.9	Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.
None known.	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
Good level of teaching in universities and supervision of students.	
D3.2	Effectiveness of joint research centres
The members of the team were not involved in the period of 2015-2019 in joint research centres with universities.	
D3.3	Success rate in supervision of PhD students
A limited number of theses (3) were defended in the period of 2015-2019.	
D3.4	Participation of PhD students in the outputs
Excellent participation of PhD students in the outputs: co-authors of 20 papers and presenting their results at international scientific conferences and workshops.	

D3.5	Participation of the team in master or bachelor studies
Excellent, more than 8 master and bachelor students in the evaluation period.	
D3.6	Assessment of cooperation intensity with universities in the form of teaching
Active cooperation with universities in the form of teaching. There is a very good number of lectures provided by senior members of the team.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
No particular strategy reported. The department participates in research popularization at the annual Days of Open Doors event of the Institute of Biophysics.	
D4.2	Publishing activities and its quality
Adequate number of publication in popular journals and good quality of contributions. Broadcasting at the national radio.	
D4.3	Participation in professional organisations in the area of research and development
Very good participation, member of international evaluation panels, members of editorial boards of international journals.	

Other comments of the commission:

3. Department of Cell Biology and Radiobiology

Strengths:

The department is well organized, has a visionary strategy, and is very strong regarding output and international visibility.

Weaknesses:

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Opportunities:

While publications in general science top journals such as Nature and Science are still lacking, the strong international position of the department should make it possible to get involved in collaborations that will result in such publications in top-tier journals.

Threats:

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Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
The output of the department is very good to excellent, with 13 top decile papers in the evaluation period.	
H1.2	Contribution of workers on the outputs reached
The department members regularly made strong contributions to the authored and co-authored work, and often were in the lead.	
H1.3	Quality of all outputs and results
Very high quality – compliments that this was achieved with this rather young department, after some reorganizations! The department is productive and appears to be future-proof.	
H1.4	The most valuable discoveries and findings in the fields, their importance for the field
The department produced a range of strong papers on histone modifications and epigenetics and their role in cellular processes and DNA repair.	
H1.5	Contribution of the participation of the authors in large collaborations
Strong and fruitful bilateral collaborations.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
Radiobiology is important for various diseases including cancer.	

H2.2	System functionality for knowledge transfer into practice, its usefulness for society. The impact of the team's activity on proper practice in society in the area of social sciences and humanities
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H2.3	Relation to practice
Limited	
H2.4	Participation in AV21 strategy
-	
H2.5	Cooperation with regions of the Czech Republic
Multiple collaborations with Czech universities.	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
Internationally competitive, very well positioned.	
D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
Fruitful, longstanding international collaborations	
D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
The department PIs and senior scientists have various roles in editorial boards and scientific societies, and are regularly decorated with awards. Overall a high level of activities and recognition.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
Yes	
D2.2	Assessment of the previous research objectives and their achievement
Not applicable	
D2.3	Assessment of implementation of recommendations from past evaluation
Not applicable	
D2.4	Success in receiving grants
Very strong track record in attracting funding	
D2.5	Adequacy of instrumental equipment
Adequate	

D2.6	Effectiveness of management
	High effectiveness, reflected in high productivity and high standards.
D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
	Healthy department structure.
D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
	Appropriate, the department makes use of the institute's facilities such as kid's corner.
D2.9	Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.
	-

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
	Various teaching activities of staff members at the Universities in Brno.
D3.2	Effectiveness of joint research centres
	-
D3.3	Success rate in supervision of PhD students
	Good result with 4 PhD defences in the evaluation period.
D3.4	Participation of PhD students in the outputs
	Very good.
D3.5	Participation of the team in master or bachelor studies
	Supervision of various Bachelor and Master projects. Maybe some room for growth.
D3.6	Assessment of cooperation intensity with universities in the form of teaching
	Good.

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
	Very positive and effective, a broad range of activities, mainly at the local and national level, including appearances in national media and open door days.

D4.2	Publishing activities and its quality
Various activities and publications addressing a range of different audiences, including physicians.	
D4.3	Participation in professional organisations in the area of research and development
Various effective activities.	

Other comments of the commission:

We would like to challenge the department to try and publish in top-ranking journals, and specifically develop a strategy that will allow this on the mid-term.
The department may benefit from more diversity, in particular women in leading positions.

4. Department of Biophysical Chemistry and Molecular Oncology

Strengths:

- Strong expertise in electrochemistry and electrochemical methods, in particular applied to biopolymers
- Support of doctoral researchers; in particular, they are encouraged to perform a short- or mid-term stay abroad.
- Support for young researchers to apply for external funding.

Weaknesses:

- The research on electrode materials is partly outdated.
- In the past, the research activities on modified nucleic acids completely relied on the collaboration with the group of Michal Hocek at IOCB.
- Publication output is mainly in average journals, except the research activities with the group of Michal Hocek.
- Internationally not yet well visible, there is potential for improvements.
- Too broad scientific activities with regard of the researchers (glycoproteins, proteins, carbohydrates and nucleic acids!)

Opportunities:

- The research activities for catalytic hydrogen evolution should be intensified, but not into the direction of structure determination. The combination of electrochemistry and photochemistry and either organic or enzymatic photocatalysts has huge potential to be effective hydrogen sources. This combined concept is currently applied for chemical photocatalysis.
- The electrochemical detection of modified nucleic acids could potentially compete with current sequencing technologies because amplification may not be necessary. This potential has not yet been explored, but should be.
- The pilot collaborations with Steve Benner and Floyd Romesberg, both starting in 2020, should give excellent opportunities to enhance international visibility.
- Focus on the most innovative scientific projects instead of the broad projects in the past.

Threats:

- Unclear situation with the group of Emil Palecek
- Unclear discrimination between „data producers“ and „paper writers“

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
Publication output is mainly in average journals, except the research activities with the group of Michal Hocek at IOCB.	
H1.2	Contribution of workers on the outputs reached
Okay.	
H1.3	Quality of all outputs and results
Average. The innovative potential of the electrochemical methods in the fields of nucleic acids and proteins is not yet being used optimally.	

H1.4	The most valuable discoveries and findings in the fields, their importance for the field
Redox labels for electrochemical detection of nucleic acids: Only these results seem to give high impact publications by this team. The method could compete with sequencing technology if high sensitivity is evidenced that PCR amplification is not necessary.	
H1.5	Contribution of the participation of the authors in large collaborations
Excellent. The team leader coordinated several national research centres, including one Centre of Excellence funded by the Czech Science Foundation.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
The research outputs of this team fit perfectly to the institute mission as the output are in the core of biophysics. The outputs enhance the international visibility of the institute and the CAS.	
H2.2	System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team's activity on proper practice in society in the area of social sciences and humanities
The electrochemical sensing of nucleic acids and proteins is highly relevant to society by advancing diagnostic tools for diseases.	
H2.3	Relation to practice
-	
H2.4	Participation in AV21 strategy
No information given.	
H2.5	Cooperation with regions of the Czech Republic
The team leader coordinated several national research centres, including one Centre of Excellence funded by the Czech Science Foundation. A significant amount of teaching at Masaryk University, Charles University and Brno University of Technology.	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
Fair. The electrochemical sensing of nucleic acids and proteins has potential, but it is not well enough explored to compete with similar international institutes. There is certainly need for improvement.	
D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
The team has already established a striking and broad set of international cooperations. The pilot collaborations with Steve Benner and Floyd Romesberg, both starting in 2020, should give excellent opportunities to enhance international visibility.	

D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
Good. Several conferences were organized.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
Clear and good, but not innovative enough. The activity plan is very general and does not define precise goals. In particular, the catalytic hydrogen evolution project is highly relevant to society.	
D2.2	Assessment of the previous research objectives and their achievement
All previous research objectives were reached as stated in the report.	
D2.3	Assessment of implementation of recommendations from past evaluation
No recommendations were included in the past evaluation.	
D2.4	Success in receiving grants
Excellent. There were several third-party grants. The team leader coordinated several national research centres, including one Centre of Excellence funded by the Czech Science Foundation.	
D2.5	Adequacy of instrumental equipment
Okay.	
D2.6	Effectiveness of management
Okay. The remark about the unclear discrimination between “data producers” and “paper writers” in the report shows ineffective management in this particular case, which should be solved soon.	
D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
Partly implemented	
D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
N/A. See general comments.	
D2.9	Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.
N/A	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
Excellent. The team has already established a striking and broad set of national and international cooperations.	
D3.2	Effectiveness of joint research centres
Very good. The team leader coordinated several national research centres, including one Centre of Excellence funded by the Czech Science Foundation.	
D3.3	Success rate in supervision of PhD students
Excellent. 12 doctoral theses were finished successfully.	
D3.4	Participation of PhD students in the outputs
Excellent. Many doctoral researchers are first authors of the publications by the team.	
D3.5	Participation of the team in master or bachelor studies
Very good. A significant amount of teaching is reported to take place at Masaryk University, Charles University and Brno University of Technology.	
D3.6	Assessment of cooperation intensity with universities in the form of teaching
Excellent. The teaching comprises not only seminars and lectures, but also practical courses in the chemistry of nucleic acids.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Fair. There are some activities into the society reported, but there is certainly room for improvement.	
D4.2	Publishing activities and its quality
Very good, but not yet excellent.	
D4.3	Participation in professional organisations in the area of research and development
Please enter your comment here	

Top 10 publications for

4. Department of Biophysical Chemistry and Molecular Oncology

1. E. Palecek, J. Tkac, M. Bartosik, T. Bertok, V. Ostatna, J. Palecek, Electrochemistry of nonconjugated proteins and glycoproteins. Toward sensors for biomedicine and glycomics, *Chemical Reviews* 115(5) (2015) 2045-2108.
An invited in-depth review devoted to electrochemistry of protein and glycoprotein.
2. J. Balintova, J. Spacek, R. Pohl, M. Brazdova, L. Havran, M. Fojta, M. Hocek, Azidophenyl as a click-transformable redox label of DNA suitable for electrochemical detection of DNA-protein interactions, *Chemical Science* 6 (2015) 575-587.
Redox labelling of DNA by aryl-azide and protein binding detection by click on DNA.
3. M. Trefulka, E. Palecek, Distinguishing glycan isomers by voltammetry. Modification of 2,3-sialyllactose and 2,6-sialyllactose by osmium(VI) complexes, *Electrochemistry Communications* 85 (2017) 19-22.
A new way to electrochemical distinction of glycan isomers based on oxoosmium labels.
4. J. Dadova, M. Vrabel, M. Adamik, M. Brazdova, R. Pohl, M. Fojta, M. Hocek, Azidopropylvinylsulfonamide as a New Bifunctional Click Reagent for Bioorthogonal Conjugations: Application for DNA-Protein Cross-Linking, *Chemistry-a European Journal* 21 (2015) 16091-16102.
Covalent capture of proteins based on Michael acceptor-modified DNA probes.
5. V. Vargova, R. Helma, E. Palecek, V. Ostatna, Electrochemical sensing of concanavalin A and ovalbumin interaction in solution, *Analytica Chimica Acta* 935 (2016) 97-103.
The first appearance of detection of glycoprotein-lectin interactions by electrochemistry.
6. V. Dorcak, E. Palecek, Catalytic deuterium evolution and H/D exchange in DNA, *Chemelectrochem* 6 (2019) 1032-1039.
DNA structure-sensitive H/D exchange for the first time detected using electrochemistry.
7. V. Ostatna, S. Hason, V. Kasalova, M. Durech, R. Hrstka, Anterior gradient-3 protein-antibody interaction at charged interfaces. Label-free chronopotentiometric sensing, *Electrochimica Acta* 297 (2019) 974-979.
First detection of antibody-antigen interactions based on catalytic hydrogen evolution.
8. J. Spacek, A. Danhel, S. Hason, M. Fojta, Label-free detection of canonical DNA bases, uracil and 5-methylcytosine in DNA oligonucleotides using linear sweep voltammetry at a pyrolytic graphite electrode, *Electrochemistry Communications* 82 (2017) 34-38
Carbon electrodes or the first time used for electroreduction of all nucleic acid bases.
9. A. Danhel, F. Ligmajer, T. Sikola, A. Walcarius, M. Fojta, Electrodeposition of silver amalgam particles on ITO - Towards novel electrode material, *Journal of Electroanalytical Chemistry* 821 (2018) 53-59.
Ag-amalgam-decorated ITO surfaces used as a novel type of electrochemical sensor.
10. V. Brazda, J. Kolomaznik, J. Lysek, M. Bartas, M. Fojta, J. St'astny, J.L. Mergny, G4Hunter web application: a web server for G-quadruplex prediction, *Bioinformatics* 35 (2019) 3493-3495.
A report on a novel web-based bioinformatic tool for in silico searching and characterization of nucleotide sequences with potential to form guanine quadruplexes in genomes.

Note: as the selected publications deal with different topics, their order according to importance cannot be compiled unambiguously.

5. Department of Plant Developmental Genetics

Strengths:

Intensity of citation and impact factor indicate the output is of international or world leading standard. Bioinformatics strengths here are significant and this skill set is making a real difference in terms of the quality of output inside and outside of this department for example in collaborations nationally. We see that the topics of study here are novel and unique research topics – particularly exciting was the sex chromosome work. The group has attained a considerable know-how in transformation of non-model plants and gene editing technologies. Their system of buffering one another through the tougher patches without funding is an excellent community model and is keeping everyone afloat. New department leader also seems to be doing a great job since taking up his role in 2019.

Weaknesses:

Strategy for female leadership needs to be formalised and will increase attractiveness internationally.

Opportunities:

Bioinformatics strengths in this team are likely to provide opportunities to contribute to larger collaborations and outputs. Current solution to outsourcing is a good one as that prevents the core team members time being drawn away from their key activities. There is an opportunity (if there is continued growth) to consider full time bioinformatics core facility. Such infrastructure (HPC etc) would have to be considered but it seems there is a real opportunity here to be national leaders on a centre for excellence in bioinformatics for plant science. Depending on the model you use for this it could also be a source of income for the department which could be used for other initiatives you would like to implement, e.g. provision of bioinformatic facilities and tools, know-how in the transformation of non-model plants, and genome editing platform in crop projects.

Threats:

As for all groups – a reduction in funding is a major threat. The team are performing well at present in gaining grants competitively so this is not likely.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
	Overall in the evaluation period there were 33 outputs reported, 24 of which were evaluated in Phase 1. Although the number of output for this department is not as high as for comparably sized departments (~12.9 FTE), it is clear that the quality of output here is very good to excellent and is clearly of international/world leading standard. There were 4 publications in the top decile of journals, and 5 in the top quartile. These include publications from journals such as Plant Science, Plant Cell, PNAS, BMC Genomics, Genome Biology, Nature Plants, Genetics, and Scientific Reports to mention just a few. These are highly respected international journals of significant standing and the discoveries presented therein are of high impact and very high quality.
H1.2	Contribution of workers on the outputs reached
	In terms of the phase 1 evaluated manuscripts it is clear that the members of this department are contributing significantly to the outputs listed. The corresponding authorships set this group above the average for the biological sciences. A large number of

the publications also have first authorships from the department and in many cases the research was carried out either entirely, or in majority, by team members.	
H1.3	Quality of all outputs and results
<p>Overall the quality of output from this department is very high to excellent. The vast majority of the papers evaluated in Phase 1 are in the upper quartiles and deciles. 4 in the 1* bracket and 17 in Q2 and Q1 combined. It is clear from the distribution of outputs (evaluated and not evaluated) that higher impact journals are a focus for this department - quality rather than quantity has been prioritised and the department should be applauded for this. From Fig 4 it is clear that they are performing above the average for the field as corrected for FTE for both world leading and internationally excellent outputs. Publications entirely from the group are routinely published in high ranking journals e.g. TOKAN, Viktor, PUTEROVA, Janka, LEXA, M., KEJNOVSKÝ, Eduard. Quadruplex DNA in long terminal repeats in maize LTR retrotransposons inhibits the expression of a reporter gene in yeast. BMC Genomics. 2018, 19(MAR2018), 184. ISSN 1471-2164 Dostupné z: 10.1186/s12864-018-4563-7. And collaborations heavily involving group members in lead positions are evident throughout their list of outputs e.g. BALOUNOVA, Veronika, GOGELA, Roman, ČEGAN, Radim, CANGREN, P., ŽLŮVOVÁ, Jitka, ŠAFÁŘ, Jan, KOVÁČOVÁ, Viera, BERGERO, R., HOBZA, Roman, VYSKOT, Boris, OXELMAN, B., CHARLESWORTH, D., JANOUŠEK, Bohuslav. Evolution of sex determination and heterogamety changes in section Otites of the genus Silene. Scientific Reports. 2019, 9(JAN 31 2019), 1045. ISSN 2045-2322 Dostupné z: 10.1038/s41598-018-37412-x.</p>	
H1.4	The most valuable discoveries and findings in the fields, their importance for the field
<p>The department is making impressive progress in sex chromosome evolution and genome dynamics, and also in epigenetics, cytogenetics and comparative genetics. There are many very valuable discoveries that could be highlighted in each of these fields. Just to highlight two examples: The Genome Biology paper on the modification of the tomato genome, and the PNAS paper on HGT between distinct grass lineages are a real tour de force of their technical skills and expertise.</p>	
H1.5	Contribution of the participation of the authors in large collaborations
<p>The group has productive collaborations internationally and nationally and has published in high impact journals with these colleagues. There is a healthy blend of entirely department-based publications and international collaborations in their list of published output in the evaluation period. And for the international collaborations they often hold lead positions, as first, last or corresponding author.</p> <p>They are collaborating with the CNRS France in their international research network on Silene, with national institutes of microbiology and experimental botany, and with Czech Globe and with the Hop breeding institute where they are providing key expertise and platforms.</p>	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
<p>The work carried out by researchers in this department are internationally of very good to excellent quality. Their research is fundamental in nature but has wide reach. Their outputs and results are driving forward complex areas of knowledge that are pertinent to food security in the future. They are active in discussing topics such as GMO on a national stage and are working with government and parliament to lobby for GMO improvements</p>	

(EU law). These topics are highly relevant and of interest to the general public – and they have made very nice videos on YouTube explaining the science of GMOs etc to the general public which has been hugely successful (over 100K views to date). Their work on identification of contaminants in bioreactors and in genotyping and trait evaluations are also of key interest and direct relevance to society as a whole.	
H2.2	System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team's activity on proper practice in society in the area of social sciences and humanities
The research carried out in this department has direct links with knowledge transfer and is directly useful for society. Their findings have practical implications for example in the study of gene function on sex chromosomes and in generating virus resistant plants. Their bioinformatics output (sequencing, software and resource development) - is also of excellent quality and contributes to an even wider community.	
H2.3	Relation to practice
In their research for practice there is one activity in the evaluation period for testing of immunomodulatory activity of a compound for 4K. This is not their area of focus and for a fundamental biology group this is not necessarily always possible or attractive area of activity. Very successful in national funding and impressive levels of funding achieved in the evaluation period. See also H2.4.	
H2.4	Participation in AV21 strategy
The contribute to the AV21 strategy under the „Foods for the Future“ initiative. They have a number of active collaborations with various groups e.g. Agro, Agritech, Algatech, Algamo, MoravoSeed and Hop breeding programmes. All of which also leave them well positioned for commentary and national debate on GMO etc (which is also linked with public engagement).	
H2.5	Cooperation with regions of the Czech Republic
They have extensive and appropriate set of Czech Republic cooperations and collaborations including: Biology Centre CAS, Institute of Scientific Instruments, Institute of Experimental Botany, Hop Research institute, Central Euro Inst of technology, Algatech, Centre of plant structural and functional genomics, and University of Masaryk.	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
The team is performing well above the average for national and international institutes of a similar size. They are a small and dynamic group, with very good to excellent quality of output.	
D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
They are members of an international research network with CNRS in France. Through this network they have a student mobility program and participate in student exchanges and an annual scientific meeting. They also have a vibrant international network of collaborators and are publishing well with these colleagues. They are well connected and cooperating	

with institutes and teams within Czech republic, e.g. Institutes of Experimental Botany and microbiology, Czech Globe and the Hop Research institute.	
D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
The team organised a national conference on GMOs, this was supported by Strategy AV21 Food for the Future, CAS, and Institute of Biophysics. They collaborated with the Institute of Experimental Botany, to run the „agro-world“ workshop for breeders. They have given a number of oral or poster presentations at national and international conferences, and have a set of invited talks they have given at the European plant biology congress, the International chromosome conference in Brazil, and the Annual plant and animal genome meeting in USA. Overall, there is a very good involvement in international dissemination of results, and a number of poster and talk awards were also achieved. Three members of the team also won national level awards for research.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
The team outline their plans to continue working on understanding genome dynamics and regulation in plants. Their plans are excellent and their trajectory is excellent. They have a unique blend of skills in house that enable them to perform complex experiments without dependency on external collaborators.	
D2.2	Assessment of the previous research objectives and their achievement
They have met their previous research objectives. They have achieved high impact factor publications on interesting findings. Their work, published in Nature Plants, on sex-linked gene expression established a link between genomic imprinting and dosage compensation in plants. Taking on board previous evaluation comments they decided to focus a little more on the epigenetic aspects which seems to be producing lots of interesting avenues to explore in more detail that affect methylome changes in <i>Silene</i> . They have developed new or strengthened existing skills in bioinformatics, ESEM, cytogenetic and molecular tools such as 3-D microscopy. All of these developments and directions have impacted positively upon currently evaluated period but also into the future. There is a real focus here on development and enhancement of skills in their staff which is really important and to be congratulated.	
D2.3	Assessment of implementation of recommendations from past evaluation
They did not have any specific recommendations from past evaluation. Nothing to add here.	
D2.4	Success in receiving grants
They currently hold 14 grants from the Czech Science Foundation – this is across 6 group leaders. This is a very good level of funding. With their research profile and the quality of their output the commis would imagine that international funding (ERC for example) would be well within their grasp. Supports for these longer and larger scale grants that hold alot of prestige and further stability could be explored.	
D2.5	Adequacy of instrumental equipment
They have very good to excellent research facilities and equipment. No concerns here.	

D2.6	Effectiveness of management
Nothing additional to add.	
D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
The team has a good profile of ages but are overall younger than other groups of a similar size.	
D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
They mention paying attention to supporting women in science but one does not see any details as to how they are doing this, what their approach is or how they are implementing changes. One wishes seeing a breakdown of the gender of their team members but from the photos in the presentation the group appears overwhelmingly male, particularly in more senior roles. How many females are in senior positions (group leader etc) and what things have been put in place to enable, facilitate and promote females into these roles?	
D2.9	Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.
As mentioned elsewhere in the report the group are involved in Strategy AV21 „Foods for the Future“.	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
The department is contributing significantly to university courses nationally and delivers a substantial number of modules to BSc, MSc and Doctoral levels in universities in Brno and Olomouc, Masaryk, Ostrava and South Bohemia. They are contributing to a small number of research project students on average 1 per year for MSc and 1 per year for BSc. This is a relatively low level of participation at the more junior levels of research activity. Members of the team frequently participate in the viva defences of PhD students and MSc students other institutes/universities and there seems to be a good involvement in these important local and national activities. Member of the team are also evaluators for Science Foundation funding. They are participating in expert panels advising the government. And are contributing to reviewing of manuscripts for well-known international journals of high ranking. The team is also very active in lab exchange programmes (funded or supported by CAS, EMBO etc etc) which is a wonderful way to network, and cross pollinate ideas and skills.	
D3.2	Effectiveness of joint research centres
Well integrated with complementary research areas nationally and internationally. Effective use of shared facilities across departments and institutes. They are part of the Centre of Excellence (PLANT GENOME) which involves Inst Biophysics, Inst Exp Botany, Biological Centres in Masaryk and Ceske Budejovice.	
D3.3	Success rate in supervision of PhD students
They have completed on average 1 PhD student per year over the evaluation period which is a low level of PhD student completion/registration. Yet, it is important to note that the	

PhD students in this department do very well in terms of research output which is essential for their onward research careers. The overall number of PhD students coming through the department is a possible area for improvement.	
D3.4	Participation of PhD students in the outputs
See D3.3	
D3.5	Participation of the team in master or bachelor studies
The department offers whole modules to a range of universities and levels from BSc to Doctoral. Members of the department are offering a small number of research projects to BSc and MSc level students. This is also a possible area for improvement. See D3.1	
D3.6	Assessment of cooperation intensity with universities in the form of teaching
Nothing to add in addition to the above.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
The team is involved in many different strategies for popularisation of their research, from activities such as „night of science“, to the festival of science and to cartoon videos explaining genetics topics and GMOs for the general public.	
D4.2	Publishing activities and its quality
In terms of their publications for outreach – they mention public media contributions in terms of GMO (detailed below). They have an extensive list of selected publications for the public including the publication of a popular science book. Team members have won awards for their popularisation of science and this seems a real strength of the group and something that team members are really committed to – again a great achievement for this dynamic group.	
D4.3	Participation in professional organisations in the area of research and development
The team has organised a conference about GMO's in Brno for the general public and scientists and journalists. And they have participated in other GMO-related workshops for students. They engage with government on policy for GMOs, and have contributed to organising plant breeder conference. They have presented 10 invited talks during the evaluation period, many of which are at international scientific meetings. These contributions are all highly relevant to their research expertise. They have also received a number of awards for their scientific achievements in this evaluation period. Team members are also members of ESEB and a variety of learned societies nationally.	

Other comments of the commission:

It would be really helpful to know where the graduated PhD students from the various institutes and departments go after completion, what % go on to postdoc, to scientific posts in industry etc from each department.

It would be helpful to have a numerical estimate of the contribution of each team to collaborative papers (0-5%, 5-10% etc etc) as a tick box for the researchers to complete when entering their data.

It would be helpful to gather appropriate information on diversity such as male to female ratios at every career stage as it is well known that whilst females are often in the majority in early career stages this unfortunately quickly drops out without very strong support systems in place.

A statement on what specifically is being done to support females transitioning to leadership roles would be good.

6. Department of Molecular Epigenetics

Strengths:

The department has very focussed research topics. They have a convincing mix of methods being used and developed. They have an active international network of collaborators.

Weaknesses:

The long term (>5 yrs.) strategy for funding and hiring and succession planning are all weaker than would be expected. The team members also have low numbers of PhD students (only 1 completed in the 5-year evaluation period). And they have low levels for both promotion of their scientific results and relation to practice.

Opportunities:

Continued strategic collaborations using their novel approaches offers a successful opportunity. This is a strategy that has served them well.

Threats:

Very focussed topics is a good idea, but there could potentially be too many diverse focussed topics here. This is probably ok for short term but as a long-term strategy could put a small team at risk of not being able to compete for funding, or, limiting their success in output in the >=Q2 journal categories.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
	In total, there were 25 outputs within the 5-year evaluation period, this was achieved with a team of ~6.7 FTE. 12 of these outputs were evaluated and these evaluated outputs all are in Q2 or above. For a group of this size this is a reasonable level of output. However, their outputs were evaluated in phase I as Internationally excellent or recognized (2 and 3). Their 2015, and 2016 papers in Heredity and Plant Journal were contributed to by this department in majority and there are a number of other papers such as their 2019 paper in the journal „DNA Research“ that were solely from the team.
H1.2	Contribution of workers on the outputs reached
	<p>Their contribution to the outputs is slightly awkward to interpret. The committee would recommend to CAS that a % input from the <u>department members</u> is used. This would be information on just this department of molecular epigenetics and not about other members of IBP and also would not refer to geographical regions e.g. Brno lab because this is rather vague. The committee would like to commend this group for taking the time to address precisely this issue in their written report – it was really helpful and thorough.</p> <p>Overall, the team is contributing to a range of positions on their evaluated output. From middle authorships to lead positions. This shows a healthy blend of the full range of involvement possible with a nice number of corresponding authorships by their department lead. They seem to really enjoy collaborative science.</p>
H1.3	Quality of all outputs and results
	The team has produced output above the average for a group of this size for the internationally excellent category. The output evaluated was not classified as „world-leading“, therefore, they are performing below the average in this regard for a team of this size. Their outputs from Phase 1 evaluation are in Q2 and involve lots of collaboration.

H1.4	The most valuable discoveries and findings in the fields, their importance for the field
<p>The team currently focus on fundamental ribosomal RNA biology, chromosome evolution, and epigenetics. The committee will highlight publications here that were in majority (90%) generated by this team:</p> <p>(1) Matyasek, R; Dobesova, E; Huska, D; Jezkova, I; Soltis, PS; Soltis, DE; Kovarik, A. (2016) Interpopulation hybridization generates meiotically stable rDNA epigenetic variants in allotetraploid <i>Tragopogon mirus</i>. <i>Plant Journal</i> 85(3): 362-377; DOI: 10.1111/tpj.13110; IF=6.1.</p> <p>In this paper the team showed that interpopulation crosses may generate epialleles that are not present in natural populations, underlying epigenetic dynamics in young allopolyploids.</p> <p>(2) Dobesova, E., Malinska, H., Matyasek, R., Leitch, AR., Soltis, DE., Soltis, PS., Kovarik, A. (2015) Silenced rRNA genes are activated and substitute for partially eliminated active homeologs in the recently formed allotetraploid, <i>Tragopogon mirus</i> (Asteraceae), <i>Heredity</i> 114(3), 356-365, DOI: 10.1038/hdy.2014.111, IF 3,8</p> <p>This is nice output in itself but the committee has highlighted it here as it leads to many other interesting questions for the group, e.g. to further test their hypothesis that active, decondensed rDNA units are most likely to be deleted via recombination.</p>	
H1.5	Contribution of the participation of the authors in large collaborations
<p>The team tends to produce output from collaborations on a small to medium scale, i.e. less than 5 national and international organisations involved. They have also been active members of the national centre of excellence in evolution and function of complex plant genomes. The group have contributed to an ERC grant submission from a collaborator elsewhere in the EU and are one of ~5 different contributors. They also have ongoing international research collaborators in the UK, Germany, China, Spain and France.</p>	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
<p>The output is directly under the remit of the missions of CAS and institute. They are carrying out fundamental research and are publishing their output in well-respected international journals. Overall, the social engagement and social response to their research could be improved significantly.</p>	
H2.2	System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team's activity on proper practice in society in the area of social sciences and humanities
<p>Nothing further to add.</p>	
H2.3	Relation to practice
<p>The team is closely focused on basic research, its relation to practice is low.</p>	
H2.4	Participation in AV21 strategy
<p>Data not available.</p>	

H2.5	Cooperation with regions of the Czech Republic
<p>They have cooperated in the large national centre for excellence in basic research focussing on evolution and function of complex plant genomes and worked with teams across many national institutes and universities to meet the goals of the project. They contributed to a number of specific topics in this consortium including consequences of hybridization and polyploidisation, and evolution and function of specialised chromosomes etc. They cooperated with the universities for the supervision of PhD students, project students and the delivery of lectures as well as for research collaborations.</p>	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
<p>This is a very difficult comparison to achieve fairly given the vast range of sizes of teams and institutes. Nevertheless, as a crude measure and with correction for FTE they are performing above average for their field for internationally excellent output evaluated in Phase 1 and have above average proportion of corresponding authorships for these outputs.</p>	
D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
<p>The team is engaged in collaborating with a set of key collaborators internationally and nationally as evidenced by their publications. In fact, the vast majority (~80%) of their publications involve collaborators from other countries or institutes. They are functioning well in this regard.</p>	
D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
<p>The team has co-organised an international conference in 2016, they have given 5 invited lectures in the evaluation period and these include 3 international invited presentations (China, Croatia and Barcelona).</p>	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
<p>The group has currently three research grants that allows them pursuing the research on during the 2020-2025 evaluation period, these include work on polyploidy, duplicated spacer promoters, and ribosomal RNA genes. They have received funding for these projects and as such the commission imagines this will increase their staffing from current numbers. Along with this they have established an intra-institutional collaboration examining changes in rDNA copy number and changes in expression in human cancer cells. A lot of diverse activities planned.</p>	
D2.2	Assessment of the previous research objectives and their achievement
<p>The research they carried out in the evaluated period was in line with their objectives.</p>	

D2.3	Assessment of implementation of recommendations from past evaluation
<p>The previous evaluation suggested reworking the name to include the evolutionary aspect of their work. They have not done this and the commission agrees that epigenetics is adequate to encompass their activities.</p> <p>To consider the molecular events that are responsible for epigenetic changes they have set up a collaboration with a group that uses animal models (as the plant model is not adequate to study this). They have exposed cancer cell lines to irradiation and are observing changes in structure and expression of rDNA.</p> <p>They were previously advised to improve their international visibility. The commission does not think the issue here is with their international collaborations on publications because the vast majority of their work is with international co-authors - as they also correctly point out. However, international visibility could be from an improved online presence, or contributing to co-organising symposia at large international conferences. They have suggested similar areas to improve visibility. These suggestions are appreciated.</p>	
D2.4	Success in receiving grants
<p>The team currently holds 3 grant proposals (one international grant – with a German partner). This might seem on the slightly low end but this is a small team which should be viewed perhaps as a single laboratory and so comparison with other groups is very difficult. They are currently not seeking additional funding.</p>	
D2.5	Adequacy of instrumental equipment
<p>Facilities and instrumentation seem very good and appropriate given their highly specialised technical skills and research.</p>	
D2.6	Effectiveness of management
<p>This is a small group, the management structure seems to be fine – no major issues were raised/apparent in terms of the effectiveness of the approach/structure.</p>	
D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
<p>The team has a slightly imbalanced age structure in that there is a gap in the age profile from mid-forties to mid-late sixties. The commission mentions this for succession planning reasons and so that efforts may be made now to look at those in younger brackets that could be supported to take up a leadership positions in the future. There was no information provided on gender distribution.</p>	
D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
<p>Nothing further to add.</p>	
D2.9	Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.
<p>Data not available.</p>	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
The team is involved in a small number of key collaborations that are yielding outputs in good quality journals.	
D3.2	Effectiveness of joint research centres
The team was involved in the Centre for Excellence in „Evolution and function of complex plant genomes“ which was a joint research centre across Masaryk University and several laboratories in the Academy of Science. They also have a joint grant from the Czech Science Foundation with the Masaryk University at Brno which they were awarded in 2019 and will finish in 2022.	
D3.3	Success rate in supervision of PhD students
Very low numbers of PhD students, they completed just one PhD student in the 5-year evaluation period.	
D3.4	Participation of PhD students in the outputs
Students are being involved in the outputs and are named co-authors on the outputs.	
D3.5	Participation of the team in master or bachelor studies
The team members are teaching one lecture course and one practical class to MSc and BSc levels respectively in Masaryk and Technical University at Brno. They are participating in the supervision of a small number of project students –1 bachelor, 6 master and 3 doctoral (PhD) in the 5-year evaluation period. Overall, they supervise low numbers of project students and the number of PhD students that graduated within the 5-year evaluation period was 1. This is very low even considering their size.	
D3.6	Assessment of cooperation intensity with universities in the form of teaching
See D3.5	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
There are low levels of activity here but it is very difficult to do much more than they are currently doing with what is effectively one laboratory. It is recommended that they combine efforts on this front with other teams.	
D4.2	Publishing activities and its quality
The team does not list publications in professional (non-scientific) journals or otherwise promote their results.	
D4.3	Participation in professional organisations in the area of research and development
One member is a journal section editor for Frontiers in Plant Science and an associate editor for Plant Systematics and Evolution. Team members are reviewing for New Phytologist and Plant Journal and in the 5 years of the evaluation period have reviewed 9	

papers in total for these two journals. They mention reviewing 1-2 papers per month – one might recommend they revisit this as this seems very high for a group of this size and prioritise the >Q2 journals. One member is on the evaluation panel for Czech Grant Agency Grants. They have co-organised an international meeting on polyploidy, hybridisation and biodiversity in Croatia in 2016.

Other comments of the commission:

N/a

7. Department of Biophysics of Immune System

Strengths:

The department appears to do extremely well regarding training – with a stunning number of 22 Bachelor thesis, 20 Master thesis, and 5 PhD defences in the evaluation period.

Weaknesses:

Lack of focus in research

Opportunities:

Make optimal use of the highly skilled personnel by looking for synergisms and making choices for focus and higher impact

Threats:

Ineffective use of resources due to lack of focus may threaten the scientific performance of the department on the medium to long term

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
The output of the department is on the average regarding both ranking of the journals and number of publications, however the low number of excellent outputs is a weakness of the department.	
H1.2	Contribution of workers on the outputs reached
The number of outputs with own reprint author for levels 1 and 2 is good. ($N_{RP1,2}/FTE$: 0.31)	
H1.3	Quality of all outputs and results
While the quality of the papers was good, it has to be considered that they are spread over a range of different research lines. It is a bit worrying that most research lines are only reflected in a sparse publication track record.	
H1.4	The most valuable discoveries and findings in the fields, their importance for the field
The department covers a broad spectrum of research topics related with immune cells, including inflammation, pollutants, and food chemistry.	
H1.5	Contribution of the participation of the authors in large collaborations
Not applicable	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
Next to the research activities on immune reactions, the very extensive teaching and training activities of the department have a considerable societal impact and relevance.	

H2.2	System functionality for knowledge transfer into practice, its usefulness for society. The impact of the team's activity on proper practice in society in the area of social sciences and humanities
Part of the research is in collaboration with the spin-out company CONTRIPRO, representing a very successful and continuing example of knowledge transfer.	
H2.3	Relation to practice
-	
H2.4	Participation in AV21 strategy
Not applicable	
H2.5	Cooperation with regions of the Czech Republic
Multiple collaborations with Czech universities in different parts of the country.	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
Diluted, which limits international visibility for the individual lines.	
D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
Very strong collaboration with CONTRIPRO	
D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
Limited contribution to conferences with invited lectures, limited recognition with awards.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
Unclear.	
D2.2	Assessment of the previous research objectives and their achievement
Largely achieved.	
D2.3	Assessment of implementation of recommendations from past evaluation
OK	
D2.4	Success in receiving grants
Good track record in receiving national funding.	
D2.5	Adequacy of instrumental equipment
Adequate	

D2.6	Effectiveness of management
The management is highly effective regarding education, training, and development of personnel. It is less effective regarding research impact, international visibility and research excellence.	
D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
Good structure, young team.	
D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
Appropriate	
D2.9	Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.
-	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
Excellent involvement in teaching at universities, recruitment of highly talented and motivated students for academic training, also post-graduate.	
D3.2	Effectiveness of joint research centres
-	
D3.3	Success rate in supervision of PhD students
Outstanding result with 5 PhD theses in the evaluation period.	
D3.4	Participation of PhD students in the outputs
Excellent.	
D3.5	Participation of the team in master or bachelor studies
Excellent.	
D3.6	Assessment of cooperation intensity with universities in the form of teaching
Excellent.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Very developed: A range of activities, including open days, radio interview, newspaper articles.	

D4.2	Publishing activities and its quality
-	
D4.3	Participation in professional organisations in the area of research and development
-	

Other comments of the commission:

We suggest establishing an advisory committee that helps the department head and (junior) PIs in making choices regarding research focus, in order to increase the visibility and research impact of the department on the medium time range.

8. Department of Biophysics of Nucleic Acids

Strengths:

Internationally well recognized team with a solid track record in the field of (unusual) nucleic acid structure and function as well as circular dichroism spectroscopy. They seem to occupy a well-established place in the community, and regularly succeed in publishing in prestigious journals. Their contribution to the collaborative papers is substantial and often leading. Renovated offices and laboratories, new equipment.

Weaknesses:

Relatively small team (12 people in total including students) that necessarily limits the available techniques and methodologies. Small size also makes the team more vulnerable to drastic changes or even fluctuations in funding. Lack of sufficient connection to the universities, not enough access to students.

Opportunities:

The top-level expertise in a well-defined technical segment (CD, stopped-flow CD) should be reflected in a high collaborative potential for the team. Recent opening to especially biomedically important new problems where nucleic acid secondary structure is a dominant factor.

Threats:

Due to historic reasons the team is focused on a somewhat limited topic and relies heavily on CD spectroscopy – wherein they excel. While CD experiments are rather simple and fast, the information obtained on macromolecular structure is limited. Without a broader technological basis the future success of the department may be at risk

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
The quality of the output is above the national average of the field for all selected outputs, for outputs with the reprint author from the team and after correction for the FC. The productivity of the team is excellent, and the outputs are also better than the field average for all the assessed performance indicators.	
H1.2	Contribution of workers on the outputs reached
The number of excellent outputs per FTE, the number of reprint author excellent outputs and the fractional contribution by the team to these excellent outputs are all above the field average. The team's contribution to the excellent outputs is in most cases dominant.	
H1.3	Quality of all outputs and results
A rather even distribution of all outputs between the journal quality quartiles 1*-3 means that the team is capable to publish its best results in top journals and does not tend to produce moderate quality publications. In particular, they have several papers in the prestigious journal Nucleic Acids Research.	
H1.4	The most valuable discoveries and findings in the fields, their importance for the field
Unusual nucleic acid secondary structures, such as guanine quadruplexes and cytosine i-motifs were experimentally characterized and modelled. Their results connect the primary structure and environmental parameters with the secondary structure. The effect of mutations on the nucleic acid structures and stability were elucidated. The conformational	

properties of telomere sequences are relevant in cell biology, in aging and in various pathologies.	
H1.5	Contribution of the participation of the authors in large collaborations
Not applicable.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
Excellent. Outputs are central in biology and have wide potential application. The research efforts of the team are in line with the institute mission. Indirect impact of their work on the biomedical field, mostly through collaboration, is conceivable. Highly cited reviews and methodological papers serve the broader international scientific community.	
H2.2	System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team's activity on proper practice in society in the area of social sciences and humanities
None known.	
H2.3	Relation to practice
Methodological advances especially in the technology and interpretation (analysis) of circular dichroism spectroscopy.	
H2.4	Participation in AV21 strategy
None known.	
H2.5	Cooperation with regions of the Czech Republic
The team relies heavily on cooperation with other CAS institutes and universities. Their contribution to the collaborative output is usually substantial or dominant.	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
The team had a pioneering role in the development and dissemination of CD methods and still has a high visibility due to this key expertise.	
D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
Mostly domestic collaborations both in-house and with Czech universities. The team contributes with its essential expertise, know-how and instrumentation. International collaboration is moderate, mostly informal and does not seem to be supported by contracts.	
D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
Very low-key, except for referee services to journals.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
The team proceeds along the planned research directions.	
D2.2	Assessment of the previous research objectives and their achievement
Previous research objectives were realistic, building on the tradition and expertise of the team.	
D2.3	Assessment of implementation of recommendations from past evaluation
Increased visibility in the scientific community (not in the general public) of the team was pursued by publishing review and methodological papers. Team members, especially young ones, participated at important meetings. In line with the recommendations the team remains focussed on what they do best, the characterization of unusual nucleic acid conformations.	
D2.4	Success in receiving grants
Eight grants were effective in the evaluation period with a total of 1202 thousand EUR funding. This seems to be average within the whole institute. All of these grants are of Czech origin, no international (single or consortium) or EU grants were received.	
D2.5	Adequacy of instrumental equipment
The team is well equipped for the planned research activities.	
D2.6	Effectiveness of management
There seems to be little challenge for management activity in this relatively small team.	
D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
The age structure is good, dominated by the 36-45year old group, with the potential of long-term management of the team. The team pays attention to attracting BSc, MSc and PhD students, and the professional staff consists of postdocs, junior and senior researchers.	
D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
The team has a male leader (recently), but otherwise it is female dominated. The former leader was a woman. No gender issue (i.e. problem) is observed.	
D2.9	Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.
None known.	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
International not reported, but there are collaborations with domestic universities. This team is capable to widen its experimental approach by collaborating with more Czech groups (e.g. NMR, in vivo work).	
D3.2	Effectiveness of joint research centres
One team member was a group leader, several team members had part time employment at CEITEC.	
D3.3	Success rate in supervision of PhD students
3 theses defended in the evaluation period out of 3 supervisions.	
D3.4	Participation of PhD students in the outputs
The PhD students contribute substantially to the output: 6 papers were published with their co-authorship, 5 of them with first authorship.	
D3.5	Participation of the team in master or bachelor studies
Adequate for the size of the team.	
D3.6	Assessment of cooperation intensity with universities in the form of teaching
Team members offer courses at both universities in Brno, at all 3 levels of higher education. This activity could be enhanced though if the team wishes to recruit more students.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Other than the annual Week of Science and Technology and the national student contest, the team does not report any further activity. Social media presence would deserve efforts and attention.	
D4.2	Publishing activities and its quality
No activity reported.	
D4.3	Participation in professional organisations in the area of research and development
None reported.	

Other comments of the commission:

9. Department of Structure and Dynamics of Nucleic Acids

Strengths:

- Strong research activities with international visibility.
- State-of-the art modelling of nucleic acids.
- Young research team.
- Clear and innovative research activity plan for 2020-2024.
- Intense international collaborations.

Weaknesses:

- Short and poor SWOT analysis in the report.
- Emphasis on well-paid researchers on long-term contract. Once all positions are filled, regular exchange by younger researchers is inhibited.

Opportunities:

- Intensification of teaching at the local university by basic courses and seminars in both the Bachelor and Master curricula. This will gain visibility among the students in their early stage of studies and gain more doctoral candidates in the future.
- More research activity in the field of prebiotic chemistry as proposed in the report.

Threats:

- Risk of reduced institutional funding for upgrade of computer clusters. This basic equipment and the upgrades can typically not be funded by third parties.
- Complaints about EU and Czech bureaucracy stated in the report.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
Excellent.	
H1.2	Contribution of workers on the outputs reached
Excellent. Individual team members occur as corresponding authors.	
H1.3	Quality of all outputs and results
Excellent.	
H1.4	The most valuable discoveries and findings in the fields, their importance for the field
<p>State-of-art molecular modelling of nucleic acids, in particular those with distinct secondary structures, like RNA motifs, G4 quadruplexes. This will have large general impact for the nucleic-acid research field, in particular by the contributions to novel force-field methods that are already being applied worldwide.</p> <p>The 2018 Chemical Reviews paper is a milestone reference.</p>	
H1.5	Contribution of the participation of the authors in large collaborations
Excellent. Significant contributions with international visibility.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
High relevance. The team contributes significantly to the excellence of the CAS in general and the institute in particular.	
H2.2	System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team's activity on proper practice in society in the area of social sciences and humanities
Highly relevant. The molecular modelling of nucleic acids and their structuring is highly important not only to basic research but also for the development of new diagnostic tools and potential drugs. The current Covid-19 pandemic clearly shows the importance of nucleic acid research (PCR diagnosis and mRNA vaccines) to society. Without the understanding of nucleic acids structure this societal relevance will not be feasible.	
H2.3	Relation to practice
Identical to H2.2.	
H2.4	Participation in AV21 strategy
No information given, not in the report and not in the presentations.	
H2.5	Cooperation with regions of the Czech Republic
Intense. Research collaborations with Masaryk University and Charles University, in particular in the RNA centre funded by the Czech Science Foundation. A significant amount of teaching at Masaryk University, Charles University and Palacky University.	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
Excellent standing on the international level and high international visibility.	
D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
Very intense international and national cooperations, in particular with renowned groups in the UK and the US. The quality and significance of these collaborations is high, in particular with respect to the research field of G4 quadruplexes.	
D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
The team is clearly internationally visible. Jiří Šponer is member of the editorial board of the journals Biochimie and Journal of Biomolecular Structure and Dynamics. Numerous invited talks by Jiří Šponer and some of his team members. Several international conferences and workshops organized by the team.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
On the whole in line.	
D2.2	Assessment of the previous research objectives and their achievement
According to the report, essentially all planned activities are fulfilled.	
D2.3	Assessment of implementation of recommendations from past evaluation
There were no recommendations from the past evaluation as far as we can see.	
D2.4	Success in receiving grants
Not obvious	
D2.5	Adequacy of instrumental equipment
State-of-the-art computer equipment.	
D2.6	Effectiveness of management
Individual team members are encouraged to occur as corresponding authors on publications. This was positively evaluated by the committee.	
D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
Emphasis seems to be on well-paid researchers on long-term contract. Once all positions are filled, regular exchange by younger researchers beyond third-party funded doctoral researchers is difficult or even inhibited.	
D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
-	
D2.9	Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.
-	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
Broad and intense. Research collaborations with Masaryk University and Charles University, in particular in the RNA centre funded by the Czech Science Foundation. A significant amount of teaching at Masaryk University, Charles University and Palacky University. Very intense international and national cooperations, in particular with renowned groups in the UK and the US.	

D3.2	Effectiveness of joint research centres
Effective! The team participated in the RNA centre (funded 2012-2018) with the Masaryk University and the Charles University. The team participates in the EU-funded network Horizon2020 (www.lightdynamic.eu).	
D3.3	Success rate in supervision of PhD students
100%. 4 doctoral theses were completed, 4 are running.	
D3.4	Participation of PhD students in the outputs
Yes.	
D3.5	Participation of the team in master or bachelor studies
Intense participation of the team in both master and bachelor studies at Masaryk University, Charles University and Palacky University.	
D3.6	Assessment of cooperation intensity with universities in the form of teaching
Intensification of teaching at the local university by particularly basic courses and seminars in the early stages of studying curricula. This will gain visibility among the students in their early stage of studies and gain more doctoral candidates in the future, as this was identified as a problem in the SWOT analysis by the team.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
The team had several media coverages and interviews in the Czech newspapers and magazines, most often on the topic of the origin of life. This is sufficient and should be continued.	
D4.2	Publishing activities and its quality
Excellent.	
D4.3	Participation in professional organisations in the area of research and development

Top 10 publications for

9. Department of Structure and Dynamics of Nucleic Acids

Sponer's group (IBP), papers ranked based on the expected **long-term** intellectual impact, as valued by us for the moment being

1. Šponer, J.; Bussi, G.; Krepl, M.; Banáš, P.; Bottaro, S.; Cunha, R. A.; Gil-Ley, A.; Pinamonti, G.; Poblete, S.; Jurečka, P.; Walter, N.G.; Otyepka, M. RNA Structural Dynamics as Captured by Molecular Simulations: A Comprehensive Overview. *Chemical Reviews* 2018, 118, 4177–4338. *Currently dominant conceptual paper in the field of molecular simulations of nucleic acids.*

2-4. Ferus, M.; Nesvorný, D.; Sponer, J.; Kubelik, P.; Michalcikova, R.; Shestivska, V.; Sponer, J. E.; Civiš, S., High-energy chemistry of formamide: A unified mechanism of nucleobase formation. *Proceedings of the National Academy of Sciences of the United States of America* 2015, 112, 657-662.

Study dealing with synthesis of RNA building blocks via radical chemistry in the formamide pathway, specifically in the context of extraterrestrial impacts in the period of Late Heavy Bombardment of the Earth.

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New paradigm in parametrization of RNA force fields suggested, assuming adding a new term for H-bonding.

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New version of DNA simulation force field, becoming to be widely used worldwide.

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First study addressing transitory ensembles on the folding landscape of G-quadruplexes.

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8-10. Górecka, K. M.; Krepl, M.; Szlachcic, A.; Poznański, J.; Šponer, J.; Nowotny, M., RuvC Uses Dynamic Probing of the Holliday Junction to Achieve Sequence Specificity and Efficient Resolution. *Nature Communications* 2019, 10, e4102.
Separation of affinity and reactivity by sequence-dependent rarely populated state in a protein/DNA enzyme complex.

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Indication of presence of dynamical register shifts in binding of single-stranded RNA to RRM class of proteins.

10. Department of Cytokinetics

Strengths:

Young dynamic team of researchers working on timely topics in the cancer biology and toxicology fields with medical relevance.

Weaknesses:

Limited resources for modern technologies, which are necessary in current cell biology. Strategy for long-term funding and financing of modern cell biology techniques is vague.

Opportunities:

The medical relevance of the research topic and the wide range of international collaboration opens opportunities for integration in large consortiums and networks able to apply for EU funding.

Threats:

The large number of diverse projects may create administrative burden to researchers.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
Very good productivity with excellent outputs.	
H1.2	Contribution of workers on the outputs reached
Very good number of outputs with own reprint author for levels 1 and 2. ($N_{RP1,2}/FTE$: 0.64)	
H1.3	Quality of all outputs and results
Higher number of outputs in the 2 and 3 quality levels. Average rating of the team is in the the average of the field.	
H1.4	The most valuable discoveries and findings in the fields, their importance for the field
The large number of projects ongoing originated diverse findings at different levels (molecular pathways involved in cancer, lipid-mediated signalling, molecular mechanisms underlying potential novel chemotherapeutic approaches, effects of dietary toxicants and environmental pollutants with impact in cancer).	
H1.5	Contribution of the participation of the authors in large collaborations
Not applicable	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
Significant societal relevance with health /clinical application.	

H2.2	System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team's activity on proper practice in society in the area of social sciences and humanities
Not applicable	
H2.3	Relation to practice
The team has collaborations with clinicians and there is a potential for application; no applied results are reported, the Team showed limited intention for knowledge transfer into practise.	
H2.4	Participation in AV21 strategy
Not applicable	
H2.5	Cooperation with regions of the Czech Republic
Wide range collaboration both on national and international level.	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
Very good international recognition, very good position in international context.	
D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
Good amount of national and international cooperation including participation in large consortia.	
D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
Excellent participation of the workers in scientific community activities (high number and diverse activities: workshops, conferences, invited lectures and awards).	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
Yes.	
D2.2	Assessment of the previous research objectives and their achievement
The previous research objectives were achieved.	
D2.3	Assessment of implementation of recommendations from past evaluation
The previous recommendations were implemented (promoting of a further integration of research topics within the department, strengthening national and international collaborative network, expanding the number of PhD students and their involvement in research).	

D2.4	Success in receiving grants
The team has been well funded during the evaluation period.	
D2.5	Adequacy of instrumental equipment
Limited resources for modern technologies, which are necessary in current cell biology. The close collaboration with other research institutions has been essential to overcome the limited resources and technologies in the department.	
D2.6	Effectiveness of management
Team appears to have been managed effectively and has been successful in recruiting new members and students.	
D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
Age structure is excellent to maintain vitality. Very good strategy for supporting a young, dynamic team of researchers and recruit PhD students.	
D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
Adequate working environment	
D2.9	Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.
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Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
Very good level of teaching in universities and supervision of students.	
D3.2	Effectiveness of joint research centres
Participation in joint activities with research in universities.	
D3.3	Success rate in supervision of PhD students
A large number of PhD theses (8) were defended in the period of 2015-2019.	
D3.4	Participation of PhD students in the outputs
Very good participation of PhD in the outputs (preparation and publication of more than 35 research papers during the evaluation period).	
D3.5	Participation of the team in master or bachelor studies
Excellent, large number of master (8) and bachelor (6) theses were concluded in the evaluation period.	

D3.6	Assessment of cooperation intensity with universities in the form of teaching
Active cooperation with universities in the form of teaching. There is a high number of lectures provided by members of the team.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Activities to the general public are adequate.	
D4.2	Publishing activities and its quality
Publishing activities not reported.	
D4.3	Participation in professional organisations in the area of research and development
Participation in activities of scientific community such as the board of the Academy Assembly of the Czech Academy of Sciences and Council of the Institute of Biophysics among other, as well as scientific societies and editorial board of journals. The transfer of novel cytometric techniques among the healthcare professionals/clinicians is also mentioned.	

Other comments of the commission:

Final report was elaborated by:

Commission 3.2 - Chemical sciences

Evaluated teams No.: 4, 9

Commission Chair: Professor Bengt Norden

Commission Deputy Chair: Alexander Čegan

Commission Members:

Teresa Bandosz

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John Tsibouklis

Hans-Achim Wagenknecht

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Commission 5.1 - Biological sciences A

Evaluated teams No.: 1, 2, 3, 7, 8, 10

Commission Chair: Prof.emer., PhD, DrHC Morten Kielland-Brandt

Commission Deputy Chair: Graça Soveral

Commission Members:

Karl-Dieter Entian

Christophe Lambing

László Tretter

Balázs Vajna

Manfred Wuhrer

László Zimányi

Commission 6 - Biological sciences B

Evaluated teams No.: 5, 6

Commission Chair: Prof. Dr. Karl-Josef Dietz

Commission Deputy Chair: Miroslav Toman

Commission Members:

Laszlo Bogle

Christophe Hano

Klaus Hoffmann

Raine Kortet

Alberto Maria Luciano

David Marshall

Mary O'Connell

Joseph Tzanopoulos