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 Microbiology of the CAS, v. v. i.

Evaluated teams and their leaders:

1. Laboratory of Fungal Genetics and Metabolism (Miroslav Kolařík)
2. Laboratory of Molecular Biology of Bacterial Pathogenes (Peter Šebo)
3. Laboratory of Biotransformation (Vladimír Křen)
4. Laboratory of Cell Reproduction (Jiří Hašek)
5. Laboratory for Biology of Secondary Metabolism (Jiří Janata)
6. Laboratory of Molecular Structure Characterization (Vladimír Havlíček)
7. Laboratory of Microbial Genetics and Gene Expression (Libor Krásný)
8. Laboratory of Modulation of Gene Expression (Miroslav Pátek)
9. Laboratory of Bioinformatics (Jiří Vohradský)
10. Laboratory of Cell Signalling (Pavel Branny)
11. Laboratory of Regulation of Gene Expression (Leoš Shivaya Valášek)
12. Laboratory of Photosynthesis (Josef Komenda)
13. Laboratory of Algal Biotechnology (Pavel Hrouzek)
14. Laboratory of Cell Cycles of Algae (Kateřina Bišová)
15. Laboratory of Anoxygenic Phototrophs (Michal Koblížek)
16. Laboratory of Environmental Biotechnology (Tomáš Cajthaml)
17. Laboratory of Fungal Biology (Jan Jansa)
18. Laboratory Post-Transcriptional Control of Gene Expression (Branislav Večerek)
19. Laboratory of Cellular and Molecular Immunology (Martin Bilej)
20. Laboratory of Tumor Immunology (Marek Kovář)
21. Laboratory of Gnotobiology (Marek Šinkora)
22. Laboratory of Immunotherapy (Luca Vannucci)
23. Laboratory of Structural Biology and Cell Signalization (Petr Novák)
24. Laboratory of Environmental Microbiology (Petr Baldrian)
25. Center for Nanobiology and Structural Biology (Babak Minofar)

A: Evaluation of the institute

Strengths:

 The strengths already listed by the Institute. In particular, the Institute covers nearly all aspects of microbiology, including fundamental, medical and other applied microbiology. This provides great expertise and supports collaborations in the various fields of microbiology, which has attracted good group leaders.

 Very good research training opportunities for PhD students

 New initiatives to recruit Early Career Researchers

Weaknesses:

 The weaknesses already listed by the Institute. In particular, parts of the institute are situated at different locations, some of them at large distances to universities, therefore suffering from suboptimal interactions with these.

 Lack of International Advisory Board.

 No defined research theme of the entire Institute. This is in part a side effect of the highly successful flat organisational structure, which tends to cause some unwanted divergence of activities. To counteract that, we recommend that part of the institutional budget will be reserved for inter-laboratory project applications.

 Mixed quality of research facilities and infrastructure.

 Considerable fraction of staff is in age group >70, potentially impeding scientific rejuvenation. Offering emeritus arrangements without salary would be helpful.

 Some teams are not internationally competitive. The organizational dynamics of closing, merging, and creating laboratories should be continued and strengthened. A scientific Advisory Board will be helpful for this.

Opportunities:

 The Institute covers nearly all areas of microbiology. This supports collaborations in the various fields of microbiology.

 The highly successful flat structure of the institute can be made even more effective at each site, promoting flagship themes.

 Focus assessment more on performance on true originality and excellence of research, rather than on impact factors of journals etc. A scientific Advisory Board will be helpful for this.

Threats:

 Recruiting students and young researchers in sufficient numbers, in particular the latter because of low salary levels. Due to large dependence on short-term (~3 years long) grants it is difficult to plan for longer terms.

 Institute dispersed over the country makes efficient managing difficult.

 Costs for maintaining castle in Nove Hrady. In addition, the laboratories there would gain strongly from being moved to a site close to a university.
 Decrease in government’s research funding budget and increased reliance on national and international competitive funding sources.

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

H1.1	Quality of selected outputs of Phase I
Most of the research teams are of high quality and internationally visible and competitive in this excellent institute.	
H1.2	**Contribution of workers on the outputs reached**
Productivity in terms of contribution to excellent outputs is above average.	
H1.3	**Quality of all outputs and results**
For many teams above average, both in terms of journal ranking and in terms of citation intensity. Both number of IF outputs (36% increase) and the average IF (from 3.6 to 4.1) have increased strongly as compared to the previous evaluation.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
There are many valuable and important discoveries from various teams.	
H1.5	**Contribution of the participation of the authors in large collaborations**
Many teams participate in large collaborations.	

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

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
Societal relevance is excellent. Output addresses the whole spectrum from yielding important fundamental knowledge, contributing to future application of all corners of biology, to very concrete applications in medicine.	
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**
Knowledge transfer is practiced wherever possible. The Institute has appointed a staff member to oversee and identify opportunities for technology transfer arising from research in the institute.	
H2.3	**Relation to practice**
Some teams have strong relations to practice.	
H2.4	**Participation in AV21 strategy**
Very active. The Institute's participation under the various themes (a) Foods for the Future, b) Diversity of Life and Health of Ecosystems (ROZE) and c) Natural Threats) has led to several patents.	
H2.5	**Cooperation with regions of the Czech Republic**
There are co-operations with nearly all regions of the Czech Republic. This is certainly facilitated by the fact that the Institute is so dispersed across the country.	

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
The institute is internationally competitive.	
D1.2	**Scope and quality of international and national cooperation and the role of the institute in such cooperation; engagement in broad international cooperation**
There is a large number of national and international co-operations, some of which are headed by institute members. Many of these are still ongoing with joint publications.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The Institute of Microbiology is highly active in inviting distinguished foreign speakers. Members of the institute organize many national and international symposia and conferences. Some team leaders received the prestigious Czech Academy of Sciences award Lumina Quaeruntur or were elected to the European Academy of Microbiology. Many team leaders are invited regularly to international meetings.	

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**
Most teams successfully implemented the activity plan for the evaluated period.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
Implementation has been excellent. In particular, the change of organisation into a flat structure without departments has turned out very well, giving more power to young team leaders and excellence in output.	
D2.4	**Success in receiving grants**
All teams are successful in receiving Czech grants and many teams also received international grants. In addition, revenue of ~1.14 million Euros over past 5 years through contract research/analyses (service centres).	
D2.5	**Adequacy of instrumental equipment**
Almost all laboratories of the institute are well equipped. State-of-art instrumentation is available, and the service portfolio looks excellent, although under-utilised in some cases. However, some instrumentation is outdated and will require financial investment.	
D2.6	**Effectiveness of management**
The Institute of Microbiology is very well managed by its director Jiří Hašek. Difficult organisational decision-making has been successfully performed in the period. However, there are still under-performing laboratories, and the pace of organisational remedies should be increased. A Scientific Advisory Board will be helpful.	

D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
HR policy is working well in all these respects. Age structure is fine for the majority of teams, but a considerable fraction of staff is in age group >70.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Most teams take well care of work-life balance conditions and gender issues. However, gender balance among leading scientists is extremely skew.	
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.**
Two units of the Institute, including Algatech, received support from this Programme.	

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**
Most teams have many relevant collaborations with national and international universities.	
D3.2	**Effectiveness of joint research centres**
Many effective collaborations with members of the Charles University are established, and Centre BIOCEV is a brilliant example. For defined periods of time, the two very successful joint centres, Center for Photosynthetic Research and C4SYS were in existence. University of South Bohemia, Charles University, and Masaryk University Brno were partners.	
D3.3	**Success rate in supervision of PhD students**
Very good. All teams supervise PhD students. Forty-six PhD theses were defended in the period.	
D3.4	**Participation of PhD students in the outputs**
PhD students sign as first authors in many publications.	
D3.5	**Participation of the institute in master or bachelor studies**
Many team leaders participate significantly in master and bachelor studies, both in terms of supervision and course teaching.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Many team leaders give lectures and practical courses in microbiology and molecular biology.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Could be improved. Some team leaders are regularly invited to provide statements on infectious diseases, vaccination, ecosystems and environment pollution in the Czech public television and radio. However, lack of PR is listed as one of the Institute's weaknesses in the Institute's report.	
D4.2	**Publishing activities and its quality**
Above average. The Institute is the publisher of the well-known journal Folia Microbiologica.	
D4.3	**Participation in professional organisations in the area of research and development**
Very good. Some team leaders are members of the Czech Science Foundation and EMBO members. The institute has hosted about 25 events (conferences, summer schools, training workshops, etc.) in the last 5 years.	

Other comments of the commission:
This is an outstanding institute with respect to science and infra-structure, and it provides strong benefit to the society.

We recommend the institute to work on improving gender balance among team leaders. There are internationally recognized ways to do that, such as the Athena Swan Charter.

We recommend a long-term declared strategy of securing that any part of the institute is close to a university campus (**see also Weaknesses**)

The highly successful flat organisational structure may tend to cause some unwanted divergence of activities. To counteract that, we recommend that budgets will be reserved for inter-laboratory project applications (**see also Threats**).

Due to large dependence on short-terms (~3-year long) grants it is difficult to plan for longer terms. We recommend that 5-year grant applications will become possible where support is ensured for the first 3 years and further support for another 2 years will be given after a progress report that shows the success of the project (**see also Threats**).

We strongly recommend establishing an International Advisory Council. An Advisory Council could (1) provide support to CAS and the Director if difficult decisions have to be taken, (2) could suggest upcoming new research areas to be covered by new recruitments and (3) could suggest to close less innovative research areas.

Part B: Evaluation of teams

1. Laboratory of Fungal Genetics and Metabolism

Strengths:
A big team that is focussed on the biology and the secondary metabolome of pathogenic fungi, world-leading in Ergot fungi. Broad experience in ecology and taxonomy.

Weaknesses:
Molecular biology is still neglected. Newly discovered putative antibiotics are not well studied chemically, and their antibiotic specificities are not characterized.

Opportunities:
Experienced taxonomic and mycochemical knowledge should be combined with increasing molecular biology.

Threats:
The team needs to be more open to new molecular technologies.

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

H1.1	Quality of selected outputs of Phase I
According to the team size, excellent selected output ($N_{1,2}$/FTE = 0.9) is close to average of this excellent institute.	
H1.2	**Contribution of workers on the outputs reached**
Contribution to productivity of excellent selected output ($FC_{1,2}$/FTE = 0.4) is close to average of this excellent institute.	
H1.3	**Quality of all outputs and results**
Average	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Progress in several fields of mycology concerning the understanding of ecology, host-pathogen interaction and taxonomy. New antibiotic activities are described in a publication from 2015. However, the Team does not report any later effort to bring their discovery closer to any practical use.	
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
The outputs have high societal relevance by their importance in basic and clinical mycology.	

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
Knowledge transfer into practice is modest. It mainly takes place through collaboration with clinicians, who benefit from it in general rather than concrete ways. Patenting of an anticancer compound is mentioned, but neither application date, application publication, patenting organisation, nor inventors are mentioned; likewise, no collaborative efforts to promote commercialization of the invention are apparent.	
H2.3	**Relation to practice**
Ergot fungi are plant pathogens and cause ergotism due to their alkaloid. Likewise, aspergillosis causes many deaths.	
H2.4	**Participation in AV21 strategy**
Not applicable.	
H2.5	**Cooperation with regions of the Czech Republic**
There are no such cooperations.	

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
With respect to taxonomy and host-pathogen interactions, the Team is at average level compared to other teams from similar international and national institutes, whereas their level in molecular biology is below international 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**
The Team has many publications together with foreign laboratories. In a financially committed sense, however, it has only moderate participation in international research cooperations. Thus, except for the smallest external grant, which was back in 2015, the Team has only national funding. Exchange visits are mostly short-term.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
They have a number of excellent international collaborations. Team members did participate in the organization of two national meetings. The Team manages a network of Czech clinical mycologists.	

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**
Mainly fulfilled.	

D2.3	Assessment of implementation of recommendations from past evaluation
Recommended strengthening of molecular biology is still missing.	
D2.4	**Success in receiving grants**
Moderate. The Team is doing reasonably well with national grants, but international grants are almost completely missing (one Horizon 2020 application pending).	
D2.5	**Adequacy of instrumental equipment**
Adequate for current activities.	
D2.6	**Effectiveness of management**
Adequate.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Although admittedly hard because of low salaries, the Team should work on recruiting internationally; the Team does not mention any effort in this respect in the report.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Fulfilled. Efforts to improve gender balance of all team personnel is mentioned in the report. The more important gender imbalance among senior researchers is statistically insignificant in the Team but an obvious issue at the institute level.	
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
There is much international collaboration. However, none of it is based on shared grants, although one is pending.	
D3.2	**Effectiveness of joint research centres**
No contribution to joint research centres.	
D3.3	**Success rate in supervision of PhD students**
Moderate. Only two PhD theses were defended during the evaluation period.	
D3.4	**Participation of PhD students in the outputs**
Yes, PhD students do participate in the outputs. For the size of the team, the extent appears moderate.	
D3.5	**Participation of the team in master or bachelor studies**

D3.6	Assessment of cooperation intensity with universities in the form of teaching
Teaching on courses is low considering the size 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
Media strategy is not presented; activity is moderate considering size of Team.	
D4.2	**Publishing activities and its quality**
Moderate popularization publishing activities; 10 publications are concentrated in 2015-2017. Quality appears good, based on apparent demand.	
D4.3	**Participation in professional organisations in the area of research and development**
Good activity. In particular the team leader and also two other senior researchers are active as editors in a total of 5 different journals, also in study boards, a committee of a scientific society, the scientific board of the National Museum.	

Other comments of the commission:

This is a large team. We suggest more activity towards international recruitment, international grants and larger collaborations.

2. Laboratory of Molecular Biology of Bacterial Pathogens

Strengths:
It is a large, international team focused on the mechanisms of *Bordetella pertussis*. To suppress human immune defence systems. They have a remarkable publication activity (40 articles in the investigated period) most of which are in internationally well acknowledged journals (Mol. Cell, PNAS, eLife, Scientific Reports etc.). In addition to Czech grants they also take part in several international research consortia. They are taking part in the development of novel pertussis vaccines.

Weaknesses:
There are no major weaknesses. It is different to attract HQ researchers as many of them goes to abroad.

Opportunities:
They have access to university students and can raise funding from vaccine manufacturers.

Threats:
Limited funding, 2/3 part comes from grants. They are good (5 PI with own CSF grant), but always worries about the future. The “Confederation of PIs” system is not perfect.

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

H1.1	**Quality of selected outputs of Phase I**
Productivity in terms of excellent selected outputs ($N_{1,2}$/FTE = 0.73) is higher than the average for the teams in this excellent institute.	
H1.2	**Contribution of workers on the outputs reached**
Productivity in terms of contribution to excellent outputs ($FC_{1,2}$/FTE = 0.35) is around the average for the teams in this excellent institute. Measured as reprint author contribution ($N_{RP1,2}$/FTE = 0.73), it is much higher than the institute average.	
H1.3	**Quality of all outputs and results**
Above average, both in terms of journal ranking and in terms of citation intensity.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Understanding adenylate cyclase toxin signalling, developing new pertussis vaccines	
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**
Developing a pertussis vaccine and carrying out research on pathogens has high societal relevance.	

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
They transfer basic scientific knowledge into vaccine development.	
H2.3	**Relation to practice**
Vaccine development	
H2.4	**Participation in AV21 strategy**
None known.	
H2.5	**Cooperation with regions of the Czech Republic**
None known.	

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
It is a large team with several groups with outstanding publication activity.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
Group takes part in many European collaborations, also as leaders.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The research unit is highly active in inviting on average 2 to 4 distinguished foreign speakers per year to deliver lectures on molecular infection microbiology research for the audience of the Institute of Microbiology. They organized a Czech-American Minisymposium on *Bordetella* in 2019. Dr. Kamanova was awarded the prestigious Czech Academy of Sciences award Lumina quaeruntur in 2019, whereas Peter Šebo was awarded the prestigious Czech Science Foundation ExPro and was elected to the European Academy of Microbiology in 2016 and invited regularly to international meetings.	

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, it is.	
D2.2	**Assessment of the previous research objectives and their achievement**
The activity plan for the evaluated period was ambitious but realistic, and it was successfully implemented.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The team was evaluated as excellent in the previous period, and the above stated recommendation of the Evaluation Commission was fully implemented and maintained over the present evaluation period.	

D2.4	Success in receiving grants
They are successful in receiving Czech and international (H2020) grants.	
D2.5	**Adequacy of instrumental equipment**
No problem is apparent.	
D2.6	**Effectiveness of management**
It is a large group with sound HR policies.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Age structure is fine with many young members.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Genders are balanced in the group.	
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
They have cooperation with Charles University, University of Chemistry and Technology and many universities abroad.	
D3.2	**Effectiveness of joint research centres**
The team develops a vigorous collaboration with members of the Department of Microbiology and Genetics of the Charles University, which leads to numerous joint publications. But, formally, they are not part of a joint research centre with a university.	
D3.3	**Success rate in supervision of PhD students**
They supervise 5 to 10 PhD students per year. There were 7 successful PhD defences during the evaluation period.	
D3.4	**Participation of PhD students in the outputs**
The PhD students most of the time sign as first authors on the publications of the research outputs.	
D3.5	**Participation of the team in master or bachelor studies**
There were 5 successful BSc and MSc defences during the evaluation period.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Prof. Peter Šebo gives lectures in Molecular mechanisms of bacterial virulence at University of Chemistry and Technology	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Prof. Peter Šebo is regularly invited to comment on infectious diseases and vaccination at the Czech public television and radio, delivers lectures for high school students and participates in public discussions on microbiology, infectious diseases and vaccination. Team also regularly participates in the organization of “Open door days” for high school students and the “Week of Science and technology” organized by The Czech Academy of Sciences.	
D4.2	**Publishing activities and its quality**
It is outstanding.	
D4.3	**Participation in professional organisations in the area of research and development**
Peter Šebo has been serving as a member of Czech Science Foundation panels 302 and 305 on microbiology, immunology and molecular and cellular biology. He has also been elected to the executive Board of International Bordetella Society and is an elected member of EMBO and of the European Academy of Microbiology. Peter Šebo serves as editor of the International Journal of Medical Microbiology and of the journal Toxins (both respected international journals with IF ~4).	

Other comments of the commission:
None.

3. Laboratory of Biotransformation

Strengths:

 Clear opportunities for women to be in leadership positions

 Existing cooperations with industry

 Good integration into university teaching (although the team considers it as ‘variable’)

Weaknesses:

 Research topics of team (enzymes in various areas of organic/bioorganic synthesis; chemical biology/bioremediation) are not cutting-edge and appear to be a poor fit for the institute

 Too many research topics for a relatively small team

 Lack of clearly defined ‚signature‘ theme

 Lack of practical aspects of research

Opportunities:

 Research in biotechnology (particularly molecular biocatalysis and glyconanomaterials) could open up collaborations with various different industries

 Collaboration with IOCB should open potentially fruitful new research

Threats:

 Outstanding medicinal chemistry research is already performed in the IOCB

 Student recruitment could suffer from competition by the IOCB medicinal chemistry team

 Lack of clarity how team integrates with the 2020-2024 strategic plan of the Institute

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

H1.1	Quality of selected outputs of Phase I
Good, some very good. In addition to the bibliometric information provided from the Phase I evaluation we acquired very useful information by directly asking the teams about which they considered their most important publications: a list of 10 publications ranked in order of importance. Both the publications and how the team ranked them (including for each publication a one-sentence comment) was found useful information.	
H1.2	**Contribution of workers on the outputs reached**
Mostly highly collaborative work, often with many (!) authors on each paper, but senior authorship owned by team members.	

H1.3	Quality of all outputs and results
Overall good to average, as most of the fields are quite mature (for example bioremediation of cyanide in wastewater). The potential of the hybrid flavenoid antioxidants seems to be limited in vivo.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Carbohydrate chemistry (White Team) appears to be the most promising, in particular the scope of diglycosidases as biocatalysts and the development of glyconanomaterials as sensors for medical diagnosis, which could open up further collaborations with industry.	
H1.5	**Contribution of the participation of the authors in large collaborations**
Team has generally been responsible for experimental design, execution, data evaluation/interpretation and manuscript writing. In significant number of papers, HRMS and NMR spectra were obviously measured by staff in the analytical facilities of the institute and it is not clear whether there was sufficient intellectual contribution that warranted their co-authorship (rather than an acknowledgement).	

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

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
Mixed – the biotechnology work has potentially the highest relevance for this Institute, whereas the natural product and chemoenzymatic research may be better placed in a different institute with a stronger focus on synthetic organic chemistry (IOCB); if this is not possible, a collaboration should be feasible	
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**
Team has recognised the opportunity of increasing their interaction with industry in the future. While the natural products work appears to be largely fundamental research (which may very well have transferable outcomes in the future, which cannot be foreseen at this stage), there are good opportunities to intensify collaborations with industry in the area of biocatalysis and medical sensoring.	
H2.3	**Relation to practice**
Mixed – the ecotechnology research has clear immediate practical applications, which are already exploited with the CZ industry (but it is quite a mature technique; the novelty of Team's approach is not clear). Other industry collaborations are neutraceuticals and speciality chemicals.	
H2.4	**Participation in AV21 strategy**
Not addressed. There are potential opportunities for the team in the programs „diagnostic methods and techniques“ and „wellbeing in health and disease“ that the team should consider exploring.	
H2.5	**Cooperation with regions of the Czech Republic**
Appears to be largely through interactions with various 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
The carbohydrate group (White Team) seems to be the most promising with the widest scope and transferable outcomes that is internationally competitive, whereas the Blue and Yellow Team are weaker.	
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 national and international collaborations, which is remarkable for a team with this size, raising the question whether (how) all these activities can be adequately serviced‘.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Could be improved, only one researcher has been member of the organisational board of a conference.	

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

D2.1	Direction in line with the perspective of the planned research directions
Not addressed.	
D2.2	**Assessment of the previous research objectives and their achievement**
Team has progressed on planned activities, which were partially refocused to align with new grants and collaboration opportunities (such as COST Actions).	
D2.3	**Assessment of implementation of recommendations from past evaluation**
Past evaluation did not identify any fundamental weaknesses and threats, and therefore no specific recommendations were made.	
D2.4	**Success in receiving grants**
Good, diverse funding sources (national, international)	
D2.5	**Adequacy of instrumental equipment**
Good; specialised instrumentation and computational modelling is available through collaborations.	
D2.6	**Effectiveness of management**
Very good. Team is divided into 3 sub-themes (Blue, White, Yellow). Each of the sub-teams has weekly meetings, and the entire team meets once per week for a seminar. In addition, a conference with team-building activities is held every year.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
The age profile of the team appears healthy with a good balance between senior researchers and students. There is a potential danger of inbreeding as PhD graduates	

often re-join the lab after their post-doc. Recruitment of researchers from external institutions could be improved.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Part-time work and working from home arrangements exist (within limits); strategies to address potential gender and diversity issues are not provided. However, all three sub-groups are led by women, which suggests that gender may be a smaller problem in this Team.	
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.**
Not addressed.	

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, several joint-projects with national and international (Austria, Argentina, France) universities.	
D3.2	**Effectiveness of joint research centres**
Currently no existing research centres.	
D3.3	**Success rate in supervision of PhD students**
Good.	
D3.4	**Participation of PhD students in the outputs**
Good.	
D3.5	**Participation of the team in master or bachelor studies**
Good.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Currently, 3 researches teach at universities (one of these is more involved than the other two) but it is not clear from the information provided whether they give single lectures or teach an entire subject/course.	

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

D4.1	**Sufficiency of media strategy and activities in the area of research popularisation**
Could be improved; apart from providing internships for high-school students and placements for international students (mostly through the Erasmus program); no apparent media releases and typical ‚outreach' activities.	

D4.2	Publishing activities and its quality
Good, several staff are members of editorial boards.	
D4.3	**Participation in professional organisations in the area of research and development**
Good, participation in evaluation panels and membership on advisory boards.	

Further comments of the commission:

This is one of the few teams the committee saw, where women are in leadership roles as chairs of the sub-teams. However, overall, this team is characterised by a comparatively large number of different research topics, even within the sub-themes. Restructuring with strong refocussing should be considered since not every aspect appears relevant to keep for the future strategy of this Institute.

White sub-team: Glycobiology involving carbohydrate chemistry and biochemistry and study of carbohydrate interactions with biosystems – the most promising and internationally competitive sub-team (also the largest), which should be strengthened and concentrate its focus on biocatalysis and medical diagnostics.

Yellow sub-team: Biotransformations of flavonoids from milk thistle, their biological activities and their metabolic fate – this research appears to be largely fundamental in nature, and it is not clear how it aligns with the Institute's future strategy. A re-alignment should be considered or transferral to another institute (IOCB).

Blue sub-team: Application of nitrilase for fine chemical synthesis and for the remediation of HCN polluted wastewaters – the bioremediation work could potentially fit under the Institute's future strategic pillar "Interactions of microbes with the environment" (p 28 of Director's presentation). Transfer into Laboratory of Environmental Microbiology should be considered.

Overall, there seems to be a disconnect between the Institute's and Theme's future strategies. The integration is not obvious and has not been outlined either in the Director's and or Theme leader's report. It is recommended that the Institute reviews the role of the Theme and its contribution to the overall strategy of the Institute.

Top 10 publications for the evaluated team

Laboratory of Biotransformation 114 – List of papers provided for Evaluation 2020 (2015-2019) corresponding author(s)*; authors from lab. 114; **IF** are from the year of publication, **Cit**: total citations; ***VIP paper***: Very important paper – tagged by journal editors; **10 most important papers**

1st Decil

1. K. Slámová*, J. Krejzová, P. Marhol, L. Kalachová, N. Kulik, H. Pelantová, J. Cvačka, V. Křen: Synthesis of derivatized chitooligomers using transglycosidases engineered from the fungal GH20 β-*N*-acetylhexosaminidase. *Adv. Synth. Catal.* **357**, 1941-1950 (2015). IF 5.663, Cit: 24
   This is the first example of functional hexosaminidase mutation. The first mutant set of transglycosidases highly efficient in the synthesis of hardly available longer chain chitooligomers.
2. D. Šimčíková, M. Kotik, L. Weignerová, P. Halada, H. Pelantová, K. Adamcová, V. Křen*: α-L-Rhamnosyl-β-D-glucosidase (rutinosidase) from *Aspergillus niger*: Characterization and synthetic potential of a novel diglycosidase. *Adv. Synth. Catal.* **357**, 107-117 (2015). IF 5.663, Cit: 16
   We described the first sequence of a rutinosidase and accomplished for the first time its heterologous expression. This novel unique enzyme has a vast application in biotechnology.
3. B. Lange, A. Šimonová, T. Fischöder, H. Pelantová, V. Křen, L. Elling*: Towards keratan sulfate – Chemo-enzymatic cascade synthesis of sulfated *N*-acetyllactosamine (LacNAc) glycan oligomers. *Adv. Synth. Catal.* **358**, 584-596 (2016). *VIP Paper* IF 6.453, Cit: 9
   Novel multienzyme chemoenzymatic cascade for the synthesis of sulfated N-acetyllactosamine oligomer structures (up to octasaccharides) is described.
4. L. Martínková, M. Chmátal: The integration of cyanide hydratase and tyrosinase catalysts enables effective degradation of cyanide and phenol in coking wastewaters. *Water Res.* **328**, 154-162 (2016). IF 5.991, Cit: 22; *Nature Index Journal*
   We showed here a novel approach to the coking wastewaters bioremediation containing cyanides and phenols. It combines cyanide hydratase and tyrosinase in the biocatalyst.
5. P. Bojarová*, P. Chytil, B. Mikulová, L. Bumba, R. Konefał, J. Krejzová, K. Slámová, L. Petrásková, L. Kotrchová, H. Pelantová, J. Cvačka, T. Etrych, V. Křen: Glycan-decorated HPMA copolymers as high-affinity lectin ligands. *Polymer Chemistry* **8**, 2647-2658 (2017). IF 5.375, Cit: 18
   HPMA copolymers tethered with chitooligosaccharidic epitopes of varying lengths were shown to be the most potent ligands of wheat germ agglutinin (binding affinities in picomolar range).
6. D. Laaf, P. Bojarová, B. Mikulová, H. Pelantová, V. Křen*, L. Elling*: Two-step enzymatic synthesis of β-D-*N*-acetylgalactosamine-(1→4)-D-*N*-acetylglucosamine (LacdiNAc) chitooligomers for deciphering galectin binding behavior. *Adv. Synth. Catal.* **359**, 2101 – 2108 (2017). IF 5.646, Cit: 20
7. D. Laaf, H. Steffens, H. Pelantová, P. Bojarová, V. Křen*, L. Elling*: Chemo-enzymatic synthesis of branched *N*-acetyllactosamine glycan oligomers for galectin-3 inhibition. *Adv. Synth. Catal.* **359**, 4015 - 4024 (2017). IF 5.646, Cit: 6
8. D. Laaf, P. Bojarová, L. Elling, V. Křen*: Galectin-carbohydrate interactions in biomedicine and biotechnology. *Trends in Biotechnol.* **37**, 402-415 (2019). IF 13.747, Cit: 25

This is an invited review to VK. Our group conceived the concept of this study. This review in this prestigious journal ensured for us high visibility in the global galectin community.

9. I. Bassanini, J. Kapešová, L. Petrásková, H. Pelantová, K. Markošová, M. Rebroš, K. Valentová, M. Kotik, K. Káňová, P. Bojarová, J. Cvačka, L. Turková, E. E. Ferrandi, I. Bayout, S. Riva, V. Křen*: Glycosidase-catalyzed synthesis of glycosyl esters and phenolic glycosides of aromatic acids. *Adv. Synth. Catal.* **361**, 2627– 2637 (2019). *VIP Paper* IF 5.451, Cit: 5
We described here for the first time the unique glycosylation of carboxylic group with a glycosidase forming relatively very acyl-glycosides.

From 1st Quartil

10. K. Purchartová, K. Valentová, H. Pelantová, P. Marhol, J. Cvačka, L. Havlíček, A. Křenková, E. Vavříková, D. Biedermann, C. S. Chambers, V. Křen*: Prokaryotic and eukaryotic aryl sulfotransferases: Sulfation of quercetin and its derivatives. *ChemCatChem* **7**, 3152-3162 (2015). IF 4.556, Cit: 14

4. Laboratory of Cell Reproduction

Strengths:
Nationally and internationally recognised laboratories

Weaknesses:
The Team is guided by experienced senior researchers. This causes a risk to see a drop in productivity outputs if the experienced scientists leave the Team.

Opportunities:
Several promising research projects have been initiated. The Team provided a convincing strategic plan to recruit a talented and experienced new lab member.

Threats:
As director of the Institute of Microbiology J. Hasek has strong administrative burden. Securing funding seems to be a challenge and causes a threat at least for the group of J. Hasek. The restructuring of Hasek's group and the departure of two co-workers have caused a threat particularly in the context of a less balanced age structure of the Teams. A special attention is required to retain or recruit experienced scientists to support research outputs.

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

H1.1	Quality of selected outputs of Phase I
Good contribution of excellent selected outputs (N1,2/FTE = 0.6)	
H1.2	**Contribution of workers on the outputs reached**
Contribution of workers on the outputs reached is on the low range (FC1,2/FTE = 0.2) in comparison to the Institute level	
H1.3	**Quality of all outputs and results**
The quality of all outputs is average in term of quality by journal ranking and by intensity of citations. Limited number of outputs in the top quartile.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Identification of mitochondria and mitochondrial retrograde signaling involvment in the regulation of U/L cell differentiation and metabolic reprogramming during colony development. This discovery is significant in the field of yeast colonies and cell differentiation.	
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
The outputs have societal relevance and particularly the work on copper biosensor	

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 Team has a focus on knowledge transfer into practise	
H2.3	**Relation to practice**
Designed a new copper biosensor and the yeast strain was patented	
H2.4	**Participation in AV21 strategy**
Active contribution to popularisation	
H2.5	**Cooperation with regions of the Czech Republic**
None known.	

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 competitive. Research is slightly above average level as compared to other teams from similar international and national institutes	
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 cooperation at national and international level. However, more contributions towards large research consortium are recommended.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
There is a good number of scientific community activities. However, the number of activities is moderate considering the size and structure of the Team (3 groups).	

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, it is.	
D2.2	**Assessment of the previous research objectives and their achievement**
The previous research objectives for each of the three groups were fulfilled	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The recommendations from past evaluation were implemented and the Team has maintained a strong international visibility by organising an international conference	
D2.4	**Success in receiving grants**
15 grants are listed in the report. Securing fund has been difficult for the Team and it was recognised by the Team as one of their weakness. The group of J. Hasek is expected to	

shrink further for the period of 2020-2024 which may reduce the productivity and visibility of the Team if no additional institutional support and increased receiving grants are achieved.	
D2.5	**Adequacy of instrumental equipment**
The instrumental equipment is adequate	
D2.6	**Effectiveness of management**
Although the Teams has experienced some restructuring, the management has been very effective to maintain productivity and visibility.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
8 of /19 members are of age 55 and above. However, the Team offers a good career and qualification growth and has a good strategic plan to recruit new members for the period of 2020-2024	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
There is an appropriate work and gender balance conditions	
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.**
Not 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**
There is a high number of cooperation with universities on national and international level in term of research activities but a low number of cooperation in term of educational outputs.	
D3.2	**Effectiveness of joint research centres**
One contribution in the joint research centres	
D3.3	**Success rate in supervision of PhD students**
3 PhD students defended their thesis in the period of 2015-2019	
D3.4	**Participation of PhD students in the outputs**
Good participation of PhD students in outputs such as publications and conferences	
D3.5	**Participation of the team in master or bachelor studies**
No lecture was given. 6 Batchelor and 7 Master students were supervised which is an adequate number of supervisions considering the size of the Team	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Teaching in form of supervision is adequate. However, no lecture was given.	

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

D4.1	**Sufficiency of media strategy and activities in the area of research popularisation**
Active contribution to research popularisation with middle school and general public engagement	
D4.2	**Publishing activities and its quality**
No known publishing activities	
D4.3	**Participation in professional organisations in the area of research and development**
No known participation in professional organisations	

Other comments of the commission:

5. Laboratory for Biology of Secondary Metabolism

Strengths:
Team has developed a strong ability to develop scientific projects in a way that both leads to fundamental, important new knowledge and to results that have high probability of having great practical value.

Each geographical part of the team appears well situated in terms of collaboration, although it must be a drawback to have the team split on two locations.

Weaknesses:
Currently only one international grant for a large laboratory.

Opportunities:
Team is in a very favourable situation, with recent results that have yielded new very promising antibiotics and methods for generating many more potentially valuable bioactive compounds.

Threats:
Like for most similar teams, granting situation is not secure.

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

H1.1	Quality of selected outputs of Phase I
Productivity in terms of excellent selected outputs (N1,2/FTE = 0.6) is close to the average for the teams in this excellent institute.	
H1.2	**Contribution of workers on the outputs reached**
Productivity in terms of contribution to excellent outputs (FC1,2/FTE = 0.3) is higher than the average for the teams in this excellent institute.	
H1.3	**Quality of all outputs and results**
Above average, both in terms of journal ranking and in terms of citation intensity.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
- Clarification of biosynthesis of 4-alkyl proline derivatives (APDs). - Tentative identification of >40 new gene clusters encoding enzyme sets leading to APDs. - Specific clarification of lincomycin biosynthesis and use of the knowledge to make >100 new, related compounds, some of which are much more potent and more efficient than lincomycin toward known resistant strains of many pathogens, including MRSA and *C. difficile*. - Zdenek Kamenik introduced non-target mass spectrometry metabolomics after foreign postdoc fellowships and established published metabolomics workflow.	
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
Societal relevance of most outputs and results is outstanding, in particular for the projects around antibiotics.	
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**
Team clearly masters the processes of knowledge transfer, and promising, patented compounds are on their way as drugs for combat of serious infections.	
H2.3	**Relation to practice**
Two small projects of contractual research for practice are reported, but of far more importance is the collaboration with Santiago Chemikálie s.r.o. for antibiotic synthesis and preclinical testing.	
H2.4	**Participation in AV21 strategy**
None known.	
H2.5	**Cooperation with regions of the Czech Republic**
None known.	

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 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**
Highly relevant cooperation with different expertise in groups in many countries, Team has a leading or central role in most cases. Cooperation is generally more focused than broad.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Board memberships, mostly within IMB, but also one outside (in IEM) and a society vicechairmanship. Organised two large workshops. Received two 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, it is.	
D2.2	**Assessment of the previous research objectives and their achievement**
Objectives were ambitious, and they were reached extremely well.	

D2.3	Assessment of implementation of recommendations from past evaluation
Implemented.	
D2.4	**Success in receiving grants**
Thanks to high quality and strong effort, the Team can manage. More international grants would reduce risks.	
D2.5	**Adequacy of instrumental equipment**
No problem is apparent.	
D2.6	**Effectiveness of management**
Although team is split on two locations, management appears efficient.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Team has in the period had a strong balance of numbers of PIs, postdocs, and students going for PhD, MSc, and BSc, with particularly many MSc-students. Development and career and qualification growth are secured, among others, by exchange visits. Best scientists are kept by enthusiasm and interesting and rewarding projects. Age structure is fine.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
There appears to be only one gender issue: all three PIs are men. This is a general issue at IMB and is best considered at the institute level rather than the team level.	
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
There is ample collaboration with universities, nationally and internationally. It is focused and relevant for the research and education.	
D3.2	**Effectiveness of joint research centres**
Activities at BIOCEV are efficient and excellent.	
D3.3	**Success rate in supervision of PhD students**
This is very successful as seen by the many (7) publications with a PhD student as the first author.	
D3.4	**Participation of PhD students in the outputs**
This is high; 12 publications had a PhD student as an author.	
Supervision is extensive and excellent.	

D3.6	Assessment of cooperation intensity with universities in the form of teaching
Supervision is extensive and excellent. Course teaching is limited: Two scientists taught some in 2018, and 4 PhD students taught some in 2019.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Team is in the favourable situation that the central practical aspects of the antibiotic research are relatively easy to understand for the general public. Team has used this forcefully and with success for popularization.	
D4.2	**Publishing activities and its quality**
High activity of popularization, both in print, internet and broadcast. Quality is likely high, considering the continued demand.	
D4.3	**Participation in professional organisations in the area of research and development**
A vicechairmanship in the Czech Microbiome Society.	

Other comments of the commission:
We encourage Team to develop a few more of the many good international collaborations into consortia that can strongly apply for international grants.

6. Laboratory of Molecular Structure Characterization

Strengths:
Functioning as a core facility the team members have insider information about most of the teams, therefore it is easy to find good collaboration partners to their own independent projects. 27 researchers with 13,4 FTE represent a very high manpower. The Department requested the evaluation not as a Core Facility, but as a research group. This is interpreted as a strong commitment for independent scientific projects. Being core facility is a possibility to get access to special techniques and equipment. The interdisciplinary approach is a great strength of the group. The group is very well funded.

Weaknesses:
Research projects ought to be more focused, less diverse. Unequal contribution of team members in the production of results can be a problem.

Opportunities:
To employ **even** more PhD students would be desirable. Merging the knowledge and experience of senior team members with the enthusiasm of PhD students could give even more fresh momentum to the independent scientific activity

Threats:
There are no important immediate threats

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

H1.1	Quality of selected outputs of Phase I
Altogether 30 outputs were evaluated. Two of the outputs were listed in Q1 and 14 published outputs were in Q2 category. 50% of the reprint authors (1 for Q1 and 7 for Q2-s) were team members. The average rating of the team based upon the selected outputs' evaluation was 2,42. These results indicate that the number of high-quality outputs should be increased.	
H1.2	**Contribution of workers on the outputs reached**
Although in many of the 30 selected papers the members of the team had a dominant contribution, for the selected Q1 and Q2 outputs the contribution of workers (FC1,2/FTE) was 0.29, it can be improved.	
H1.3	**Quality of all outputs and results**
During the evaluation period the number of papers published in journals with impact factor was 194. This very high number can be attributed also to the Core Facility function of the team.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Mass spectrometry (MS), nuclear magnetic resonance (NMR), and electron microscopy (EM) are combined for the characterization of molecular structures. MS group is focused on infection metallomics. Next-generation analytical procedures for non-invasive diagnostics of clinically relevant diseases are developed in close collaboration with Czech hospitals. Obesity, diabetes and neurodegeneration crosstalk are studied by NMR metabolomics. EM equipment has been used in multimodal imaging project. The team's results are highly important and can influence and stimulate research of other groups as well.	

H1.5	Contribution of the participation of the authors in large collaborations
“Danube meets omics” collaboration with Austria, Slovakia, Serbia.	

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

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
The results are highly relevant to the society. The team successfully participates in projects having associated with scientific and technological development.	
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 contracts with companies and has three patents.	
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
The team is well-known internationally, it is a regional centre of excellence. Using cutting edge technology, the team is highly collaborative and competitive.	
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 group had 9 international cooperation in the 2015-19 period with groups from 6 countries.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The team leader is member of four scientific societies, advisory board member of two scientific journals, board member of four Czech scientific or educational committees. Team members were obtained ten national or international awards in this evaluation period. Team members were invited lecturers on more than ten international conferences.	

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 made considerable progress in most of the research objectives formulated in 2014.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The past evaluation did not specify any other recommendation than “the present activities should be continued”.	
D2.4	**Success in receiving grants**
Well-funded laboratory (9 grants and contractual funding). Currently 4 group members participate mainly as PI-s in 9 grants worth of 1 M Euro.	
D2.5	**Adequacy of instrumental equipment**
The team has the necessary equipment to produce high level scientific results. The current equipment makes possible a high-level multidisciplinary approach to scientific problems.	
D2.6	**Effectiveness of management**
The PI is internationally well-known expert of his field. The high number of papers (192/5 years) indicates that the team as a Core facility is successful and reliable. The management successfully integrates and directs the work of the subgroups.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Team 6 is a great team with 27 researchers with more than 10 PhD students. This manpower can be used ideally. For a high level “routine” collaboration experienced people are needed. For “cutting edge” science there are enough young researchers and PhD students and senior people to supervise.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
The MBI is an equal opportunity employer. The female/male ratio in the group is 43/57. The lab has a number of team members from foreign countries.	
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.**
The group is funded by National Sustainability Program**.**	

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
There is broad scale cooperation between the group and the Czech universities. Team members participate in the teaching and in the supervision of the students.	
D3.2	**Effectiveness of joint research centres**
Seven collaboration contracts exist between the group and university departments, faculty hospitals.	
D3.3	**Success rate in supervision of PhD students**
4 doctoral theses have been successfully defended in the evaluation period.	
D3.4	**Participation of PhD students in the outputs**
PhD students participated actively in the projects and became co-authors in the papers.	
D3.5	**Participation of the team in master or bachelor studies**
The team participated in 7 bachelor and in 11 master courses.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
The team participates in the teaching activity of four Czech universities.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Public relations are pursued by their webpage indicating press releases (Star Telegram, CBS News), links to the US and Czech TV reportages or laboratory videos. Large scale of outreach activities towards secondary schools and universities.	
D4.2	**Publishing activities and its quality**
-	
D4.3	**Participation in professional organisations in the area of research and development**
The involvement of the group in professional R&D organizations is excellent. In the report 10 are listed.	

Other comments of the commission:

7. Laboratory of Microbial Genetics and Gene Expression

Strengths:
A major focus of the team is gene expression in bacteria (*Bacillus subtilis, Mycobacterium smegmatis* and *Escherichia coli*) and the influence of sigma factors, co-factors and other small molecules on RNAP function. The most outstanding finding was the discovery that NAD linked at the 5' end of RNA promotes transcription initiation *in vitro*. Furthermore, they showed together with others that NAD stabilized mRNA against degradation.

The team has a remarkable publication record including publications in 2020 (EMBO J. and Nat. Commun.).

Weaknesses:
There are no major weaknesses. Finding excellent co-workers is a major challenge.

Opportunities:
The team has excellent national and international collaborations.

Threats:
Strong competition for good students and continuously increasing bureaucracy.

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

H1.1	**Quality of selected outputs of Phase I**
Excellent publications in highly ranked journals (Nature, Nature Commun., EMBO J.).	
H1.2	**Contribution of workers on the outputs reached**
Major input of team members to excellent publications.	
H1.3	**Quality of all outputs and results**
Above average	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Understanding 5‘ mRNA modification, transcription initiation and mRNA stability.	
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**
Outputs have excellent societal relevance by their significance for our understanding of fundamental phenomena related to RNA polymerase, in particular understanding mRNA capping, de-capping, modified nucleotides, and their influence on mRNA formation, stability and function. In addition, some results have potential practical significance for development of antimicrobials.	

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
Despite the few-year existence of the team, its members have a good understanding of knowledge transfer and have participated in patent application. The team has collaboration with industry on strain development.	
H2.3	**Relation to practice**
Developed antimicrobials have been used in clinical trials.	
H2.4	**Participation in AV21 strategy**
None known.	
H2.5	**Cooperation with regions of the Czech Republic**
None known.	

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
Their research is very good and is on high national and international 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**
They have excellent international collaborations.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Team leader L. Krásný is member of several scientific councils and also acts as reviewer for several prestigious journals. The team is going to organize a major *B. subtilis* conference in 2022.	

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, directions are in line with the research planned.	
D2.2	**Assessment of the previous research objectives and their achievement**
The activity plan was successfully implemented.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
Not applicable; team started in 2016.	

D2.4	Success in receiving grants
Yes, national and international.	
D2.5	**Adequacy of instrumental equipment**
The laboratory seems well equipped.	
D2.6	**Effectiveness of management**
Laboratory appears well managed.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Age structure is fine, including senior and young members.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Genders are balanced.	
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.**
Not 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
They have a large number of national and international collaborations, most of them with universities.	
D3.2	**Effectiveness of joint research centres**
They have established several collaborations with members of the Institute of Microbiology and Rutgers university which resulted in numerous joint publications.	
D3.3	**Success rate in supervision of PhD students**
They supervise about 10 PhD, Master and Bachelor students per year. There were 3 successful PhD defences during the evaluation period.	
D3.4	**Participation of PhD students in the outputs**
Excellent. The PhD students most of the time sign as authors on the publications of the research outputs.	
D3.5	**Participation of the team in master or bachelor studies**
There were 6 successful BSc and MSc defences during the evaluation period.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
L. Krásný holds lectures at Charles University entitled “From the genome to Proteome”.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Expertise of L. Krásný is frequently asked as an expert in gene regulation.	
D4.2	**Publishing activities and its quality**
Excellent.	
D4.3	**Participation in professional organisations in the area of research and development**
L. Krásný is member of several scientific organisations and the Assembly of the Czech Academy of Sciences.	

Other comments of the commission:

8. Laboratory of Modulation of Gene Expression

Strengths:
Some interesting and important projects with broad perspective. Good national and international collaborations, a strong generation of young students/researchers under the age of 35.

Weaknesses:
Low quality of scientific output. Low funding. Two divergent research group, without the necessary overlaps**.**

Opportunities:
Increase the cohesion within the unit by the involvement of young generation. Application for international, consortium grants. Ultimately, changing the structure

Threats:
Low funding and consequently less students

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

H1.1	Quality of selected outputs of Phase I
The average rating of the team (3,06) is too high indicating that in the selected outputs the number of Q1 outputs is low but the numbers of Q3 and Q4 ranked outputs are high. The N_{rp}/FTE is average.	
H1.2	**Contribution of workers on the outputs reached**
Considering excellent outputs the FC1,2/FTE is 0.14, rather low.	
H1.3	**Quality of all outputs and results**
According to the journal ranking 4/42 belongs to D1, 3/42 to Q1 category. 19/42 outputs were published in Q3 and Q4 journals**.**	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Authors had interesting results in bacterial catabolism of phenols: Bioremediation of the polluted soil and water using various bacteria is a promising option in the elimination of environmental pollution. Authors found connections between the phenol stress and stress activated sigma factors in Corynebacterium and Rhodococcus bacteria. Application of nanodiamond carriers has promising therapeutic potential in targeting bioactive molecules.	
H1.5	**Contribution of the participation of the authors in large collaborations**
The nanomedicine group has joined a project consortium responding to the EuroNanoMed call in 2020. The consortium consists of 5 research groups, medical hospital, and small enterprise groups from Czech Republic, Turkey, and Spain.	

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

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
The topics the team is dealing with have great societal relevance considering both the environmental aspects (bacterial decomposition of toxic compounds), both the medical applications (nanodiamonds in drug delivery).	
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**
-	
H2.3	**Relation to practice**
Patent application is being submitted for nanodiamond carriers in wound healing.	
H2.4	**Participation in AV21 strategy**
-	
H2.5	**Cooperation with regions of the Czech Republic**
Intramural collaborations (6). National cooperations (5) are mainly associated with nanomedicine	

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 quality of outputs needs to be improved**.**	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
Broad international cooperation. Four projects in Germany in connection with sigma factors, srRNA-s, enzymes participating in aromatic hydrocarbon decomposition. Joint grant project with Austria, collaboration in Italy and Switzerland in connection with genes and enzymes of nitrile metabolism and aromatic hydrocarbon decomposition.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, 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 group's structure has been reorganized since the last evaluation (one of the groups separated, a PI has retired and her program ended, the nanomedicine group was incorporated) therefore certain tasks have been omitted from this report, but most of the research was continued according to the plan.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
-	
D2.4	**Success in receiving grants**
Moderate	
D2.5	**Adequacy of instrumental equipment**
Adequate	
D2.6	**Effectiveness of management**
Success in building national and international collaborations, attracting motivated BSc, Master and PhD students.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
The age structure of the lab is unbalanced, there is an almost entirely missing cohort between 35 and 50 years. The current structure of the lab is suffering from diverging scientific projects. Either the projects or the methods ought to be more convergent.	
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 range of cooperation exist with universities in the forms of joint projects, exchange students, joint grant application.	
D3.2	**Effectiveness of joint research centres**
-	

D3.3	Success rate in supervision of PhD students
Two PhD theses were defended. Currently there are 6 PhD students in the lab.	
D3.4	**Participation of PhD students in the outputs**
Staying abroad at collaborating universities help to keep ties with these groups, produces results and enriches the methodology. PhD. students also participate in writing papers.	
D3.5	**Participation of the team in master or bachelor studies**
Three team members participate in master courses as lecturers in Charles University and in Ostrava University	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Team members supervised two bachelor and three master students.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
For general public: „The day of opened laboratories“; „Week of Czech Science and Technology“. In youth education Participation in „Open Science“; Research training for excellent high school students.	
D4.2	**Publishing activities and its quality**
-	
D4.3	**Participation in professional organisations in the area of research and development**
Patent application in submission	

Other comments of the commission:

9. Laboratory of Bioinformatics

Strengths:
The team has a very strong leader with a no-nonsense approach and a clear strategy regarding research areas and funding. Participation in EU bioinformatics infrastructures providing also secure financing at present. Good international visibility and connections. Professional staff. On the one hand the research is focused on bioinformatics tool development, with the tools being readily disseminated to the scientific community as documented by the multiple downloads. On the other hand the group has collaborations with experimental groups where the bioinformatics expertise is successfully applied. The team is productive.

Weaknesses:
The team is small, the FTE is only 4.6 including (one) student and non- researchers. A strategy towards considerable growth is not apparent. The team heavily relies on collaboration with experimentalists.

Opportunities:
Epigenetics, experimental RNA structural studies are especially strong in the country, providing plenty of possibilities for interaction and collaboration. Moving the research focus more towards medicine related topics such as the human microbiome may offer possibilities. This will require, however, major resources and may only pay off on the long term, and it is questionable whether such an investment of time and effort is affordable with the currently allocated resources.

The European research networks and initiatives may allow to formalize some of the activities and collaborations, and thereby to get into stronger positions for attracting funding targeted to consortia.

Threats:
Strong competition with the high salaries in the IT industry, possible „brain drain“. The team relies on the enthusiasm of students for science. The small team size and high specialization may be considered a threat for the continuity of activities

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

H1.1	Quality of selected outputs of Phase I
The overall average rating is somewhat worse than the field average. The number of excellent outputs per FTE (N_{12}/FTE) is nevertheless better than the field average, due to the low FTE (small group size).	
H1.2	**Contribution of workers on the outputs reached**
Fractional (i.e. in-team) contribution and reprint author contribution normalized to FTE (FC_{12}/FTE and $N_{rp,12}$/FTE) for excellent outputs are also higher than the field average. In most of their papers this team is the dominant contributor (almost always they provide the reprint author).	
H1.3	**Quality of all outputs and results**
For all WoS outputs the quality distribution is better than average in terms of journal ranking, and this is especially so for the selected outputs. This contradicts the Phase I	

evaluation to some extent. The results on the intensity of citations are much worse, the non-WoS outputs are mostly cited.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
This team develops computerized deterministic and probabilistic models of regulation of gene expression and use statistics and artificial intelligence for analysis of large scale gene expression data. These activities are embedded in the ELIXIR initiative. Their website offers several highly visited and used open access bioinformatics toolboxes for the scientific community. Substantial contribution to the analysis of structure-function relations in RNA and relevant collaborations are also reported.	
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**
Web-based open access tools help a broad scientific community. Efforts to build an integrative bioinformatics infrastructure in the Czech Republic.	
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**
None known.	
H2.3	**Relation to practice**
None known.	
H2.4	**Participation in AV21 strategy**
None known.	
H2.5	**Cooperation with regions of the Czech Republic**
None known.	

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**
Based on the reported popularity of the bioinformatics tools available on the server of the team, this group compares well with similar international teams. The group is internationally competitive and recognized.	
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 facilitates and organizes EU and domestic bioinformatics collaborations and networks. They are members of two EU infrastructures, ELIXIR (bioinformatics) and the	

Infrastructure for Systems Biology. It may be strategically advantageous to formalize, strengthen and deepen some of these collaborations, for tapping into funding streams and further increasing international visibility. They are involved in several bilateral collaborations with foreign universities.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Very modest. The PI is member of several committees and one journal editorial board.	

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, it is.	
D2.2	**Assessment of the previous research objectives and their achievement**
The team has fulfilled its goals in that they managed to develop new algorithms and implement them in their bioinformatics tools, made them publicly available, and succeeded in the establishment of the bioinformatics core facility of the Institute.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
With the bioinformatics core facility and the publicly available bioinformatics tools the team has a higher collaboration potential and became more capable to open towards important biological problems. They strengthened their teaching activity, managed to employ several young colleagues and became largely independent on Czech government financing. The group has moved in part to working with mammalian cells which may result in higher citations.	
D2.4	**Success in receiving grants**
Two EU networks contributed significantly to the financial resources, plus a smaller Czech Science Foundation grant. The PI is confident that the ELIXIR funding will continue in the future. Overall, grant support is limited, but sufficient to meet the financial requirements of the group.	
D2.5	**Adequacy of instrumental equipment**
The team has access to state of the art computational infrastructure.	
D2.6	**Effectiveness of management**
Clear strategy and good management	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Although it is difficult to recruit talented young workforce due to the competitive salaries in the IT sector, the present composition of the team seems adequate. The age structure is hard to assess for such a small group, but at least the slight majority is younger than 35 indicating a good age structure. The team is very efficient and appears to have a high level of professionalism.	

D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
The group is heavily male dominated but, again, for such a small group this may be meaningless.	
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.**
Not 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
The team has strong, productive academic collaborations. Due to the fact that the group operates in networks, the list of domestic and foreign collaborations is long. There seems to be a high demand for the computational and bioinformatics expertise of this team.	
D3.2	**Effectiveness of joint research centres**
Not applicable.	
D3.3	**Success rate in supervision of PhD students**
The group tends to have between one and a few PhD students. There was a successful PhD defence in 2018.	
D3.4	**Participation of PhD students in the outputs**
No available information.	
D3.5	**Participation of the team in master or bachelor studies**
The team is not involved in the formal supervision of master or bachelor projects.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
The team is involved in teaching, albeit at a rather limited scale. One Master course taught by a junior team member.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
None	
D4.2	**Publishing activities and its quality**
None	

D4.3	Participation in professional organisations in the area of research and development
The PI of the group has been a member of the Head of nodes committee of two EU research infrastructures: ISBE C4Sys and ELIXIR.	

Other comments of the commission:

We encourage the team to engage in the supervision of bachelor and master students. We think students can learn a lot when participating in the research of the team.
In terms of highly visible publications, we would advise the team members to prepare a review article, eventually together with other bioinformatics groups working in related fields. Also, joint publications with users of the developed bioinformatics tools would be desirable and may help to increase visibility.

10. Laboratory of Cell Signalling

Strengths:
It is a definite strength of the lab to have closely connected researchers that work on related problems in very different organisms, since approaches and technologies used in one organism can often be transferred in original ways to another organism. This team uses this strength productively.

Weaknesses:

Opportunities:
Cell signalling is an important field that is steadily gaining even more importance.

Threats:
The organizational structure with two groups where one group leader reports to the other can be *a priori* risky. It appears to work really well in this case, but the institute must stay attentive that this continues to be so.

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

H1.1	Quality of selected outputs of Phase I
Productivity in terms of excellent selected outputs (N1,2/FTE = 0.6) is close to the average for the teams in this excellent institute.	
H1.2	**Contribution of workers on the outputs reached**
Productivity in terms of contribution to excellent outputs (FC1,2/FTE = 0.2) is close to the average for the teams in this excellent institute.	
H1.3	**Quality of all outputs and results**
Higher than average, both in terms of journal rankings and citations.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Identification of the new cell division protein LocZ in *S. pneumoniae* is a landmark in the field, and it illustrates the strength of the strategy and approaches taken.	
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
Societal relevance is excellent for both groups of the team. For the Prokaryotic group by the obvious importance of knowledge on kinase/phosphatase signalling in most branches of biology, and by the use of a human pathogen as experimental organism. For the Eukaryotic group by the emphasis on cancer-related research and the collaboration with hospitals and medical university units.	

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**
Potential knowledge transfer is furthered through collaboration.	
H2.3	**Relation to practice**
There is commercial potential, albeit still rather far from valorisation.	
H2.4	**Participation in AV21 strategy**
Activities fit well in AV21 perspectives, but there is no formal participation.	
H2.5	**Cooperation with regions of the Czech Republic**
Presumably with the hospital in Motol.	

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**
Same level. The team carries out research of high quality and originality.	
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 cooperates nationally and internationally in a way that furthers high-quality research. Cooperation is more focused than broad.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Both group leaders participate in scientific study boards and in refereeing of scientific literature.	

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, it is.	
D2.2	**Assessment of the previous research objectives and their achievement**
Objectives were ambitious and have been well reached.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
Implemented in the right way: not blindly but thoughtfully.	
D2.4	**Success in receiving grants**
Team does comparatively OK in a difficult landscape, thanks to quality and effort.	

D2.5	Adequacy of instrumental equipment
Rather adequate. However, a full proteomics-MS core facility on campus would be an important advantage.	
D2.6	**Effectiveness of management**
Appears to function well.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Team is strong in all these respects.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Frequent common social events, also including family.	
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 detected.	

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
Team has expedient research collaboration with many universities, nationally and internationally.	
D3.2	**Effectiveness of joint research centres**
Not applicable.	
D3.3	**Success rate in supervision of PhD students**
In the period only two PhDs graduated because more postdocs were employed, but now the team has 7 PhD students, which is very good.	
D3.4	**Participation of PhD students in the outputs**
Excellent.	
D3.5	**Participation of the team in master or bachelor studies**
Excellent; five master theses were defended.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Currently excellent, with courses by both PIs at two universities. During the evaluation period, course teaching is reported to have been carried out by one PI only.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Insufficient; there is no popularization activity.	
D4.2	**Publishing activities and its quality**
There are no popularization publications.	
D4.3	**Participation in professional organisations in the area of research and development**
Each PI is active on a university study board.	

Other comments of the commission:

We encourage both PIs to develop some of the international collaborations into consortia that strongly can apply for international grants.

A very minor comment: When you try, you will discover that also popularization can stimulate your research.

11. Laboratory of Regulation of Gene Expression

Strengths:
The team investigates gene expression with a special focus on translation initiation and translation termination. Although of moderate size this team has a remarkable array of outstanding publications.

Weaknesses:
There are no major weaknesses. Increased bureaucracy hinders their scientific efficiency.

Opportunities:
Good funding situation.

Threats:
International visibility is always difficult to reach.

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

H1.1	Quality of selected outputs of Phase I
Outstanding. They have a truly remarkable publication activity in internationally well acknowledged journals (NAR, eLife etc.).	
H1.2	**Contribution of workers on the outputs reached**
Most of the contribution to the publications originates from the team. In terms of both fractional counts ($FC_{1,2}$/FTE = 0.8) and reprint authorships ($N_{RP1,2}$/FTE = 1.0), this team is in the very top of this excellent institute when it comes to productivity of contribution to excellent output as evaluated in Phase I.	
H1.3	**Quality of all outputs and results**
Outstanding; much above average, both in terms of journal ranking and in terms of citation intensity.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Understanding the molecular function of eIF3 in translation initiation and several other important discoveries, mostly within translational control.	
H1.5	**Contribution of the participation of the authors in large collaborations**
The team has a large number of collaborations, and the team provides in many cases the original findings.	

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

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
Understanding gene regulation is central in biology and its applications; this includes an essential role in the fundamental understanding of many diseases.	

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
Fundamental research needed to understand many diseases caused by defects in gene expression, e.g. cancer.	
H2.3	**Relation to practice**
Control of gene expression with cytostatic drugs.	
H2.4	**Participation in AV21 strategy**
None known.	
H2.5	**Cooperation with regions of the Czech Republic**
None known.	

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
High standards. Team successfully competes with national and international institutes.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
Group is supported by Welcome Trust. Collaborations are relevant and focused rather than broad.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Members of the team are regularly invited to present lectures abroad. They organized an EMBL meeting in 2015 and were member of the organizing team for the 28th international conference of yeast genetics and molecular biology.	

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, it is.	
D2.2	**Assessment of the previous research objectives and their achievement**
The activity plan for the evaluated period was ambitious but realistic, and it was successfully implemented.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
Recommendations were followed.	
D2.4	**Success in receiving grants**
They are successful in receiving Czech and international (welcome Trust) grants.	

D2.5	Adequacy of instrumental equipment
Instrumental equipment is adequate.	
D2.6	**Effectiveness of management**
The team is well managed.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Age structure is fine with many young members.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Team leader takes care of social conditions. Gender balance is good.	
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
They have a number of international collaborations (R. Beckmann, Munique, Y. Hashem, Bordeaux, etc.)	
D3.2	**Effectiveness of joint research centres**
Not applicable.	
D3.3	**Success rate in supervision of PhD students**
The number of PhD students is reported to be currently 7, which is good.	
D3.4	**Participation of PhD students in the outputs**
Very good; 50% of publications have PhD students as first author.	
D3.5	**Participation of the team in master or bachelor studies**
The number of BSc and MSc students supervised by the team is moderate and could well be increased.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
No obvious teaching activity at universities; should be improved.	

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

D4.1	**Sufficiency of media strategy and activities in the area of research popularisation**
They participate in several research popularization activities, including „Open Door Activities“ TV presentations together with Venki Ramakrishnan (Nobel laureate) about gene regulation.	
D4.2	**Publishing activities and its quality**
Scientific publishing is excellent; no written popularization is recorded.	
D4.3	**Participation in professional organisations in the area of research and development**
Member of several evaluation panels and doctoral boards.	

Other comments of the commission:

This outstanding team leader contributes so much to research and supervision. Considering the excellent presentation abilities he showed the commission, it is a shame that he does so little course teaching at universities.

12. Laboratory of Photosynthesis

Strengths:
Well organized hierarchy, good age structure, high international reputation, intensive collaborations, pleasant, peaceful location.

Weaknesses:
Isolated location distant from universities, lack of a sufficient number of talented BSc and MSc students.

Opportunities:
The organization of the Centre Algatech allows a multidisciplinary approach. Present level of funding for the Laboratory allows high quality research.

Threats:
No serious threats observed.

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

H1.1	Quality of selected outputs of Phase I
Average rating somewhat better than the field average. The number of excellent outputs per FTE (N_{12}/FTE) is nevertheless lower than the field average, so slightly more manpower is producing slightly less excellent result than average.	
H1.2	**Contribution of workers on the outputs reached**
Fractional (i.e. in-team) contribution and reprint author contribution normalized to FTE (FC_{12}/FTE and $N_{rp,12}$/FTE) for excellent outputs are also lower than the field average.	
H1.3	**Quality of all outputs and results**
This relatively large team produced a high number of outputs of which 25 were evaluated. For all outputs the quality is average in terms of journal ranking and intensity of citations. However, the journal ranking of the evaluated outputs is much better than the ranking after Phase I.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Various studies dealing with the assembly of the photosynthetic apparatus, the adaptation of its complex structure to the environment, chlorophyll biosynthesis and proper insertion, control of the degradation of the photosynthetic complexes, microdomain structure of the photosynthetic membranes and its regulation. All results may have biotechnological and agricultural relevance.	
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
Photosynthesis research has relevance for renewable energy, green technologies, agriculture and food production, water management.	
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**
No direct knowledge transfer activity reported, nevertheless the development/improvement of instrumentation and methodologies could be used for practical purposes.	
H2.3	**Relation to practice**
No information found.	
H2.4	**Participation in AV21 strategy**
None known.	
H2.5	**Cooperation with regions of the Czech Republic**
None known.	

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
Despite moderate statistics on research output, basically due to the relatively high FTE, this laboratory is a powerhouse of international photosynthesis research. The Centre Algatech and this laboratory therein are recognized internationally for their facilities and capabilities.	
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 good. The team has many foreign and domestic partners, the cooperations are live and productive and the team's contribution is usually substantial.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Adequate for the size of the team. Memberships in domestic councils and journal editorial boards. They organized two workshops, have been invited lecturers or speakers at a number of international conferences. They obtained the Prize of the Czech Academy of Sciences for the best scientific result for 2016.	

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, the team follows the planned research directions.	

D2.2	Assessment of the previous research objectives and their achievement
The objectives were organized around the biogenesis (and regulation thereof) of various photosynthetic apparatuses, and the team by and large achieved their goals.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The team has followed the recommendation to improve their research infrastructure especially by acquiring new advanced light microscopy capabilities.	
D2.4	**Success in receiving grants**
Excellent in comparison with other teams. Many individual domestic research grants, research consortia, plus an ERC Synergy grant.	
D2.5	**Adequacy of instrumental equipment**
The laboratory is very well equipped for the molecular biological and structural studies they perform.	
D2.6	**Effectiveness of management**
This is a rather large team with four relatively independent research groups, each led by PI-s. The success of the Laboratory in acquiring funding, equipment and maintaining high international visibility indicate that the team is well established and managed.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
This is a very large, department size laboratory. The age structure of the team is quite good, peaking in the 30-35 range, at postdoc- or early career investigator age. This is promising in terms of development in the foreseeable future.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
The gender composition is not listed, but the leadership (group leaders, seniors) is very much male dominated.	
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.**
Involvement in the Algatech Plus project of the National Programme of Sustainability II as part of the Centre Algatech.	

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 relies heavily on a number of common research projects with both domestic and foreign universities.	
D3.2	**Effectiveness of joint research centres**
Not relevant.	

D3.3	Success rate in supervision of PhD students
The success rate is difficult to estimate, but there have been 7 defended theses in the Laboratory.	
D3.4	**Participation of PhD students in the outputs**
37% of published articles were co-authored by students and 10% published with the student as 1st author.	
D3.5	**Participation of the team in master or bachelor studies**
At very low rate due to the isolated location of the Centre in the countryside.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Team members offer quite a few courses at the University of South Bohemia despite the distance.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Press releases, TV and radio interviews following the successful ERC grant application. The team together with Centre Algatech is quite active in popularizing science (open house, lectures, summer schools).	
D4.2	**Publishing activities and its quality**
Apparent only in the form of interviews.	
D4.3	**Participation in professional organisations in the area of research and development**
Two senior team members are editorial board members of the journal Photosynthetica. The Laboratory head is vice chair of the council of the Institute of Microbiology, another senior is member of the assembly of the Academy.	

Other comments of the commission:

13. Laboratory of Algal Biotechnology

Strengths:
Expertise in lab scale through large (6000 litres) pilot scale cultivation of microalgae. Same for downstream processing. Enthusiastic members of the staff.

Weaknesses:
Efforts are diluted into too many activities that require different expertise. Manpower in each activity is thereby suboptimal for quick development of scientific fields. An early and strong development of a molecular biology group starting in 2017 would have been expedient, and some of the other activities could have waited.

Geographical location away from a university campus lowers chances to attract good BSc and MSc students.

Opportunities:
Availability of suitable equipment for cultivation of microalgae and downstream processing.

Threats:
Present insufficient contribution to high-profile outputs may lower chances of getting sufficient grants.

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

H1.1	Quality of selected outputs of Phase I
Productivity in terms of excellent selected outputs (N1,2/FTE = 0.2) is in the low range for the teams in this excellent institute.	
H1.2	**Contribution of workers on the outputs reached**
Productivity in terms of contribution to excellent selected outputs (FC1,2/FTE = 0.04) is the lowest among all teams in this excellent institute.	
H1.3	**Quality of all outputs and results**
Quality is average in terms of journal ranking, above average in terms of citation intensity.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
In a clarification of biosynthesis of lipopeptides, Mareš et al. (2019) found alternative starter units, which is important to know in future manipulations for biosynthesis of novel lipopeptides.	
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

Highly relevant. Microalgae are important potential sources of pharma, feed and food.	
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**
In relation to most collaboration, Team is observant for knowledge transfer into practice.	
H2.3	**Relation to practice**
Team collaborates with the company Aveflor to produce astaxanthin esters; a patent application is in preparation. Team generates around 100 000 EUR per year for contractual research and sale of Chlorella biomass. These activities are valuable for maintaining routine and expertise.	
H2.4	**Participation in AV21 strategy**
Team is very active in popularization and PR, also within this strategy.	
H2.5	**Cooperation with regions of the Czech Republic**
None known.	

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**
Although Team compares poorly with the rest of IMIC in terms of contribution to excellent publications, it is probably about level with similar teams internationally in this respect. Team/Algatech is world-known for its facilities and capabilities.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
There is much and relevant cooperation. Role of Team varies. Team participated in two large international projects: - ISBE 2016-19 with analytical work - Sabana 2016-21 EU H 2020 on alga refinery.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Good. One subgroup leader is active in professional society, study boards and a scientific advisory board. One international workshop organized. One award. Many (22) invited lectures.	

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, it is.	
D2.2	**Assessment of the previous research objectives and their achievement**
Objectives were largely defined by one large grant (NPU-II), for which they were fulfilled.	

D2.3	Assessment of implementation of recommendations from past evaluation
Team must be praised for the changes made in 2016 and since. There is still some way to go in terms of focus and narrowing the short-term strategy, in particular prioritizing molecular biology even more.	
D2.4	**Success in receiving grants**
Very good, but would have to be improved even more if institutional support should decrease.	
D2.5	**Adequacy of instrumental equipment**
Does not appear to be seriously limiting.	
D2.6	**Effectiveness of management**
Team appears to have been directed well to its present stage. Future requires more strategic management.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Age structure has improved and is fair. More MSc and BSc students would be stimulatory for the scientific atmosphere. This would presumably be easier achieved if Algatech were moved to near a university campus.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Proportion of women was declared 35% in the presentation. The more relevant number is the proportion among the 6 PIs, which is lower.	
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.**
Strong involvement through a large grant.	

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
This cooperation is focused and relevant.	
D3.2	**Effectiveness of joint research centres**
Not applicable	
D3.3	**Success rate in supervision of PhD students**
D3.4	**Participation of PhD students in the outputs**
Very good: 7 PhD students were (co)authors of 29 publications from the team in the period.	

D3.5	Participation of the team in master or bachelor studies
Modest, probably due to the distance to universities.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Course teaching intensity is fair.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Team is extremely active, both in outreach directed to potential business and popularization for the general public.	
D4.2	**Publishing activities and its quality**
Activities range through many media like books, fairs, internet, lectures, non-scientific conferences, summer schools, bio-economy courses, etc. The demand indicates high quality.	
D4.3	**Participation in professional organisations in the area of research and development**
One membership of the scientific committee of Intl. Soc. Appl. Phycology.	

Other comments of the commission:

14. Laboratory of Cell Cycles of Algae

Strengths:
Visible and valued Team in the field. High number of collaborations with national and international partners.

Weaknesses:
Lack of a strategic plan in term of the team structure. The Team has not been successful to attract a new group leader. As a result of this, it seems that the Teams has the intention to press a postdoc in the lab to transition towards a group leader position. Instead, the Team should design a strategic plan to attract a motivated new member to take the tenure track position

Opportunities:
Good amount of preliminary data and ongoing funding to support vitality and sustainability of the Team. The research direction includes applied research with opportunities to generate important outputs with societal relevance.

Threats:
Some scientific projects have a narrow vision.

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

H1.1	Quality of selected outputs of Phase I
The quality of excellent selected outputs is relatively low (N1,2/FTE = 0.3).	
H1.2	**Contribution of workers on the outputs reached**
Contribution of workers on the outputs reached is on the low range (FC1,2/FTE = 0.23) in comparison to the Institute level.	
H1.3	**Quality of all outputs and results**
The quality of all outputs is average in term of quality by journal ranking and by intensity of citations.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Progression of the cell cycle in algae is related with CDK activity and temperature. At high temperature, cell cycle is arrested while cell growth is unaffected and starch accumulates in the cells. This discovery has significance in biotechnology.	
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
High societal relevance. Manipulation of algal physiology can provide diverse biotechnological advantages (pharmaceutical, biofuel production…).	
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 Teams has adequately recognised impact in research and has a focus on knowledge transfer into practice.	
H2.3	**Relation to practice**
6 applied outputs (e.g. rare earth element recovery).	
H2.4	**Participation in AV21 strategy**
The Team is very active in popularization	
H2.5	**Cooperation with regions of the Czech Republic**
None known.	

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 at average level in comparison with Teams from similar international and national institutes.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
High volume of cooperation which include a funded project H2020 involving a large collaborative team.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
High amount of diverse scientific community activities: 6 invited lectures, 3 awards, 2 workshops. Good contribution from different Team members in these activities.	

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, it is.	
D2.2	**Assessment of the previous research objectives and their achievement**
2 out of 3 research objectives were achieved. The third objective was not completely achieved because the outcome of the other two objective led to more relevant work.	

D2.3	Assessment of implementation of recommendations from past evaluation
The Teams adequately implemented the recommendations from the past evaluation.	
D2.4	**Success in receiving grants**
Good number of receiving grants (9) but the Teams should focus on the most impactful aspects of the research proposal in order to increase the number of successful grant applications.	
D2.5	**Adequacy of instrumental equipment**
The instrumental equipment is adequate.	
D2.6	**Effectiveness of management**
The Team lacks a good management and the future of team structure is uncertain. The research seems too diverse and some aspects have a narrow impact which may reduce the future scientific quality and productivity of the Team.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Good support for career and qualification growth but a better development strategy is needed to attract a motivated and talented candidate for the tenure track position.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Good 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.**
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
The cooperation with universities is limited. Only 2 cooperations in term of scientific research and only few lectures.	
D3.2	**Effectiveness of joint research centres**
Not applicable	
D3.3	**Success rate in supervision of PhD students**
No thesis was defended.	
D3.4	**Participation of PhD students in the outputs**
Good participation of PhD students in publications, conferences and awards	
D3.5	**Participation of the team in master or bachelor studies**
The participation is low in term of lectures and supervisions.	

D3.6	Assessment of cooperation intensity with universities in the form of teaching
The number of teaching is relatively low: 11 Bachelor lectures, 3 Master lectures and 0 Doctoral lecture.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
High contribution in research popularisation	
D4.2	**Publishing activities and its quality**
Diverse publishing activities: video, photographs, article in the regional press	
D4.3	**Participation in professional organisations in the area of research and development**
Good participation. Three memberships of scientific societies and 4 participations in activities of scientific community.	

Other comments of the commission:

15. Laboratory of Anoxygenic Phototrophs

Strengths:
It is a small team founded in 2015, whose size increased from the initial headcount of 7 to the present 12 with many international members. They have remarkable publication activity (39 articles in the investigated period) and performed also instrument development (3 registered prototypes).

Weaknesses:
From the 12 people only 2 are financed by the institute. They have been working on a scientifically narrow field until now, and this may limit the impact of their results.

Opportunities:
They are about to move towards broader fields, and they are taking part in a large EXPRO project (PhotoGemm+).

Threats:
From the 12 people only 2 are financed by the institute, thus they are very grant-dependent.

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

H1.1	Quality of selected outputs of Phase I
Average rating of the selected outputs during Phase I (2.75) and the number of excellent selected outputs per FTE ($N_{1,2}$/FTE = 0.56) as judged by Phase I are slightly worse than the field average.	
H1.2	**Contribution of workers on the outputs reached**
Productivity in terms of contribution to excellent outputs is significantly better than the field characteristics average ($FC_{1,2}$/FTE = 0.36, $N_{RP1,2}$/FTE = 0.56).	
H1.3	**Quality of all outputs and results**
The outputs are widely distributed in terms of journal ranking with a peak at quartile 2. Almost 10% of all outputs were published in the top decile though. The citation intensity pattern is about average.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Measuring infra-red kinetic fluorometry making possible to measure activity of APB bacteria directly in natural samples. Describing light harvesting complexes in *Gemmatimonas phototrophica*.	
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
The team's results may have relevance in ecology and in biotechnology.	
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**
They seem to be aware of the importance of knowledge transfer: they perform instrument development (3 registered prototypes) and provide expert consultations to companies. It is not related to the scientific outputs, but worth to mention that they took part as volunteers in COVID testing.	
H2.3	**Relation to practice**
They give consultation to Austrian companies.	
H2.4	**Participation in AV21 strategy**
None known.	
H2.5	**Cooperation with regions of the Czech Republic**
None known.	

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
It is a small, but very active team with good publication activity. The team is active in a well-defined sub-field of microbiology that enables them to maintain a strong international network of collaborations and a well-recognized position in the community.	
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 group takes part in a number of domestic and foreign bilateral collaborations where this team has a dominant role. No broad multilateral international cooperation reported.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
They were the main organizers of four Regional Symposia on Aquatic Microbial Ecology 2015, 2016, 2018, 2019, they are taking part in boards of many organizing committees and the PI gave 2 invited lectures.	

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, it is.	

D2.2	Assessment of the previous research objectives and their achievement
All the goals of 2015-2019 were reached: they established a fully functional and internationally recognized lab.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The group was established in 2015, hence there was no previous evaluation.	
D2.4	**Success in receiving grants**
They are successful in receiving Czech grants. Currently they have an exceptionally valuable Czech grant that secures the financing until 2023. However, international (EU, consortium) grants would reduce risks.	
D2.5	**Adequacy of instrumental equipment**
No problem is apparent.	
D2.6	**Effectiveness of management**
It is a small group with sound HR policies. The PI does not intend to increase the size of the group.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Age structure is optimal, dominated by young members, new lab members are selected based on international open contests.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Genders are balanced in the group.	
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
They have research cooperation with the University of South Bohemia and a Danish university.	
D3.2	**Effectiveness of joint research centres**
They have a joint publication in the framework of the project „Center of Photosynthesis Research“ with the Faculty of Science, University of South Bohemia.	
D3.3	**Success rate in supervision of PhD students**
This is a young group, thus only 1 PhD thesis was defended during the evaluation period.	

D3.4	Participation of PhD students in the outputs
This PhD student participated in 3 papers as first author and in 3 others as co-author.	
D3.5	**Participation of the team in master or bachelor studies**
None during the evaluation period.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
None during the evaluation period.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
They published 2 popular science articles in the journal Vesmír (in Czech).	
D4.2	**Publishing activities and its quality**
They have only a minor activity.	
D4.3	**Participation in professional organisations in the area of research and development**
The PI is: Member of the Academy Assembly of the Czech Academy of Sciences, Member of the Czech committee of Intergovernmental Oceanographic Commission, UNESCO, Member of the Hydrobiology PhD program committee, University of South Bohemia in České Budějovice.	

Other comments of the commission:
Team could develop more connections with University of South Bohemia including teaching activity at the university.

16. Laboratory of Environmental Biotechnology

Strengths:
It is a smaller group with top equipments enabling to measure almost everything from every matrix. Moreover the group has outstanding publication activity (80 articles in the investigated period). They have diverse knowledge, as there are microbiologists, biochemists and toxicologists in the team.

Weaknesses:
The group is young and needs more experience.

Opportunities:
Top equipments and practical solutions for environmental problems.

Threats:
Possible movement of any group members can cause problems.

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

H1.1	**Quality of selected outputs of Phase I**
Only 10 papers out of 80 were rated in Phase I, which is not representative.	
H1.2	**Contribution of workers on the outputs reached**
Only 10 papers out of 80 were rated in Phase I, which is not representative.	
H1.3	**Quality of all outputs and results**
Above average, both in terms of journal ranking and in terms of citation intensity.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Basic and applied research concerning microbial biodegradation of environmental pollutants, developing decontamination technologies.	
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**
Practical application of bioremediation.	
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**
Practical application of bioremediation.	

H2.3	Relation to practice
Practical application of bioremediation.	
H2.4	**Participation in AV21 strategy**
None known.	
H2.5	**Cooperation with regions of the Czech Republic**
None known.	

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
It is a smaller team with diverse research fields with outstanding publication activity.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
Group takes part in many European collaboration resulting in joint publication.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
They participated in the organization of Ecology of Soil Microorganisms 2015, and members were invited to several lectures.	

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, it is.	
D2.2	**Assessment of the previous research objectives and their achievement**
Most of the subject were successfully fulfilled as documented by the number of important high-quality research results, reported in high-level peer-reviewed publications. This documents well that the activity plan for the evaluated period was ambitious but realistic and it was successfully implemented.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
They adapted successfully recommendations (cooperations with industrial partners) from past evolution.	
D2.4	**Success in receiving grants**
They won numerous Czech projects, took part in Cost action and also submitted application to H2020 grants.	
D2.5	**Adequacy of instrumental equipment**
Instrumental equipment is outstanding.	

D2.6	Effectiveness of management
The team of the laboratory consists mainly of younger workers, and they are successful in establishing new postdoc positions.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Age structure is fine with many young members.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
There is no gender problem.	
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
They have cooperation with many Czech universities.	
D3.2	**Effectiveness of joint research centres**
Cooperations lead to numerous joint publications.	
D3.3	**Success rate in supervision of PhD students**
There was 7 successful PhD defences during the evaluation period.	
D3.4	**Participation of PhD students in the outputs**
The PhD. students are involved in almost every papers, a few times as first author.	
D3.5	**Participation of the team in master or bachelor studies**
There was 17 and 9 successful BSc and MSc defences during the evaluation period.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
They give numerous lectures at Charles University and University of Ostrava	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Tomáš Cajthaml gives interviews and visit TV news.	
D4.2	**Publishing activities and its quality**
It is outstanding.	

D4.3	Participation in professional organisations in the area of research and development
Members of numerous committees and editorial boards.	

Other comments of the commission:
If they have energy, try to apply international grants, as well.

17. Laboratory of Fungal Biology

Strengths:
The team has sharpened its scientific focus in the recent years on functioning and microbiome of Arbuscular mycorrhizal symbiosis using outstanding methods. The number of publications is reasonable.

Weaknesses:
The team claims that part of the infrastructure (growth chambers) are outdated.

Opportunities:
The group is internationally visible.

Threats:
The funding situation needs improvement.

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

H1.1	Quality of selected outputs of Phase I
Productivity in terms of excellent selected outputs ($N_{1,2}$/FTE = 1.1) is much higher than the average for the teams in this excellent institute.	
H1.2	**Contribution of workers on the outputs reached**
Productivity in terms of contribution to excellent outputs ($FC_{1,2}$/FTE = 0.6) is much higher than the average for the teams in this excellent institute. This is also the case when reprint authorship is considered ($N_{RP1,2}$/FTE = 0.9).	
H1.3	**Quality of all outputs and results**
Average.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
The function, nutrient transfer and microbial interactions in AM symbiosis.	
H1.5	**Contribution of the participation of the authors in large collaborations**
The team does not participate in large collaborations.	

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

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
The outputs have large societal relevance. Fundamental knowledge on fungus-plant interactions has wide potential application in agriculture, forestry, and environment protection.	
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**
Knowledge transfer so far not visible.	

H2.3	Relation to practice
Implications on ecosystems are important.	
H2.4	**Participation in AV21 strategy**
Not applicable.	
H2.5	**Cooperation with regions of the Czech Republic**
There are no respective cooperations.	

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 at average level compared to other teams from similar international and national institutes.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
Only moderate participation in such cooperations.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Good participation. Organizer of the International conference on Mycorrhiza, Prague, 2017 with 500+ participants. Eight invited lectures at international conferences.	

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**
Mainly fulfilled.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
More focus was requested. This was followed to a major extent.	
D2.4	**Success in receiving grants**
Third-party support is not clearly documented.	
D2.5	**Adequacy of instrumental equipment**
Currently the equipment is adequate, but limited and does not allow biohazard-class research.	
D2.6	**Effectiveness of management**
Adequate.	

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 balanced.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
The group is rather small and cannot take much care on these 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.**
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**
There are many small collaborations.	
D3.2	**Effectiveness of joint research centres**
No contribution to joint research centres.	
D3.3	**Success rate in supervision of PhD students**
Moderate. Three PhD theses defended in the period.	
D3.4	**Participation of PhD students in the outputs**
Yes PhD students do participate in the outputs.	
D3.5	**Participation of the team in master or bachelor studies**
Only one team member has given lectures in the period.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Collaboration intensity low.	

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

D4.1	**Sufficiency of media strategy and activities in the area of research popularisation**
Media strategy is poor.	
D4.2	**Publishing activities and its quality**
No known publishing activities.	

D4.3	Participation in professional organisations in the area of research and development
Good. Commission membership of Czech Sci. Foundation. Editorial board membership of two international journals, Board of Directors Intl. Mycorrhiza Soc.	

Other comments of the commission:

18. Laboratory Post-Transcriptional Control of Gene Expression

Strengths:
Young, enthusiastic group. Very good network for research collaboration. Therefore expertise is deep and wide despite the small size of Team.

Weaknesses:
Team is small, which increases risks.

Opportunities:
Project area is very interesting and awarding, both for fundamental biology and for very applied medicine.

Threats:
Success rate of grants can become too low.

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

H1.1	Quality of selected outputs of Phase I
Productivity in terms of excellent selected outputs (N1,2/FTE = 0.4) is close to the average for the teams in this excellent institute.	
H1.2	**Contribution of workers on the outputs reached**
Productivity in terms of contribution to excellent selected outputs (FC1,2/FTE = 0.09) is in the low range among teams in this excellent institute. However, numbers are small. If reprint author is considered instead of fractional count, numbers look somewhat better.	
H1.3	**Quality of all outputs and results**
Above average, both in terms of journal ranking and in terms of citation intensity.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
- Czech *B. pertussis* isolates have evolved with chromosome rearrangements like in the rest of the world, with similar consequences for the transcriptome and the proteome over the years; no geographical differences are seen - The first full characterization of a small regulatory RNA in *B. pertussis* and links to a function for glutamate uptake - Necessity of an RNA chaperone for virulence factors, including the sophisticated Type Three Secretion System - Transcriptomic and proteomic analysis of interplay between *Bordetella* and macrophages. All these findings are significant pieces in the puzzle around infection and the immunity system: they have important health potential.	
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
Societal relevance is excellent. Fundamental biological phenomena with potential applications derived from many branches of biology are clarified. More specifically, the results on interplay between bacteria and macrophages are almost certainly going to be important in further efforts to combat pertussis, a deadly illness on the rise in industrialized countries.	
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**
Team participates in a European-Gates-supported international consortium which aims at results that shall enable future development of improved pertussis vaccines. Knowledge transfer into practice is thus a long-term expectation but does not currently take place.	
H2.3	**Relation to practice**
No current relation to hospitals or medical industry.	
H2.4	**Participation in AV21 strategy**
None described.	
H2.5	**Cooperation with regions of the Czech Republic**
None 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
Team is small compared with similar teams internationally. In this view, team is doing very well. Productivity and quality are at level internationally.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
Both nationally and internationally is the cooperation of impressive intensity. It is focused and highly relevant. Contribution and benefit are of comparable size. Team participates in a European-Gates-supported international consortium.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
An international symposium is being planned; otherwise none.	

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, it is.	

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**
Doing OK in a difficult landscape.	
D2.5	**Adequacy of instrumental equipment**
Appears adequate.	
D2.6	**Effectiveness of management**
Appears efficient.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Young and enthusiastic small group with a majority of students. The intense international collaboration is an important part of development and career and qualification growth. Interesting and rewarding projects will make best scientists stay. Age structure is fine.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Two lab members currently on maternity leave witness positive approach in these regards.	
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
Research collaboration with Czech and foreign universities is comprehensive and relevant. Supervision of students is large for the size of the group.	
D3.2	**Effectiveness of joint research centres**
Not applicable.	
D3.3	**Success rate in supervision of PhD students**
Appears fine.	
D3.4	**Participation of PhD students in the outputs**
Fair. Four of the outputs listed in the report as being from PhD students were from the 5-year period.	

D3.5	Participation of the team in master or bachelor studies
Participates fine.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Modest. One course listed.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Students from Team participate in activities organized by Academy and Institute, Team organizes none.	
D4.2	**Publishing activities and its quality**
Team does not publish popularization material.	
D4.3	**Participation in professional organisations in the area of research and development**
None.	

Other comments of the commission:
It is apparent that Team has prioritized the core activity of research to the extent that related activities like course teaching, outreach, participation in professional societies, etc. have been partially or fully neglected. This can be necessary for some time, but Commission recommends Team to take up/increase these related activities soon. Team will discover that also these activities are stimulatory for scientific creativity.

19. Laboratory of Cellular and Molecular Immunology

Strengths:
Expertise in a timely topic, good age structure, broad range of collaborations, well-funded team.

Weaknesses:
The low number of high-quality publications, low FC1,2/FTE value.

Opportunities:
The number of young scientists and the broad range of collaborations can contribute to the outputs.

Threats:
Too many research topics

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

H1.1	Quality of selected outputs of Phase I
On the basis of the journal rankings the selected outputs are of relatively low quality, when compared to the output of other laboratories. From the 19 outputs selected only 3 were listed in the grading level 2. The average rating of the team was 2,96.	
H1.2	**Contribution of workers on the outputs reached**
The contribution of team members in the highly ranked outputs should be increased (FC1,2/FTE=0,15). For all of the selected outputs the FC/FTE ratio was higher, 0,54.	
H1.3	**Quality of all outputs and results**
56 journal articles (with IF) and 9 book chapters were published in the evaluation period. The average IF of the published articles was elevated. Four of the book chapters were published in internationally acknowledged textbooks.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
The team characterized pattern recognition receptors involved in antimicrobial defence of earthworms. Their findings might be used in monitoring of soil ecotoxicity. Studying microbiota, mucosal immunity and inflammatory diseases they tried to identify host-microbe interactions in inflammatory diseases to improve diagnosis, The team described that probiotic E. coli Nissle 1917 prevented autoimmune uveitis.	
H1.5	**Contribution of the participation of the authors in large collaborations**
The group participates in the PANDORA European Training Network (ETN) funded in the framework of H2020 Marie Skłodowska-Curie ITN program.	

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

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
Deeper knowledge and understanding of the microbiota – host organism interactions, the exotoxicity and the effect of environmental factors on autoimmune diseases could modify lifestyle and could contribute to the prevention and treatment of many diseases.	
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**
There are projects with strong clinical orientations. Three out of nine major projects of the Team are in cooperation with clinical laboratories.	
H2.4	**Participation in AV21 strategy**
In the framework of „Foods for the future“ program seven symposia and round table discussions were organized for the professional and lay public.	
H2.5	**Cooperation with regions of the Czech Republic**
The team cooperates with many groups in various regions of the Czech Republic	

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 quality of the outputs has to be further improved in order to be competitive with similar national teams.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
Numerous cooperations with Czech and foreign groups. In 5 of the 17 selected outputs international team was involved.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The group is highly active. Three of the group leaders participate in national and international scientific councils and committees. Team members organized two symposia and participated in the organization of additional meetings as members of organization committee. Two invited lectures are listed, and three of the group leaders were decorated by various awards (e.g. Gold Medal of Charles University).	

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**
Based on the published papers, it can be considered that the teams made progress in the major topics of the previous research objectives.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The group was successful to install younger members as PIs, attracted young scientists and students, established a number of international collaborations, improved the quality of publications. The group was less successful to decrease the heterogenity and the number of projects and to produce internationally excellent outputs.	
D2.4	**Success in receiving grants**
Successful grant applications	
D2.5	**Adequacy of instrumental equipment**
Aging infrastructure, inadequate animal facility.	
D2.6	**Effectiveness of management**
Too many groups and topics. Reading the reports the PIs, the structure of the groups and personnel is not entirely clear.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
29 team members are below sixty, 18 are below 40. Youth and experience are well mixed. The department has difficulties to get PIs from other institutes or from abroad.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Good gender ratio	
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 range of cooperation with university hospitals and teams.. Supervision of 12 PhD., 8 MSc., 3 BSc students.	

D3.2	Effectiveness of joint research centres
Team members participated in one project of BIOCEV - Biotechnology and Biomedical Center of the Academy of Sciences and Charles University	
D3.3	**Success rate in supervision of PhD students**
3 PhD theses were defended, but the total number of PhD students is not quite clear.	
D3.4	**Participation of PhD students in the outputs**
In about 20% of papers of the laboratory PhD students are the first authors.	
D3.5	**Participation of the team in master or bachelor studies**
Three courses for MSc, one for PhD students. Supervision of 8 MSc and 3 BSc students.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Five team members (four were both programme leaders and lecturers) were participated in various master courses and in one PhD course of the Charles University.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Senior team member gave interviews for various magazines, radio and television stations. Activity in various patient associations (seven lectures and discussion meetings) and professional associations (five lectures for diet manufacturers, pharmacists).	
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:

20. Laboratory of Tumor Immunology

Strengths:
Recognised set of expertise in the field of tumor immunology. Several collaborations with national and international partners which include the biotechnology company SOTIO

Weaknesses:
Lack of contribution to large consortium which can restrict access to international funding.

Opportunities:
The planned research program has a high potential to secure funds and produce research outputs

Threats:
Age structure is slightly under-represented for the group <30 year-old. Difficulties to recruit students. Disproportion in the number of outreach activities produced between Team members.

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

H1.1	Quality of selected outputs of Phase I
Very good quality of selected outputs (N1,2/FTE = 1.5) but relatively low productivity	
H1.2	**Contribution of workers on the outputs reached**
Good contribution of workers on the outputs reached (FC1,2/FTE = 0.61)	
H1.3	**Quality of all outputs and results**
Good quality of outputs with a good representation of outputs and intensity of citations in the top 2 quartiles.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Detailed molecular structure of IL-2/JES6.1 mAb and IL-2/SB6 mAb provided a deeper understanding in the interaction between IL-2 complexes and its receptor. IL-2 complexes has potential therapeutic use.	
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
The main research area on cytokine/ani-cytokine mAb and the development of HPMA copolymer conjugates for drug delivery have very high societal relevance.	

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
Team has a focus for knowledge transfer into practice.	
H2.3	**Relation to practice**
Collaboration with biotechnological company SOTIO to test various immunotherapeutic agents.	
H2.4	**Participation in AV21 strategy**
The Team is involved in popularization of science but the contribution between Team members is disproportionate.	
H2.5	**Cooperation with regions of the Czech Republic**
None known.	

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 above level average in comparison to teams with similar international and national institutes.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
There are several international cooperation: 5 collaborations with other laboratories and 1 collaboration with a biotechnological company. Lack of engagement in broad international consortium.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Good level of participation in scientific community activities: 1 workshop, 6 invited lectures (only most important events were listed in the report).	

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, it is.	
D2.2	**Assessment of the previous research objectives and their achievement**
Most research objectives were achieved.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The recommendations from past evaluations were properly implemented.	

D2.4	Success in receiving grants
Good number of receiving grants (14). Only 6 receiving grants as principal investigator.	
D2.5	**Adequacy of instrumental equipment**
Instrumental equipment appears adequate.	
D2.6	**Effectiveness of management**
Team appears to have been well-managed.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
The age group < 30 year-old is under-represented while two members are above 60 year-old. Age structure may be a threat to the Team long term sustainability when these two members above 60 year-old go on retirement. Apart from this, there is an active strategy to keep the best scientists. Career development for young scientists can be improved (e.g. increase their contributions to outreach activities).	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Adequate work conditions.	
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
Adequate cooperation with universities on national and international level.	
D3.2	**Effectiveness of joint research centres**
Not applicable	
D3.3	**Success rate in supervision of PhD students**
2/3 PhD students have defended their thesis during the evaluation period.	
D3.4	**Participation of PhD students in the outputs**
Participation of PhD students in the output is limited in term of publication and outreach activities.	
D3.5	**Participation of the team in master or bachelor studies**
Good amount of lectures for Master students but none for Batchelor students. Good number of supervision of Bachelor students (11) but limited for Master students (2).	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Fair amount of teaching at Master and Doctoral level**.**	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
High amount of media coverage in the area of research popularisation but the contribution within the Team is disproportionate.	
D4.2	**Publishing activities and its quality**
Good range of activities: workshop, TV channels, radio stations and newspapers.	
D4.3	**Participation in professional organisations in the area of research and development**
High level of participation (8) in professional organisations such as panel member of the Czech Science Foundation.	

Other comments of the commission:

21. Laboratory of Gnotobiology

Strengths:
It is a large group with unique experimental models (germ-free mouse and swine), with outstanding publication activity (56 articles in the investigated period).

Weaknesses:
They are far away from big cities. They are largely dependent on grants.

Opportunities:
They have unique experimental models, which attract students.

Threats:
There are 5 independent groups, it is not very easy to coordinate them.

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

H1.1	Quality of selected outputs of Phase I
Productivity in terms of excellent selected outputs ($N_{RP1,2}$/FTE = 0.6) is much higher than the average for the teams in this excellent institute.	
H1.2	**Contribution of workers on the outputs reached**
Productivity in terms of contribution to excellent outputs ($FC_{1,2}$/FTE = 0.36) is around the average for the teams in this excellent institute.	
H1.3	**Quality of all outputs and results**
Above average, both in terms of journal ranking and in terms of citation intensity.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Immunoglobulin heavy chain genes rearrangements in T-cells, role of AB T-cells in melanoma tumors, study of preterm life in sterile conditions, study of gut dysbiosis.	
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
With germ-free animals they provide good models for many medical questions.	
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**
They transfer basic scientific knowledge also into medical applications.	

H2.3	Relation to practice
Providing tools for answering medical questions.	
H2.4	**Participation in AV21 strategy**
None known.	
H2.5	**Cooperation with regions of the Czech Republic**
None known.	

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
It is a large team with diverse groups with outstanding publication activity.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
Group takes part in many European collaboration also as leaders.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
2nd Polish-Czech Probiotics Conference: Microbiology, Immunology & Allergy and October SciFest. They gained many diploma, PhD and poster award. Martin Schwarzer won EMBO excellence in life science award.	

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, it is.	
D2.2	**Assessment of the previous research objectives and their achievement**
The activity plan for the evaluated period was ambitious but realistic and it was successfully implemented.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
They adapted successfully recommendations from past evolution.	
D2.4	**Success in receiving grants**
They have numerous running, evaluated and prepared projects.	
D2.5	**Adequacy of instrumental equipment**
No problem is apparent.	
D2.6	**Effectiveness of management**
They adhere to the HR guidelines of the Institute of Microbiology. Scientists are evaluated every year mainly on the basis of publication criteria.	

D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Age structure is fine with many young members.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
There is a bit prevalence of woman among workers, but all the PIs are men.	
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**
They have cooperation with plenty Czech and foreign universities.	
D3.2	**Effectiveness of joint research centres**
Cooperations lead to numerous joint publications.	
D3.3	**Success rate in supervision of PhD students**
There was 2 successful PhD defence during the evaluation period.	
D3.4	**Participation of PhD students in the outputs**
The PhD. students are involved in almost every papers, a few times as first author.	
D3.5	**Participation of the team in master or bachelor studies**
There was 1 successful BSc defence during the evaluation period.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
They give lectures at numerous universities: Czech University of Life Sciences in Prague, Charles University, University of Padua	

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

D4.1	**Sufficiency of media strategy and activities in the area of research popularisation**
They give several public lectures.	
D4.2	**Publishing activities and its quality**
It is outstanding.	

D4.3	Participation in professional organisations in the area of research and development
Members of numerous committees and editorial boards.	

Other comments of the commission:
None.

22. Laboratory of Immunotherapy

Strengths:
The lab has an internationally and nationally highly visible leader and is very strong regarding outreach activities as well as knowledge dissemination. Also, there's a clear focus on translation of the results into the clinics.

Weaknesses:
Publication track record is rather weak.

Opportunities:
Collaborations with biotech and biopharma companies, making use of the in vitro and in vivo systems established in the lab.

Threats:
The team is rather small, so continuity might be endangered in case several team members would leave.

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

H1.1	Quality of selected outputs of Phase I
The output of the team is limited in number and impact, with a mere 2 items in Q1, and a total of 6 outputs evaluated in Phase I. This is below average.	
H1.2	**Contribution of workers on the outputs reached**
Close to the average.	
H1.3	**Quality of all outputs and results**
Close to average, whilst output in the highest decile is missing.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
The team has highly valuable in vivo and in vitro systems for studying cancer – stroma interactions, giving the team a strong position in the study of the tumor microenvironment.	
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
The study of the tumor microenvironment and its role in cancer etiology is of high societal relevance and lead to innovation in diagnosis and therapy.	

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
The team leader articulates a clear focus on clinical translation. It has to be acknowledged, however, that this is often a long and tedious path.	
H2.3	**Relation to practice**
The team has commercial contracts which warrant contribution to clinical and biopharmaceutical research.	
H2.4	**Participation in AV21 strategy**
-	
H2.5	**Cooperation with regions of the Czech Republic**
Plenty of national collaborations.	

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 has a very good international standing regarding presentation and conference participation. A highlight are the many lectures of the PI at international and national conferences. The publication track record is a weakness.	
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 a range of one-to-one collaborations; It appears that this does not sufficiently translate into a collaborative publication output – neither regarding quality nor quantity.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The team is exceptionally strong in this regard. This includes the organization of conferences and activities as well as the participation therein.	

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 team was successful, yet the productivity was below average as judged from the publication output.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
Some improvements were achieved along the lines of previous recommendations	

D2.4	Success in receiving grants
The team succeeds in securing a relatively stable grant support which covers the costs of a large part of the team activities and research.	
D2.5	**Adequacy of instrumental equipment**
Rather adequate. However, a full proteomics-MS core facility on campus would be an important advantage.	
D2.6	**Effectiveness of management**
Good.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
The team is healthy in these aspects	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
The team also appears healthy and well-positioned regarding these aspects	
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
The team has many collaboration. This translates only into a modest publication output.	
D3.2	**Effectiveness of joint research centres**
-	
D3.3	**Success rate in supervision of PhD students**
The team contributed to the graduation of 2 PhD students during the evaluation period.	
D3.4	**Participation of PhD students in the outputs**
Good.	
D3.5	**Participation of the team in master or bachelor studies**
Excellent contribution – the team has a strong teaching and training focus.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Several team members, in particular the PI, contribute considerably to teaching at a national but also international level. This is a very strong aspect of the team's performance.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Excellent – the team and the PI are visible, there are multiple exposures of the general public to the research activities of the team, such as visits from school classes.	
D4.2	**Publishing activities and its quality**
Very strong in outreach.	
D4.3	**Participation in professional organisations in the area of research and development**
Excellent. The PI is chairman of the Czech Society for Immunology.	

Other comments of the commission:
Maybe a more selective approach towards collaborations could help to focus on highly productive alliances which might help to improve the publication output of the group.

23. Laboratory of Structural Biology and Cell Signalization

Strengths:
New campus close to Prague, good working conditions. Very advanced technology and expertise both experimentally and in data evaluation (including software development).

Weaknesses:
Vulnerability to budget due to the size of the manpower and the costs of maintaining the laboratory. Publication quality according to the Phase I evaluation below the field average.

Opportunities:
Industrial partnership, including the research and development carried out in the group and offered to the industrial partners and the health system.

Threats:
As everywhere in the system, insufficient funding.

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

H1.1	Quality of selected outputs of Phase I
According to the Phase I evaluation the quality of selected outputs is below the field average in all parameters (average rating = 2.8, $N_{1,2}$/FTE = 0.5).	
H1.2	**Contribution of workers on the outputs reached**
Productivity in terms of contribution to excellent selected outputs ($FC_{1,2}$/FTE = 0.11) is significantly lower than the field average. It is also in the low range of this excellent institute. Counting on the basis of reprint author is closer to its average ($N_{RP1,2}$/FTE = 0.29).	
H1.3	**Quality of all outputs and results**
This relatively large team has produced 110 outputs in the evaluation period, which is rather high. The quality of all outputs by journal ranking is good, dominated by ranks 1*, 1 and 2. This is even more so for the selected outputs, which is in apparent contradiction to the result of Phase I, reflecting the high quality of the field. The quality of all outputs by the intensity of citations is moderate.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
By state of the art mass spectrometry and sample manipulations in connection to mass spectrometry the team contributes strongly to obtaining dynamic and close to *in vivo* structural information and interaction characterization not accessible by NMR, X ray crystallography or even cryo EM. Substantial software development and online services, too.	
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
Relevant. Multiple industrial connections in testing and instrument development. Clinical kits for in vitro diagnostics, tools for biomarker discovery.	
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**
Through collaborations the team seems to be aware and pays attention to knowledge transfer into the industrial or medical field.	
H2.3	**Relation to practice**
The team is active in technological innovation both in mass spectrometry (e.g. special sample preparation) and in promoting medical diagnostics. Active collaboration with several industrial partners.	
H2.4	**Participation in AV21 strategy**
None known.	
H2.5	**Cooperation with regions of the Czech Republic**
None known.	

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
This is a strong team in mass spectrometric macromolecular structural determination with good international recognition. This fact is not fully reflected in the statistics of the Phase I evaluation.	
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 is heavily involved in cross-Europe consortia: currently and in the near future they participate in the EU H2020 EPIC-XS infrastructure consortium, in the EU -E-Rare project and in the EU H2020 EU_FT-ICR_MS network.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Very good. The senior group members held several key positions in the Czech Academy organization, Czech science funding and the Czech mass spectroscopy community. The group leader is Instruct-ERIC Access Committee chair. One international mass spectrometry proteomics course organized. Main organizers of the Annual meetings of the Czech Society of Mass Spectrometry. Many (13) invited lectures and one award reported.	

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, it is.	
D2.2	**Assessment of the previous research objectives and their achievement**
This is a relatively new group whose first couple of years were dominated by building a new laboratory on a new campus. These goals were nicely achieved and the team is now focusing on the planned research objectives.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
Not applicable.	
D2.4	**Success in receiving grants**
Rather good both in the domestic and the European scene in comparison with other Czech teams. Funding seems to be secured until 2022-23, but for the relatively high head-count of the team they must be alert and grab all opportunities for future grants.	
D2.5	**Adequacy of instrumental equipment**
Excellent, state-of-the-art.	
D2.6	**Effectiveness of management**
The team was founded in 2015 by members formerly working elsewhere. They managed to build, occupy and organize a new infrastructure and started to produce good results. The internal life, regular meetings and communication between sub-groups is well organized.	
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, although a few more researchers in the 30-40 year group would be desirable. The team hierarchy is adequately built, with senior, junior researchers and students in all sub-groups.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
The undeniable gender balance is misleading, since all seniors are men. It would be desirable to promote the career of the best female students to fill up the hole in the age and gender distribution (if possible).	
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
Among the many international contacts, the team has contributed with lectures at specialized courses at universities in Portugal, Finland, Croatia, as well as the hosting of a sabbatical from a New York university.	
D3.2	**Effectiveness of joint research centres**
Not applicable.	
D3.3	**Success rate in supervision of PhD students**
In this new team so far 3 dissertations were defended out of 13, but this will probably rapidly increase in the foreseeable future.	
D3.4	**Participation of PhD students in the outputs**
Not detailed in the team's report.	
D3.5	**Participation of the team in master or bachelor studies**
A high number of students and also a high success rate.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
The team is rather active at all three levels of higher education.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
No relevant information found on media strategy. One team member is evaluation committee chair in high school students' biology contest.	
D4.2	**Publishing activities and its quality**
No relevant information found.	
D4.3	**Participation in professional organisations in the area of research and development**
The team leader is panel member in the RDI council of the Czech government.	

Other comments of the commission:

24. Laboratory of Environmental Microbiology

Strengths:
Large group with stable size running in multi-PI mode with broad, yet focused research topics.
Very good international reputation in the field of research.
State of the art methodology and position at the frontier of its development.

Weaknesses:
The funding of research as well as personnel is largely dependent on running projects.
Due to space limitation the facilities are divided into two geographical locations.
Missing research infrastructure for experiments with plant/microbial interactions (greenhouse)

Opportunities:
Large number and wide network of international collaborations opens possiblity for large consortia and international funding.

Threats:
The large number of projects and personnel, as well as the 2 geographical locations of the facilities, are very exigent in respect to time dedication for management of the team.

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 (N1,2/FTE = 0.76)	
H1.2	**Contribution of workers on the outputs reached**
Contribution of workers on the outputs is very good, with 1st author or corresponding author in most of the selected outputs, above the range in comparison to the Institute level. (FC1,2/FTE: 0.55).	
H1.3	**Quality of all outputs and results**
High number of outputs in the top two quality levels.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
The research is focused on ecology of microorganisms in their environment; microbial involvement and interactions in ecosystem processes.	
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 biotechnology and environmental issues.	

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**
Only few applied results (e.g. nature protection) 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 applicable	

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 international recognition, excellent 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**
Large number of international cooperations including contribution to large consortium: (co-PI in the international project by the CELSA - Central Europe Leuven Strategic Alliance).	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Organization of several international conferences in the period of evaluation, strong participation in 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**
Recommendations were fully implemented.	
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
The existent equipment is very adequate; missing research infrastructure for experiments with plant/microbial interactions (phytotrons, whole year operable greenhouse).	
D2.6	**Effectiveness of management**
The team is very large in number of researchers and broad in topics, but the management seems efficient in consolidating the structure and governance of the team.	
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. 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.	
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
Good level of teaching in universities and supervision of students.	
D3.2	**Effectiveness of joint research centres**
Not applicable.	
D3.3	**Success rate in supervision of PhD students**
A good number of PhD theses (5) were defended in the period of 2015-2019.	
D3.4	**Participation of PhD students in the outputs**
Excellent participation of PhD students, participation as co-authors in 45 papers, and as first authors in 18 papers. Participation as co-authors of 2 book chapters.	
D3.5	**Participation of the team in master or bachelor studies**
Master (6) and bachelor (4) completed their theses during 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 very adequate.	
D4.2	**Publishing activities and its quality**
Very good number of publishing in popular journals and conferences to the general public. Broadcasting at the national radio and television.	
D4.3	**Participation in professional organisations in the area of research and development**
Not reported.	

Other comments of the commission:

25. Center for Nanobiology and Structural Biology

Strengths:
Well-equipped laboratories, broad scale of methods, very active participation in scientific community, large scale of collaborations, team leaders are appreciated members of international and domestic scientific bodies.

Weaknesses:
Low quality of publications, disunited projects, no clear strategy to focus the diverse activities**.**

Opportunities:
Collaborations, good equipment.

Threats:
Lack of proper long-term funding.

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

H1.1	Quality of selected outputs of Phase I
The quality of selected outputs should be improved. The team's average rating is 2.89 (worse than the field average of 2.37), the productivity of the team in the excellent category (No. of excellent publications/FTE=0.39) is low. Too many of the selected outputs (5 per 18) are listed into the fourth category by the Phase I evaluation.	
H1.2	**Contribution of workers on the outputs reached**
Among the excellent outputs the $FC_{1,2}$/FTE value is too low (0.16), the dominant contribution of the team in the excellent outputs is also low ($N_{RP1,2}$/FTE = 0.29). These numbers (and also $N_{1,2}$/FTE) are low due to the high FTE, not due to the low contribution to the outputs.	
H1.3	**Quality of all outputs and results**
The total number of outputs is 47 scientific papers. 13 % was published in D1 journals, 10.6% in Q1, 36% in Q2, 17% in Q3 17% in Q4 journals. 6% was not applicable. Therefore, 23 % of the papers was published in high prestige journals, but 34 % in Q3 + Q4 ranked journals. The team should increase the quality of papers. The citation intensity of the outputs is also rather low.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
The aim of the research team was to develop new methods in molecular systems biology and apply them to study scientific problems. Important observations were made in structure-function relations of Orai and STIM channels playing a role in store-operated Ca2+ entry. Details of coupling of Duplex Translocation to DNA Cleavage in a Type I Restriction Enzyme were described. Studies of enzyme catalysis in non-aqueous media has a potential in waste management. Structure-functional relationships of Haloalkane Dehalogenases (participating in metabolism of toxic xenobiotics) and RNA helicase P4 of bacteriophage φ4 were studied. Technical improvements to the technique of two-photon polarization microscopy were done. Structural and functional analysis of the yeast K+ translocation system(s) encoded by TRK1 and TRK2 were studied.	

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
Studies on plastic degrading enzymes, catalysis in non-aquatic solvents can have a large impact in the fight against environmental pollution.	
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 team seems to be aware and pays attention to knowledge transfer into the environmental protection industry.	
H2.3	**Relation to practice**
In the activity plan the study of plastic degrading enzymes can be very important for the prevention and treatment of environmental pollution. No patents were mentioned, no clinical relations.	
H2.4	**Participation in AV21 strategy**
None known.	
H2.5	**Cooperation with regions of the Czech Republic**
None known.	

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 has very wide collaborations with national and foreign laboratories. Team leaders are well known in the international scientific community. The extremely broad range of projects however inhibits the most important aims: to generate high level, ground-breaking scientific outputs.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
Participation of the team in national and international collaborations is very wide. Considering the selected outputs in category 2 papers the FC of the group is 2.19/7 with 4 reprint authorship, and in category 3 papers the FC is 2,42/6 and five of the reprint authors are from the team. The team plays a substantial to dominant role in the collaborations. The team was a founding member of the Czech Infrastructure for Systems Biology C4SYS, which was a node of the European ESFRI infrastructure in systems biology, ISBE. They were also partners in the Czech-Austrian Center for Supracellular Medical Research ATCZ14.	

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

Excellent performance in participation in scientific community activities:

Organization of conferences, workshops
7th Visegrad Symposium on Structural Systems Biology, *2017, Nove Hrady, CZ*
EMBO Workshop: Synergy of experiment and computation in quantitative systems biology, *2019, Nove Hrady, CZ*
37th Small Meeting on Yeast Transport and Energetics. *11. –, Nove Hrady, CZ*
FEBS Advanced Course: Ligand-Binding Theory and Practice 2016, 2018
FEBS Advanced Course: Advanced methods in macromolecular crystallization 2016, 2018
Summer Schools
Summer Schools in Molecular Biophysics and Systems Biology 2015, 2016, 2017, 2018, 2019

Awards and invited lectures
2016 Fulbright-Masaryk Scholarship – senior category to R. Ettrich
3 invited plenary lectures (2015-2017)

Very high number of invited lectures (21) on international conferences (2015-2019)

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. In the next period the team is planning to continue some of the ongoing studies and initiate new projects. The number of projects planned is currently 8.

D2.2	Assessment of the previous research objectives and their achievement

Previous research objectives are very generally formulated. In all of the areas progress has been made.

D2.3	Assessment of implementation of recommendations from past evaluation

N/A. The team belonged to another institute, therefore there were no recommendations for the 2016-19 period.

D2.4	Success in receiving grants

The numbers of ongoing grants are very few.

D2.5	Adequacy of instrumental equipment

Adequate, high tech. equipment on a very broad scale.

D2.6	Effectiveness of management

The effectiveness of the management should be improved drastically. The team's total FTE is 14. This is divided between four groups. The total number of projects during the 2015-19 period was 19! (based upon 3-4_Report_on_the_research _activity...). This diversification does not give the possibility to build up a characteristic, independent, internationally competitive scientific profile.

D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
The age structure of the Team CNSB is healthy, near to ideal. There are a large number of young people, there is no missing cohort.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
The remote localization of the laboratory has both advantages and disadvantages. There is no serious gender imbalance, and one out of the four team leaders is female.	
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
Each year the institute hosts up to 10 students from Princeton University and other American universities. With national universities Team members teach numerous courses at all 3 levels of higher education in nearby University of South Bohemia.	
D3.2	**Effectiveness of joint research centres**
Collaboration with University of South Bohemia in Ceske Budejovice for the training of students and other pedagogical activities. Master and bachelor study programs with Johannes Kepler University, Linz, Austria in the study programs of Biological Chemistry and Bioinformatics. Long-established collaboration with Princeton University, NJ, USA. CNSB laboratories are an official training centre for two established exchanges programs; Collaboration with Belarusian State University to establish student mobility	
D3.3	**Success rate in supervision of PhD students**
8 doctoral theses were defended in the present evaluation period.	
D3.4	**Participation of PhD students in the outputs**
All PhD students substantially contribute to most peer-reviewed papers and are co-authors of scientific publications. PhD students also are involved in the training of undergraduate students during their research stays and Summer Schools.	
D3.5	**Participation of the team in master or bachelor studies**
Numerous courses. 9 Bachelor and 4 Master theses defended in the evaluation period.	

D3.6	Assessment of cooperation intensity with universities in the form of teaching
Cooperations both on national level with the University of South Bohemia (31 BSc courses, 29 Master courses, 15 PhD courses) and at the international level (University of Bonn: Master course).	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Popularization of research is focussed on the collaboration with grammar schools in the region. Regular excursions of the high school students in the team's research laboratories. Workshop done in laboratories of CNSB Nove Hrady for grammar school (Trhove Sviny) students where they could try or test basic methods and principles in the field of microbiology. The team organized the annual summer Schools in Molecular Biophysics and Systems Biology Nove Hrady. These summer schools attract around 20 high school and university students annually.	
D4.2	**Publishing activities and its quality**
None reported.	
D4.3	**Participation in professional organisations in the area of research and development**
No industrial cooperations.	

Other comments of the commission:

Final report was elaborated by:

Commission 3.2 - Chemical sciences
Evaluated teams No.: 3

Commission Chair: Professor Bengt Norden
Commission Deputy Chair: Alexander Čegan
Commission Members:
- Teresa Bandosz
- Timothy Clark
- Vladimir Sepelak
- Francesc Teixidor
- John Tsibouklis
- Hans-Achim Wagenknecht
- Uta Wille

Commission 5.1 - Biological sciences A
Evaluated teams No.: 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25

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