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: Biology Centre of the CAS, v. v. i.

Evaluated teams and their leaders:

1. Insect Molecular Biology and Genetics (Ivo Šauman)
2. Insect Biochemistry and Physiology (Dalibor Kodrík)
3. Insect Biodiversity and Conservation Biology (Lukáš Čížek)
4. Insect Ecology (Vojtěch Novotný)
5. Aquatic Parasitology (Tomáš Scholz)
6. Evolutionary Parasitology (Miroslav Oborník)
7. Veterinary Parasitology and Zoonotic Diseases (Martin Kváč)
8. Aquatic Microbial Ecology (Petr Znachor)
9. Ecology of Fish and Zooplankton (Jiří Peterka)
10. Plant Virology (Igor Koloniuk)
11. Soil Ecology (Jan Frouz)
12. Molecular Cytogenetics of Plants (Jiří Macas)
13. Biophysics and Biochemistry of Plants (Hendrik Küpper)
14. Molecular Genetics of Plants (Jaroslav Matoušek)
15. Hydrochemistry and Ecosystem Modelling (Petr Porcal)
16. Functional Genomics of Trypanosomes (Julius Lukeš)
17. Ticks and Tick-borne Pathogens (Daniel Růžek)

Part A: Evaluation of the institute

Overall evaluation of the institute elaborated in agreement of all commissions' chairs, who evaluated the institute.

Strengths:

The BC includes five institutes with 17 teams. Fourteen of the teams, which are focused on biological and ecological research of microorganisms, animals (including parasites) and plants from terrestrial and aquatic ecosystems are involved in this part of the evaluation. In 2016, another research infrastructure SOWA was established to develop cooperation between the Czech and international research community in studying interactions between soil and water. A number of teams have achieved international acclaim, judged on successful grant application; bibliometric outcome and international cooperation.

The BC has recently established an International Advisory Board, which had its first meeting in May 2019.

The IBERA initiative (Incorporation of the Biology Centre of the CAS into the European Research Area): Guiding issues such as recruitment, retention, gender balance, remuneration, and 'start-up' packages to attract competitive researchers could be embraced by the IBERA initiative. The gap analysis was undertaken by IBERA, and the resulting actions demonstrate the willingness to get engaged in key issues affecting the future development of the BC.

The facilities of BC are unique and excellent with state-of-the-art equipment managed by first-class teams. Core facilities and the combination of facilities (notably animal rearing, bioimaging, viral containment, molecular and analytical tools) provide unique opportunities for research and collaboration. Core facilities are not managed centrally but are assigned to individual units (institutes).

Weaknesses:

There is some overlap in the research fields at the level of teams and laboratories (e.g., in insect pest biocontrol or in soil biology/hydrobiology). Identification and exploitation of such synergies could save resources.

The large size of the Centre together with the institutional organisation limits the flexibility to structural changes. The lack of central funds excludes the opportunity to stimulate and support novel and innovative research directions. This lack seems to add to the low flexibility of BC in modifying and implementing novel directions of the research strategy.

Although some institutes and individual departments have excellent international collaborations and considerable international staff, the entire centre would greatly benefit from a significant increase in international exchange and collaboration.

Failure to fill PhD positions or to attract early-career researchers will slow-down future development of BC. Recent recruitment of excellent staff emphasizes the growing international reputation of BC. However, there seems to be major room for further improvement.

Opportunities:

The location of all institutes of the BC on the campus of the University of South Bohemia facilitates both the organization of and the cooperation between the institutes and their teams as well as the relationships in research and teaching with the university. Core facilities, like

the Laboratory of Electron Microscopy, the Fish Ecology Unit or Czech- Bioimaging are attractive to foreign students and researchers alike, and promote national as well as international collaboration. Merging the Institute of Hydrobiology and the Institute of Soil Biology into one single "Institute of Land and Water Resources" with regards to joining the large research infrastructure SoWa is supported.

Threats:

The relatively low basic financial support makes it difficult for all teams to stay up to date with the required complex analysis equipment**.** Grants are limited to shorter periods of time, which makes the implementation of long-term ecological projects difficult. Relatively low salaries make it difficult for all teams to recruit internationally excellent cross-institutional postdoctoral fellows. The leader of team 14 (Molecular Genetics of Plants) is going to retire and the overall future of the team is uncertain.

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

H1.1	Quality of selected outputs of Phase I
Average rating of the teams in phase I evaluation ranged from 1.63 (Molecular Cytogenetics of Plants; 8 paper submitted) to 3.11 (Molecular Genetics of Plants; 9 papers submitted). The majority of teams has published 10 to 20 % of their submitted papers in „World Leading“ journals and 40-60 % in „Excellent“ journals.	
H1.2	**Contribution of workers on the outputs reached**
Outputs per FTE with reprint authors from the team varied considerably and were highest in the teams Aquatic Microbial Ecology and Molecular Cytogenetics of Plants, and lowest in the teams Ecology of Fish and Zooplankton and Plant Virology. In joint papers resulting from national and/or international collaborations, scientists from BC provided essential contributions, and were frequently leading/coordinating the project.	
H1.3	**Quality of all outputs and results**
Quality of all outputs and results varied considerably between the 14 teams, but overall it can be described as very good to excellent. BC received a total of 19 international grants from 2015 to 2019 and is currently involved in 9 projects under EU Framework programs, including three ERC grants. In addition, another 21 international projects are currently being worked on.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
In the Institute of Entomology, results from studies on the role of specific neuropeptides in insect circadian clock and on insect silk as biomaterial have gained international attention. The mapping of butterflies of the Czech Republic is of high national importance. The Institute of Hydrobiology acts as an advisory body for the assessment of the ecological potential of polluted waterbodies. Results obtained in the Institute of Parasitology have contributed to the prevention of human and animal parasitic diseases and have an impact on agriculture. The Institute of Plant Molecular Biology has published recent results in two PNAS papers (2021).	
H1.5	**Contribution of the participation of the authors in large collaborations**
N/a.	

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 place where research results with application potential are identified at the BC is the Knowledge and Technology Transfer (ÚTT). Specific projects with societal relevance are listed in the evaluation forms of the teams. In summary, it can be said that the societal relevance in many projects in entomology, parasitology and limnology is particularly high.	
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**
ÚTT manages an Intellectual Property database, where all research results data with commercial potential are properly stored. ÚTT also serves as a contact point for companies and public administrations if they want to establish cooperation with BC or require specific hi-tech services.	
H2.3	**Relation to practice**
Besides the already mentioned practical application of research results, entomological as well as limnological studies will help to improve management of insects and fish. This has direct practical relevance for human nutrition (project on development of new strategies for efficient utilization of natural resources to ensure food and resource security).	
H2.4	**Participation in AV21 strategy**
BC is one of the institutes that introduced its own program and therefore participated in Strategy AV21 in the role of the coordinator of the program Diversity of Life and Health of Ecosystems (ROZE). There were 12-15 individual topics each year that contributed to ROZE's overall objective mentioned above. BC also participated in the role of an active partner in two other programs (Natural Hazards and Diagnostic Methods and Techniques). Recently, BC started to prepare a new program entitled „Saving and Restoring the Landscape“ for the next five years.	
H2.5	**Cooperation with regions of the Czech Republic**
BC runs 4 projects within the program „The support of Regional Cooperation among the Regions and the Institutes of the Czech Academy of Sciences“ (Lipno fishery decline; monitoring of natural grazing of megaherbivores; telemetry of the Great Capricorn beetle; fish biomass and eutrophication in the Jordán Reservoir).	

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 BC is one of the largest non-university institutes worldwide, acting in the field of organismic biology. The institute is primarily active in basic research, but results of BC research are used in agriculture, forestry, fisheries, human and veterinary medicine, public and state administration, and other social sectors. The Biology Centre is a nationally leading research institution. The centre is recognized, and in part leading, in the international context.	

D1.2	Scope and quality of international and national cooperation and the role of the institute in such cooperation; engagement in broad international cooperation

A growing number of joint research activities has arisen in recent years, connecting established research teams, ad-hoc project teams, and individuals across the BC. At the national level, the main partners for cooperation are the Universities of South Bohemia, Prague and Brno, but also other CAS institutes, such as the Institute of Organic Chemistry and Biochemistry and the Institute of Molecular Genetics. At the international level, groups and research teams maintain numerous bilateral contacts with abroad partners. BC was also very successful in applying for international grants and received a total of 19 international grants from 2015 to 2019. BC is attractive for foreign students and Postdocs: A total of 209 BC employees (27% of the total number of 780) are from abroad.

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

In the evaluated period, the BC was the main organizer or co-organizer of about 100 important conferences; most of them were with international participation. Details can be found in the individual team evaluations. In February 2019 BC obtained the prestigious HR Award. Invited lectures and personally awards are also listed in the individual team evaluations. Many other invited lectures for the general public were given by BC employees on different occasions every year.

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

D2.1	Direction in line with the perspective of the planned research directions

The Biology Centre is a large institution encompassing 5 institutes with a total of 17 teams and a very broad and diverse research program. Thus, the commission could not evaluate all presented information on each project in detail. However, the commission came to the general conclusion that the aims of the Centre were convincing, important and competitive in the international context. The aims are fully in line with the mission of CAS and the Centre.

In 2016 the SoWa research infrastructure was established to develop the cooperation of the Czech and international research community in a comprehensive study of interactions between soil and water from the microscale through the river basin level to the landscape level. Meanwhile, 11 laboratories are successfully developing 6 research programs. SoWa is cofounded by the Ministry of Education, Youth and Sports of the Czech Republic and by the EU through the Operational Programme Research, Development and Education.

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

The strategic plan 2015 to 2019 was satisfactorily fulfilled in the evaluated period. Details are given in the individual team's evaluation forms.

D2.3	Assessment of implementation of recommendations from past evaluation

Besides the specific recommendations for individual teams (see comments given for the teams), the BC as a whole also received some recommendations: (1) Insufficient attention has been paid to risk of e.g. fire and flood to the collections, at the very least a risk register and contingency plans need to be considered. - A solution to this problem is underway. (2) The structure of BC, with five institutes, is not at all clear. It is recommended that the barriers are broken down and the whole fully merged. - The BC structure is the result of historical development with five independent institutes. The structure is comparable to the faculty structure at universities. (3) The largest part (58%) of the budget is spent on

salaries. Mechanisms need to be found to provide BC with flexibility in their budget. - Solution depends on the funding of science in the Czech Republic and is beyond BC competence.

The BC has thoroughly considered all recommendations of the past evaluation and has responded to all of them. Most importantly, the BC has established an international advisory board, and has started to collaborate with clinical experts. The commission encourages the BC to consider and implement the recommendations by the International Advisory Board.

D2.4	Success in receiving grants

The BC is the fourth most successful institute of the Czech Academy of Sciences in obtaining projects of the H2020 program in the field of Life Sciences and Chemical Sciences. The BC received another 3 ERC grants from the European Research Council Executive Agency. In total, BC received 19 international grants from 2015 to 2019 from H2020, ESF, EFRR, and SNSF.

D2.5	Adequacy of instrumental equipment

Since no on-site evaluation was possible, it is not easy to assess the adequacy of the instrumental equipment. As far as known, equipment in the research services is excellent, but some younger and smaller teams need more support.

D2.6	Effectiveness of management

The commission came to the conclusion that management and governance are effective, but agrees with the Advisory Board that the overall structure (Centre > Institutes > Departments > Individual researchers) is unnecessarily complex and, therefore, inefficient.

The BC has recently established an International Advisory Board, which had its first meeting in May 2019. The BC has also its own Project Department that consists of skilled and experienced project and financial managers. Managers are well suited for preparing and managing large international projects and coordinating all project partners.

D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth

The number of BC employees increased from 587 (451 FTE) in 2015 to 780 (587 FTE) in 2019, almost 30% of them are from abroad. The growing number of employees is mostly related to successfully obtained grants. SoWa has facilitated growth towards an emerging centre of excellence. Age structure of the BC is average with more than 50 % in the age category 25-40 years.

D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues

No information available.

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.

BC members are members of various scientific boards and important government bodies including the Scientific Board of the Ministry of Environment of the Czech Republic, Section Government Commission for Sustainability. Some teams are involved in the novel program „Saving and restoring the landscape“ since 2019.

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 BC provides a research platform mainly for the Faculty of Science of the University of South Bohemia in České Budějovice, with which BC shares the campus. An important milestone is the common School of Doctoral Studies in the biological sciences. Bachelor, Master and doctoral semester lectures, seminars and courses are also given at many other Czech universities and in Austria.	
D3.2	**Effectiveness of joint research centres**
At present, BC does not have a formal agreement on the establishment of a joint research centre with any university, but such an agreement is in preparation with the University of South Bohemia.	
D3.3	**Success rate in supervision of PhD students**
During the last five years, 138 PhD theses have been successfully defended.	
D3.4	**Participation of PhD students in the outputs**
PhD students authored or co-authored in many outputs. The absolute numbers varied between institutes and teams and can be seen in the respective team evaluation forms. When defending their thesis, most of them are author or co-author of papers in high quality international journals.	
D3.5	**Participation of the institute in master or bachelor studies**
In the period 2015 to 2019, 171 Bachelor students and 101 Master students were supervised.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Bachelor, master and doctoral semester lectures, seminars and courses were given at 9 universities in Czech Republic (České Budějovice, Prague, Brno, Ostrava, Ústí nad Labem, and Olomouc). An overview of semester lectures, seminars and courses is given in the evaluation forms of the individual teams. Staff members also taught at universities abroad, most frequently in the form of invited lectures and talks at university/department seminars.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
The BC pays excellent attention to the popularization of science and its research results. Every year BC released 16 to 25 press information and many other invitations to public lectures and events. Media communication is coordinated by a PR manager. The number of total media outputs was between 750 (2015) and 1,130 (2019).	
D4.2	**Publishing activities and its quality**

D4.3	Participation in professional organisations in the area of research and development
During the evaluation period, 11 exhibitions were organized in various cities of Czech Republic with thousands of visitors. Interior exhibitions on large posters showing research made by the BC were created too. As already mentioned, the BC is home of two international scientific journals.	

Other comments of the commission:

- The systematics/nomenclature of Centre, Institute, Department, Team, Laboratory, group or sub-group is really confusing, and also the numbering of the teams. It should be improved before next evaluation.
- The Biology Centre of the CAS is located in a unique joint University and Academic Campus in České Budějovice. Furthermore, the guidance of the Centre by its very motivating director is excellent. Both facts can serve as guidance for other institutes of the CAS.

Part B: Evaluation of teams

1. Insect Molecular Biology and Genetics

Strengths: The team Insect Molecular Biology and Genetics consists of five laboratories, each of them working in molecular entomology, but with different orientations. All of them have achieved international acclaim, both with regards to received grants (high percentage of EC grants) as well as publications (e.g. PNAS, Cell, Plos Genetics, Biological Reviews) and international collaboration. The facilities, as the Biological Imaging Unit, are unique.

Weaknesses: The five laboratories all work on highly topical but very different and diverse topics, which may make an intensive collaboration between the laboratories not easy. The use of common methods and laboratories, as well as common seminars try to overcome this difficulty.

Opportunities: The location of all teams of the Institute of Entomology on the campus of the University of South Bohemia facilitates both the organization of and the cooperation between the teams as well as the relationships in research and teaching with the university.

Threats: Relatively low salaries make it difficult to recruit internationally excellent cross-institutional postdoctoral fellows. There is a relatively limited space in the Institute of Entomology building for possible future team expansion.

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

H1.1	Quality of selected outputs of Phase I
Forty publications from a total output of 97 publications between 2015 and 2019 were evaluated in the first phase. Average rating of outputs is 2.48. Output per FTE for world-leading publications is above average (15%), for internationally excellent outputs slightly below average (ca. 30%). The distribution of quality of submitted outputs based on phase I is also very good with 15.0% as World Leading (1) and 47.5% of outputs as WL + Internationally Excellent (1+2).	
H1.2	**Contribution of workers on the outputs reached**
In more than 50% of the publications, reprint authors are from the team. The researchers from the team contribute quite well to the achieved excellent results and in most cases, they appear as corresponding authors ($FC_{1,2}$/FTE: 0.24, $N_{RP,12}$/FTE: 0.41).	
H1.3	**Quality of all outputs and results**
Outputs and quality of results are at an excellent level. The distribution of quality of total outputs by bibliometrics is excellent, with 21.6% of outputs in 1* or 1 quartile, and 60.1% of outputs in the quartile 1* - 2.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
The following results are novel and have received widespread recognition in the insect community: Insect silk as source of biomaterial in laboratory 1. Juvenile hormone receptor and the role of JH in insect metamorphosis in lab 2. Differences between mechanisms of sex determination in insects in lab 3. Role of neuropeptides of the EFLa group in insect	

circadian clock in lab 4. Differences in the telomere structure between queen, king and workers of eusocial insects in lab 5.

H1.5	Contribution of the participation of the authors in large collaborations
Each lab of the team has established formal or informal cooperation with national and foreign groups and/or institutions. In almost all international projects, the local authors are applicants and principle investigators.	

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

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
All five labs are mainly involved in basic entomological research. The work on insect silk as biomaterial has the highest practical 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**
In times of global temperature change, any work on insects that prevents the extinction of insect species is of highest societal importance. The insect collection in the Institute of Entomology is of great educational importance.	
H2.3	**Relation to practice**
A short-term implementation of the research results in practical use is not to be expected.	
H2.4	**Participation in AV21 strategy**
The team is involved in the “Diversity of Life and Health of Ecosystems (ROZE)“ program.	
H2.5	**Cooperation with regions of the Czech Republic**
National collaborations include researchers from the Institute of Organic Chemistry and Biochemistry CAS and the Institute of Molecular Genetics CAS in Prague, Faculty of Science of the Charles University in Prague, Faculty of Science of the Masaryk University in Brno, Veterinary Research Institute in Brno, and Institute of Experimental Botany CAS in Olomouc.	

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
Large areas of physiological entomological research in Europe have been disbanded in favour of general “molecular biology“ in recent years. The Institute of Entomology, and especially the team Insect Molecular Biology and Genetics, represent one of the few remaining top institutions in this field in Europe.	
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 excellent international cooperation, that is shown, for example, by its EC supported international projects. Lab 4 is coordinating the EC program InPho-Time from	

2017 to 2022 with a 2 Mill. € support. Another example is the InChron project with University of Leicester (Marie curie Action) focusing on juvenile hormone receptor phosphorylation. Head of lab 1 is editing Current Opinion in Insect Science and of Scientific Reports. Head of lab 2 is Chief Editor of the Journal of Insect Biochemistry and Molecular Biology.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The heads of the labs have organized a high number of international congresses, workshops and symposia during the evaluation period.	

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

D2.1	**Direction in line with the perspective of the planned research directions**
One of the five labs (Lab 5) was only recently founded, but is well integrated into the team and represents a valuable thematic addition.	
D2.2	**Assessment of the previous research objectives and their achievement**
All research objectives were fully met.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The recommendation of the past evaluation committee was very positive: “The research topics are very interesting, and the sub-teams should continue their successful research”. Nevertheless, the team still tried to improve its performance, for example by establishing a new research group in 2018 (Laboratory of Telomere Research).	
D2.4	**Success in receiving grants**
The team was very successful in receiving grants, also beyond those from Czech institutions, such as EC grants (total of 239,694 € per FTE, which is far above average).	
D2.5	**Adequacy of instrumental equipment**
Instrumental equipment is adequate and in effective use.	
D2.6	**Effectiveness of management**
The recently established International Advisory Board (11 members) of the Biology Centre benefits all teams.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
All teams meet very good requirements for recruitment of best scientist. The present age structure of the team is vivid.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
As in all research institutions, the gender ratio is balanced until PhD students. Hardly anything will change there.	
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.**

No information available.

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
Thanks to the location of the Biology Centre on the campus of the University of South Bohemia, the relationships between these partners are particularly close. There are also good relationships with many other national and international universities.	
D3.2	**Effectiveness of joint research centres**
Not applicable.	
D3.3	**Success rate in supervision of PhD students**
At present, 12 PhD students work in the team and are optimally supervised. The rate of successfully finishing PhD studies is very high. Eight doctoral dissertations were defended during the evaluation period.	
D3.4	**Participation of PhD students in the outputs**
PhD students are authors, and sometimes corresponding author in almost all publications.	
D3.5	**Participation of the team in master or bachelor studies**
Sixteen bachelor theses and 19 master theses were defended between 2015 and 2019.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Thanks to the common location on the university campus, the teaching intensity of all team members is very high.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Members of the team organized regular science popularization event for general public.	
D4.2	**Publishing activities and its quality**
Besides the scientific output (see above), members of the team have published several popular books and articles.	
D4.3	**Participation in professional organisations in the area of research and development**
Some team members are involved in professional societies.	

Other comments of the commission: n/a

2. Insect Biochemistry and Physiology

Strengths:
The team "Insect Biochemistry and Physiology" consists of four laboratories, each working on mechanisms that help insects to survive and perform in various stressful situations. This research area is of high general importance, when recognizing the current global insect die-off under changing environmental conditions. The breadth of research ranges from forest monitoring through agriculture to lab work. Stress biology is clearly the unifying theme between the labs of the team.

Weaknesses:
The acquisition of grants is relatively low and the output of publication per FTE does not exceed average. However, when looking on output per FTE with reprint author from the lab, the productivity is well above average, yet lacking articles in the top world-leading category.

Opportunities:
Lab 4 (Analytical Biochemistry and Metabolomics) is going on to develop methods allowing to determine more than 2000 metabolite entities in one sample at the same time. This achievement would set the team towards world-leading position.

Threats:
The relatively low basic financial support makes it difficult to stay up to date with the required complex analysis equipment. The practical use of neuropeptide agonists or antagonists needs close collaboration with agricultural industry. The team should prepare strategies for this collaboration for the intermediate future.

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

H1.1	Quality of selected outputs of Phase I
Twenty eight publications from a total output of 138 publications between 2015 and 2019 were evaluated in the first phase. The team publishes continuously in internationally well recognized journals, but more publications in top journals would be desirable. The average mark of 2.46 in the phase I evaluation indicates that the outputs are internationally close to excellent in terms of originality, significance and rigour, but that more papers in World Leading category would be required. The distribution of quality of submitted outputs based on Phase I is only 3.6% as World Leading (1) but 53.6% of outputs as WL + Internationally excellent (1+2).	
H1.2	**Contribution of workers on the outputs reached**
The total output per FTE is comparably low (1.26), but in most of the papers, corresponding author is from the team. The lab of Dalibor Kodrik has recently (2021) published a paper in Neuroscience and Behavior Reviews (IF 9.526).	
H1.3	**Quality of all outputs and results**
Outputs and quality of results are of very good level. The distribution of quality of total outputs by bibliometrics is good, with 12.3% of outputs in 1* or 1 quartile, and 54.3% of outputs in the quartile 1* - 2.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Experiments on the endocrine control of stress situations showed a high species specifity, which makes it necessary to study a wide variety of also non-model insect species. Studies	

on insect survival not only in extreme cold winters, but in liquid nitrogen are of great importance for freezing tolerance of animals and tissues in general. Forest protection against pests like bark beetles gains local and international importance under global climate change. Finally, the Analytical Biochemistry Lab represents an indispensable "pillar" for all teams.	
H1.5	**Contribution of the participation of the authors in large collaborations**
The team is involved in several joint projects with international partners. Output produced in very large collaborations is slightly below average.	

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

H2.1	**Societal relevance of outputs and results pursuant to CAS and institute mission**
Although the four labs are involved in basic entomological research, all research fields let expect practical application: Neuropeptides as a novel class of highly specific insecticides; survival in liquid nitrogen for bioconservation of animals and tissues; protective measurements against bark beetles in forest conservation.	
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 above mentioned practical applications will certainly take some amount of time, but they are important approaches in an ecology-friendly environmental policy.	
H2.3	**Relation to practice**
Immediate and direct application of the research results can be expected, for example, in the bark beetle protection program.	
H2.4	**Participation in AV21 strategy**
Protection against bark beetles represents an important component in the novel AV 21 program "Saving and Restoring the Landscape".	
H2.5	**Cooperation with regions of the Czech Republic**
Direct cooperation occurs with the forest authorities in Czech Republic. The lab of Analytical Biochemistry is an important service provider for laboratories in CZ and abroad.	

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 laboratories of the team have become more or less leading institutions in the field of insect biochemistry and physiology in recent years. The analytical platform, for example for the structure elucidation of neuropeptides, is in demand worldwide (e.g., University of Capetown, RSA).	
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 involved in several national and international cooperations. For example, there is long term collaboration with group of B. Sinclair at Western Ontario, which has resulted in a series of highly original studies on the mechanisms of insect cold hardiness focusing on low molecular mass cryoprotectants, and also involved bidirectional exchange of doctoral and postdoctoral students. The head of the team is Executive Editor of the European Journal of Entomology.

D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The head of the team organized the 93rd Conference of the Czech and Slovak Physiological Societies in 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**
Future research will focus on the following areas: adipokinetic hormone vs. entomopathogens in stress reaction and the role of vitellogenin; insect diapause regulation and photoperiodic signaling; use of fungi in bark beetle control; neuropeptides as insecticides; insect metabolomics.	
D2.2	**Assessment of the previous research objectives and their achievement**
All research objectives were fully met.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The evaluation committee had seen the prospects of the team as 'good' but noted that the team needs support by younger researchers. The previous report also motivated the team to wider exploit *Drosophila* knock-down mutants for functional assays, and considering epigenetically and small RNA-regulated processes. The team followed these suggestions as far as possible.	
D2.4	**Success in receiving grants**
The amount of grants was 3.731 Mill. € for 2015-2019, that means 168 595 € per FTE. This could be considered as average.	
D2.5	**Adequacy of instrumental equipment**
Cannot be evaluated in detail without on-site visiting, but the self report indicates that equipment is adequate	
D2.6	**Effectiveness of management**
The team consists of a manageable unit of four smaller laboratories. The good cooperation is reflected in many cross-laboratory publications.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
The current age structure needs to be rejuvenated in the near future. Eight out of 30 members are older than 50 years.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Laboratory managers are male, but several female PhD students work in the labs.	

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.
No information available.	

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
Thanks to the location of the Biology Centre on the campus of the University of South Bohemia, the relationships between these partners are particularly close. There are also good relationships with many other national and international universities.	
D3.2	**Effectiveness of joint research centres**
The BC organization is beneficial for the team.	
D3.3	**Success rate in supervision of PhD students**
The team is very active in doctoral training as in total 11 PhD dissertations were defended during the evaluation period. The relatively small laboratories presently supervise 2 to 4 PhD students each.	
D3.4	**Participation of PhD students in the outputs**
All PhD students are authors or even corresponding authors of the respective publications.	
D3.5	**Participation of the team in master or bachelor studies**
Very high number of BSc (16 in 2015-2019) and MSc (6) students.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Team and lab heads teach regularly at the University of South Bohemia on the campus.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Media communication at the Biology Centre follows the BC media strategy and is coordinated by the PR manager of BC. Every year, the Biology Centre, together with the University of South Bohemia, has organized two series of lectures for the general public, called Akademické půlhodinky (Academic Half-Hours).	
D4.2	**Publishing activities and its quality**
Head of lab 4 is author or co-authors in three popular science books in Czech or English language.	
D4.3	**Participation in professional organisations in the area of research and development**

The heads of labs 1-3 are members of the editorial boards of eight international journals. The head of the team organized the 93rd Conference of the Czech and Slovak Physiological Societies in 2016 in Česke Budejovice. Andrea Bednářová (lab 1) received the Seal of Excellence awarded by Marie-Sklodowska Curie Action, 2018.

Other comments of the commission: n/a

3. Insect Biodiversity and Conservation Biology

Strengths:
Insect biodiversity and insect conservation have become most important fields of entomology in a world of global temperature change and beyond. The team consists of four active laboratories, which have been merged to a team in 2015 and cover large areas of biodiversity research, from butterflies in traditional landscape and forest to the freshwater biota under climate change and pollution, and the application of nematodes in insect pest control. Lab 5 is new and followed the Aphidiology of Petr Stary in 2019 (lab 4). The age profile of the team is good with a balance in terms of young and more experienced researchers.

Weaknesses:
The four labs each work for themselves on relatively specialized sub-areas, so that a cooperation is rather difficult and not yet recognizable. Some labs are very small. Closer collaboration with the entomologists from team 2 would also be desirable. Forest management work of labs from different teams/institutes should be better coordinated. Research funding, and especially from international sources, should be strengthened.

Opportunities:
The novel research field of nematode diversity and its application in biocontrol in lab 5 promises high practical relevance. Another expandable research area of high general interest is the species succession and biodiversity in former military training areas (lab 1).

Threats:
The new lab 5 needs continuous financial commitments for a determined development of this new direction, and also to get international cooperation partners in near future.

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

H1.1	Quality of selected outputs of Phase I
The productivity of the team in excellent outputs is average, or slightly above when considering reprint authors from the labs (mark 2.32 in phase I rating). The distribution of quality of submitted outputs based on bibliometric is relatively good with 14% in 1* and more than 60% of output in 1* or 1 quartile, and 82% in 1*-2. The distribution of quality of submitted outputs based on Phase I is also good with 7% as World Leading and 61% of outputs as World Leading plus Internationally Excellent. Compared to the field, the team produces less than the average of total outputs and less of World Leading outputs. However, the World Leading + Internationally Excellent outputs are the same as the average.	
H1.2	**Contribution of workers on the outputs reached**
In many publications reprint authors are from the team.	
H1.3	**Quality of all outputs and results**
Many papers are published in very good to excellent international journals (Ecology Letters, Nature Communication, Peer J., PlosOne). The distribution of quality of outputs by journal ranking is relatively good, with 3% of outputs in 1*, 12% on 1st quartile and 16% in the 2nd quartile.	

H1.4	The most valuable discoveries and findings in the fields, their importance for the field
The mapping of butterflies of the Czech Republic (lab 1) is of high societal importance. A rather novel technique is the radiotracing of endangered beetles in Europe. Lab 4 developed a method of DNA extraction for forensically important flies.	
H1.5	**Contribution of the participation of the authors in large collaborations**
The cooperation activity is average and could be strengthened. A large number of submitted outputs are produced with international collaboration and in more than half of them the corresponding author was from the team. World Leading outputs were only produced through participation in international consortia. It is thus evident that international collaboration has resulted on higher quality outputs and it should thus be encouraged.	

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

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
The work of the team targets the cross-section among ecology and society. The four labs are engaged in basic entomological research, but in all cases social relevance of outputs is expected.	
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**
Forest management and the restoration of military training areas are important in terms of nature conservation, preservation of biodiversity and global temperature changes. The same applies for the biodiversity in freshwater ecosystems in relation to temperature increase and water pollution.	
H2.3	**Relation to practice**
Results from the work in lab 4 promise the use of nematodes in agricultural pest biocontrol. The team has collaborated with state conservation officials and NGOs.	
H2.4	**Participation in AV21 strategy**
Results from all labs will contribute to our basic understanding of ecosystem functioning in polluted terrestrial and aquatic ecosystems. Insect protection and conservation makes a decisive contribution to the maintenance of our agricultural systems, and thus to the nutrition of humans.	
H2.5	**Cooperation with regions of the Czech Republic**
Close cooperations exist with forest authorities, water protection authorities and military institutions throughout the 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 entire team has a very good international standing, as indicated by their international publications. However, research focuses on the study of ecosystems in the Czech Republic.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
Lab 3 aims to chart the diversity of New Caledonian mayflies and unravel their origin and evolutionary history. The group collaborates with a number of international institutions. The international collaboration seems to increase the quality of the outputs. The team should explore further opportunities for international collaboration in big research projects.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The members of the group are very active across the whole range of relevant scientific activities including editor in journals, members of advisory boards, and scientific societies, and organisers of conferences and workshops.	

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

D2.1	Direction in line with the perspective of the planned research directions
The proposed research plan aims for consistent continuation. The main goal of this team is to document and understand the principles of insect biodiversity in non-tropical regions in order to conserve this fundamental component of ecosystems.	
D2.2	**Assessment of the previous research objectives and their achievement**
The team successfully followed the previous research plan and achieved the proposed aims. Laboratory 4 was well integrated into the team.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
As recommendation from past evaluation, the current team of Insect Biodiversity and Conservation Biology was successfully formed. Further recommendations including internationalisation, molecularization, and wider collaborations were partially achieved.	
D2.4	**Success in receiving grants**
Grants per FTE are lowest of the four teams in the Institute of Entomology (83,000 € per FTE). More intensive acquisition of funds, also from the EC, would be desirable.	
D2.5	**Adequacy of instrumental equipment**
As there was no on-site evaluation, nothing can be said about this.	
D2.6	**Effectiveness of management**
The team is quite small and can easily be managed by the head.	

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 average; one lab was closed in 2019 because of retirement/ health problems of the head. The age profile of the rest of the labs is good with the majority of researchers below the age of 45 with ample scientific freedom to pursue their research but also closely linked with existing strengths in the group. However, the gender balance needs further improvement. The team provides a supportive environment for the PhD students and young researchers. The team welcomes foreign researchers and PhD students.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Not applicable.	
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 team is involved in the novel program „Saving and Restoring the Landscape“ since 2019.	

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

D3.1	Scope of cooperation with universities on national and international level
All labs are highly engaged in teaching, mainly at the University of South Bohemia.	
D3.2	**Effectiveness of joint research centres**
The team is in close contact with the other teams of the Institute of Entomology, occasionally realizing common supervision of BSc and MSc theses. An agreement on the establishment of a joint workplace with the University of South Bohemia is being prepared (The school of doctoral studies in the biological sciences).	
D3.3	**Success rate in supervision of PhD students**
Nine PhD students defended their thesis in 2015-1019. Eight PhD students are presently working in labs 1-3, but none in the recently founded lab 5.	
D3.4	**Participation of PhD students in the outputs**
PhD students appear regularly as authors, or even corresponding authors, on the publications.	
D3.5	**Participation of the team in master or bachelor studies**
All teams offer courses for BSc and MSc students and in all teams bachelor (17) and master students (21) completed their theses in the period of 2015-2019.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
The teaching activity comprised regular lectures, seminars and courses and appears sufficient and adequate.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
All teams of the Biology Centre communicate with the public online on social networks (websites, Facebook, YouTube). A lot of events for the general public is organized by the teams. Four members of the team are editorial board members for three international journals.	
D4.2	**Publishing activities and its quality**
The head of the team and lab 2 have published a book on the National Park Krkonoše.	
D4.3	**Participation in professional organisations in the area of research and development**
The head of lab 3 organized the symposium on „Freshwater Food Webs: Where do we go“ together with the University of South Bohemia in 2019 and was main organizer of the 5th Conference of the Czech Society for Ecology in Ceske Budejovice, 2015.	

Other comments of the commission: n/a

4. Insect Ecology

Strengths:
The team consists of ten labs, working on ecological and evolutionary mechanisms of biodiversity origin and function, using a combination of field and laboratory observations, experiments and modelling on local to global scales. The productivity of the team in excellent outputs is clearly well above average, also when considering the reprint authors from the team. The number of publications per FTE is high (1.63). In the period of 2015 to 2019, the team received external funding in a total amount of more than 10 Mill. €, which means about 290,000 € per FTE. As indication of this team's excellence there were also two large EC grants.

Weaknesses:
Most of the work takes place abroad, which has become difficult during the last 12 months. With ten labs, the team is quite large and could perhaps be organized more stringently. However, it is to be recognized that they have established a joint support team, managing finances, supplies, logistics and other support across laboratories.

Opportunities:
Plant herbivore food webs in lowland rainforest show unique attributes, as well as the topdown control of rainforest arthropods by low vertebrate predators. This research approach promises novel and surprising results. There is a good opportunity, and need, to work together with the botanical colleagues.

Threats:
In the current pandemic it must be hoped that work abroad can soon be fully resumed.

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

H1.1	Quality of selected outputs of Phase I
Fifty nine publications from a total (very high) output of 285 publications between 2015 and 2019 were evaluated in the first phase. Average rating of outputs is 2.07, that can be considered as internationally excellent in terms of originality, significance and rigour. The distribution of quality of submitted outputs based on phase I is also excellent with 14 (23.7%) as World Leading (1) and 42 (71.2%) of outputs as WL + Internationally Excellent (1+2). Quality output of phase I evaluation is excellent also with 1.63 publications per FTE. Publications are found,e.g. in Nature Conservation and Ecology Letters.	
H1.2	**Contribution of workers on the outputs reached**
Members of the team are reprint authors in 4 of the 14 'group 1' papers and in 15 of the 28 'group 2' publications. Fractional count also indicates that contribution of workers in the produced world leading papers of phase I outputs is very high ($FC_{1,2}$/FTE: 0.35, $N_{RP,12}$/FTE: 0.53).	
H1.3	**Quality of all outputs and results**
Quality of all outputs and results is of excellent level. The distribution of quality of total outputs by bibliometrics is also excellent, with 31.6% of outputs in 1* or 1 quartile, and 55.8% of outputs in the quartile 1* - 2.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**

Several of the labs are working in close collaboration on network structure and functions in tropical areas. The investigations range from observational and experimental research in the field through small scale laboratory experiments to DNA metabarcoding and simulation models.

H1.5	Contribution of the participation of the authors in large collaborations
In collaboration with lab 1 of team 3, the insect biodiversity in post-industrial sites and former military areas is studied. Other collaborative activities include the leadership or participation in international projects in eight countries.	

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

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
Several outputs have direct societal relevance, such as the restoration of former coal mines or other post-industrial sites.	
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 trains many PhD students at high level for a later career in industry and science.	
H2.3	**Relation to practice**
In addition to the direct conversion of the research results into practice in restoration of post-industrial areas, findings on the pollination biology in tropical ecosystems or on biodiversity maintenance are also of high practical relevance.	
H2.4	**Participation in AV21 strategy**
Several teams are involved in developing procedures to restore damaged landscape in Czech Republic and abroad.	
H2.5	**Cooperation with regions of the Czech Republic**
Restoration areas under consideration are distributed throughout 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
Team 4 is the largest insect ecology facility in the Czech Republic and has an excellent and internationally recognized standing.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
Studying ecological mechanisms of biodiversity in the tropics is only possible with excellent cooperation with the local administrative and scientific institutions.	

D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
Fifteen conferences and symposia were organized by team members in 2015 to 2019. Out of seven awards received by team members in the last 5 years, an Alexander-von-Humboldt fellowship and a Marie Curie fellowship should be mentioned.	

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

D2.1	Direction in line with the perspective of the planned research directions
The team is fully in line with the planned research directions using a still wider variety of taxa and global networks of study sites.	
D2.2	**Assessment of the previous research objectives and their achievement**
The team produced the highest output of any group in the Institute of Entomology. The number of labs increased from four to ten, the last one has been opened recently.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The increase in lab numbers during the last five years let the individual labs as basic research unit remain in a manageable size. An increased focus on biochemical research has been developed in collaborations with colleagues from abroad.	
D2.4	**Success in receiving grants**
The team received highest amount of grants of any team in the Institute of Entomology, absolutely as well as per FTE.	
D2.5	**Adequacy of instrumental equipment**
New controlled climate chambers allow the team to expand their experiments from field manipulations to laboratory microcosms. In Papua New Guinea, the principal field site of the team, a canopy crane was built, providing them with access to rainforest canopy.	
D2.6	**Effectiveness of management**
The team is quite large, but well managed by tight interactions between the laboratories.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
The team expects to expand to approximately 150% of its current size over the next five years, from ten to ~14 laboratories. They try to keep their focus on diverse funding sources, including ERC, in order to support their future expansion. The present age structure is 30 years in average.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
No information available.	
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.**
No information available.	

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
Two of the team members have been involved in establishing a new MSc Ecology program at the local University of South Bohemia that is taught in English language. The team members have acted as external supervisors for 22 BSc (Hons), MPhil and MSc students in tropical countries.	
D3.2	**Effectiveness of joint research centres**
No information available.	
D3.3	**Success rate in supervision of PhD students**
PhD students represent a majority of team members (41 from 79). In total of 16 doctoral theses were defended during the evaluation period. More than 80% of the PhD graduates remain in research, some of them were successful at obtaining postdoctoral positions overseas.	
D3.4	**Participation of PhD students in the outputs**
More than 80% of the publications include PhD students as authors, many of them as corresponding authors.	
D3.5	**Participation of the team in master or bachelor studies**
See D3.1. Lectures, seminars and courses were given for BSc and MSc students at three Czech universities and five universities abroad.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
The team members' commitment to teaching at universities is above average.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Popularization outputs of the team are mostly in Czech language for the local audience in Czech Republic, and to smaller extent also in English for the international audience including Papua New Guinea and Cameroon.	
D4.2	**Publishing activities and its quality**
The team published more than 100 texts in newspapers.	
D4.3	**Participation in professional organisations in the area of research and development**
Team members are active as editors or editorial board members in 15 international journals.	

Other comments of the commission: n/a

5. Aquatic Parasitology

Strengths:
The team is internationally very well recognised with a wide scope of research that utilizes for example large-scale molecular approaches together with more traditional approaches of parasitology. The team has implemented systematic research into wider evolutionary and ecological concepts, resulting in a broader scientific interest and publications in high-impact journals. The team has secured governmental, EU and commercial funding for its projects, and successfully hired international experts at the postdoc level to kick-start new lines of research. The team has been able to update facilities and instruments. The electron microscopy laboratory is an excellent core facility for own research and other groups in BC. Outputs of the team receive relatively well citations.

Weaknesses:
Many members of research staff get their salaries through grants and only a few positions are somewhat secure (no permanent positions). European commission level funding is relatively low. Genomics and proteomics approaches could be used more in research. Number of PhD students is low. The team self-reported the shortage of IT specialists in image analysis and 3D reconstruction due to the low level of salaries in public research institutions.

Opportunities:
Team has good capacity to offer high-level on-site training of foreign researchers and students. Number of doctoral students has been increasing.

Threats:
Some of the key senior researchers may be retiring soon, and optimal recruitment is always a challenge. Recruitment of students is difficult due to the limited opportunities for most researchers to teach at universities.

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

H1.1	Quality of selected outputs of Phase I
Twenty nine publications from a total (very high) output of 280 publications between 2015 and 2019 were evaluated in the first phase. Average rating of outputs is 2,03, that can be considered as internationally excellent in terms of originality, significance and rigour. The distribution of quality of submitted outputs based on Phase I is also excellent with 24,1% as World Leading (1) and 48,3% of outputs as Internationally excellent (2).	
H1.2	**Contribution of workers on the outputs reached**
Fractional count indicates that contribution of workers in the produced world leading papers of Phase I outputs is very high (more than four times the average of the field). Also the contribution in world-leading plus internationally excellent level outputs indicates excellent activity and output (that is notably higher than average of the field). The researchers from the team contribute a substantial part to the achieved excellent results and in most cases they appear as corresponding authors ($FC_{1,2}$/FTE: 0,55, $N_{RP,12}$/FTE: 0,62). Both parameters indicate excellence.	
H1.3	**Quality of all outputs and results**

Outputs and quality of all results are of good level. The distribution of quality of total outputs by bibliometrics is good, with 9,6% of outputs in 1* or 1 quartile, and 31,8% of outputs in the quartile 1* - 2.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
The team has provided discoveries and findings from several topics including 1) Biodiversity, phylogeny and evolution of myxozoans in fishes, 2) Evolution, systematics and ecology of amoeboid organisms, 3) Parasites threatening amphibian biodiversity, 4) Host-parasite interactions and fish immune responses, 5) Global diversities of tapeworms and nematodes, 6) Parasites of freshwater fish in Africa, 7) Diversity and phylogenetic relationships of helminths in the neotropical region, 8) Species boundaries, diversity, ultrastructure and interrelationships of tapeworms, 9) Integrative taxonomy approaches to trematode diversity and ecology, 10) Fish- and water-borne helminthoses as emerging human diseases, and 11) Invasive fish parasites. Many of the findings have notable importance to the field also internationally.	
H1.5	**Contribution of the participation of the authors in large collaborations**
Many of the outputs are product of large collaboration efforts.	

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

H2.1	**Societal relevance of outputs and results pursuant to CAS and institute mission**
Some of the outputs have direct and indirect 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**
The team was engaged in some applied research which brings new possibilities for translation into practice. Some research outputs were applied in the form of new methods or manuals in the field of agriculture (fish production, veterinary medicine) or environmental protection.	
H2.3	**Relation to practice**
Applied research has provided applicable information that is practical to, for example, aquaculture and veterinary fields. The lab of Protistology produced a new methodology for alternative ecosystem management, certified by the Czech Ministry of Environment.	
H2.4	**Participation in AV21 strategy**
No information available.	
H2.5	**Cooperation with regions of the Czech Republic**
The team prepared several methodological guides and SOPs and organized workshops for veterinarians and fish farmers in South Bohemia and some other 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
This is an internationally recognized very strong team.	
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 research groups of the team do have active national and international cooperation activities. A. Holzer and members of the Laboratory of Fish Protistology were part of EU-Horizon 2020 project “ParaFishControl” with a multidisciplinary consortium comprising 28 partner institutions. T. Scholz was the coordinator of one of four principal groups of National Science Foundation, USA project “Tapeworms from Vertebrate Bowels of the Earth”. Laboratory of electron microscopy is a part of a national Infrastructure for biological and medical imaging involving facilities of nine academic partners supported by the Ministry of Education, Youth and Sports of the Czech Republic.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The team has been actively involved in scientific community activities, and in organizing many scientific 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
Current directions are quite well in line with the perspective of the planned research.	
D2.2	**Assessment of the previous research objectives and their achievement**
Notably high number of outputs was produced.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The team has expanded its research to new applied fields by strong development and diversification of laboratory staff and their research, both in evolutionary and ecological as well as in functional studies. Earlier systematic approaches have been modified into wider analytical concepts, high throughput sequencing datasets have been produced, and genomic/transcriptomic bioinformatics pipelines have been established. The team has strongly improved the quality of their scientific outcomes and has published key papers in high-impact journals such as Nature Genetics, Clinical Microbiology Reviews, Nature Communications, PNAS, Current Biology, Emerging Infectious Diseases, Trends in Parasitology, PLoS Pathogens, and Molecular Ecology. Team has established a strong and internationally unique model for applied research (an in vitro and in vivo model for myxozoan proliferation research). The staff has been more stabilised because of success in competition for grants including EU projects (Horizon 2020) and contract with Skretting Company.	
D2.4	**Success in receiving grants**
The team obtained grants of 4,299 M€, equalling 0,223M € per FTE.	
D2.5	**Adequacy of instrumental equipment**

Instrumental equipment is adequate and effective.	
D2.6	**Effectiveness of management**
Management is effective. The team worked in three relatively independent laboratories: lab. of Fish Protistology, lab. of Helminthology and lab. of Electron Microscopy, which acts also as core facility for other teams in the Biology Centre of CAS.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Age structure is balanced with 4 senior researchers and predominance of young researchers 25-45 years. Some of them have the potential to replace the current group leaders in future. The team is also quite international with almost one half (46%) members having joined the team from predominantly high-quality scientific institutions abroad.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
The gender balance of the team members is good with 62% of staff being women. Two of the three laboratories are headed by women.	
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.**
No information provided.	

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 plenty of active cooperation with universities both on national and international level.	
D3.2	**Effectiveness of joint research centres**
Team members were active in “European Centre of Ichthyo-Parasitology” founded as the Centre of Excellence between Masaryk University Brno and Biology Centre CAS České Budějovice.	
D3.3	**Success rate in supervision of PhD students**
Six doctoral theses were defended 2015-2019, but the “Personal structure of team“ sheet yet indicates low proportion of FTE of PhD students. The proportion is increasing, though.	
D3.4	**Participation of PhD students in the outputs**
PhD students co-authored in 71 outputs that equals approx. one fourth of all the outputs produced by the team.	
D3.5	**Participation of the team in master or bachelor studies**
Teaching courses at the universities is active with majority at the University of South Bohemia, but also Charles University in Prague, Technical University of Ostrava and two abroad (Spain, U.S.A). They acted as supervisors of 12 bachelor, 15 master and 13 doctoral (Ph.D.) students.	

D3.6	Assessment of cooperation intensity with universities in the form of teaching
The team has active teaching cooperation with universities (mostly with University of South Bohemia), including several bachelor and master level courses.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Research popularisation, both nationally and internationally, has been active and sufficient, including various media communication, articles, general public lectures, exhibitions, etc.	
D4.2	**Publishing activities and its quality**
Several articles in newspapers and popular science magazines were released.	
D4.3	**Participation in professional organisations in the area of research and development**
Team members serve on editorial boards of several scientific journals, T Scholz acted as a head of evaluation panel of Czech Science foundation (GAČR), and members of evaluation boards of other grant agencies. The members acted as a members of Academy Assembly of the CAS, members of Board of the Biology Centre (T. Scholz as a Chairman 2012 - 2017) and the members of Scientific board of the Institute of Parasitology.	

Other comments of the commission:

6. Evolutionary Parasitology

Strengths:
The strengths of the team rest on a dynamic group of young scientists who are internationally well recognized with an outstanding portfolio of publications addressing the central questions of the research topic as well as good facilities. The team has very good funding from Czech sources.

Weaknesses:
One weakness of the team is the lack of international funding despite several application for ERC and other funding sources.

Opportunities:
The expertise of the group in modern molecular technologies together with their existing international contacts and excellent publication record indicates that the team has the potential to obtain international funding and increase its international profile.

Threats:
Despite having funding available it was not possible to hire additional staff for the laboratory of environmental genomics. This is a concern and threat for the future development of this highly successful team.

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

H1.1	Quality of selected outputs of Phase I
All four laboratories within the department have a strong portfolio of publications in high impact journals. Eighteen publications from a total output of 105 publications were evaluated in the first phase. Average rating of evaluated outputs is 1,72 which is well above the average of the evaluated biological teams. The distribution of quality of submitted outputs based on Phase I is also excellent with 9 (50 %) as World Leading (1) and 5 (27,7 %) of outputs as Internationally excellent (2).	
H1.2	**Contribution of workers on the outputs reached**
Though not always as lead authors, the members of the department have played a major or leading role in most of their high impact publications	
H1.3	**Quality of all outputs and results**
The number and quality of the outputs is consistent with what would be expected from a young dynamic and highly motivated team of scientists. In the evaluated period, 105 outputs were published, this means 9,5 publication per FTE (high number) 29 (27,6 %) of which were in the first decile or quartile, 28 (26,6 %) in the second quartile, altogether 54 % publications in the first or second quartile.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
Members of the department have contributed to the discovery of chromerids. They have provided evidence of the evolutionary link between apicomplexan and dinoflagellate plastids through sequence-based approaches. They have also studied the evolution of key metabolic pathways and their role in parasitology in several of their target organisms.	
H1.5	**Contribution of the participation of the authors in large collaborations**

The main contribution the group has made to many of the collaborative studies has been through bioinformatic evolutionary analyses and metabolic pathway reconstruction.

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

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
The laboratories within this department not only have good publication records but are producing outputs which are of major evolutionary significance in terms of the coevolution of organisms. The topic is of principle 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**
The focus of the department is on evolutionary processes but the principles they are elucidating have significant value in developing an understanding of parasitology in both the applied and evolutionary spheres.	
H2.3	**Relation to practice**
The team is focused exclusively on basic research, they do not put applied research or outputs into practice.	
H2.4	**Participation in AV21 strategy**
Data not available	
H2.5	**Cooperation with regions of the Czech Republic**
Data not available	

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 team compares very well at both the national and international levels.	
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 plays a significant active role in several national and international collaborations. The quality of the work and the range of technologies that the team has in house will increase the opportunities to expand and further develop their work.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The team has been highly active in supporting scientific publication through editing and reviewing and large number of journals - most of high quality. They also have a good record of organising workshops based on their technical experience and the capability and infrastructure facilities.	

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

D2.1	**Direction in line with the perspective of the planned research directions**
The work is well focussed and directed and builds sensibly on the previous work.	
D2.2	**Assessment of the previous research objectives and their achievement**
All the groups have made excellent progress against their planned workplan which has matured to the level of excellent publications	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The recommendation to increase the staffing support for the Horak lab has not been met due to difficulty of recruitment. This is a concern which needs a broader strategy to solve which may include such options as joint appointments with external laboratories and countries.	
D2.4	**Success in receiving grants**
They have a very good grant portfolio, though their grant success is largely focussed on Czech sources. Given the quality of the work and their publication record it is surprising they have not had more success at a European level. They need to develop an active strategy to broaden their funding portfolio.	
D2.5	**Adequacy of instrumental equipment**
The group has good equipment resources. This is in terms of laboratory facilities, microscopy and computing resources and supporting expertise.	
D2.6	**Effectiveness of management**
This group is well managed and focused on delivery of basic understanding. The team consists of four more or less independent scientific laboratories.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
The team has a good youthful age structure (most up to 45 year). This includes most of the laboratory leaders. They also have an explicit policy of supporting return to work after maternity and dealing with the issues of childcare. The international mixture of the laboratory is a very positive sign.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
See above	
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.**
Data not available	

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 members have efficient links at both the national and international levels.	
D3.2	**Effectiveness of joint research centres**
They were part of two research centres: 1. Photosynthesis Research Centre (2012-2018) (Institute of Parasitology BC, Faculties of Science, Mathematics and Physics Charles University), 2. ERDF-ESF Centre for research of pathogenicity and virulence of parasites (2017- 2022) (Institute of Parasitology BC, Faculty of Science Charles University, Faculty of Science University of Ostrava)	
D3.3	**Success rate in supervision of PhD students**
6 PhD student have graduated in the evaluation period.	
D3.4	**Participation of PhD students in the outputs**
Students have made a major contributions to the outputs from the department. Many of the important papers in excellent journals have Ph.D. students as first authors which is an adequate practice.	
D3.5	**Participation of the team in master or bachelor studies**
The team has supported 11 students at this level. Team members were supervisors of bachelors (12 students graduated) and masters (6 student graduated since 2015).	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
The team has provided courses in bioinformatics, genomics, population genetics, molecular ecology, molecular phylogenomics and conservation genetics (Faculty of Science, University of South Bohemia). This is an excellent use of the wide expertise 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
Several members of the team have given popular scientific lectures or contributed articles in Czech science popularisation journals. They also delivered professional lectures for the general public and high school students.	
D4.2	**Publishing activities and its quality**
Members of the team have acted as either guest or subject editors for mainstream journals as well as contributing as reviewers.	
D4.3	**Participation in professional organisations in the area of research and development**
Team members served as associate, subject, guest and topical editors of international journals, are members of advisory boards and made bioinformatic tools available to the community.	

Other comments of the commission: n/a

7. Veterinary Parasitology and Zoonotic Diseases

Strengths:
The team exercises multidisciplinary approaches and applies a broad spectrum of laboratory methods and animal models. A broad collaboration at the national and international level is established. They have close cooperation with practice, e.g., with human and veterinary doctors and their health services. The work of the team constitutes an attractive topic for students, and, therefore, many students of various levels are engaged in the scientific work of the group

Weaknesses:
The team comprises a small number of core workers. This limitation represents a vulnerable scientific structure. The number of researchers does not correspond to a wide thematic scope. As a consequence, there is the danger that some topics cannot be adequately addressed.

Opportunities:
With the well-developed international cooperation, the team has the potential to conduct notable international projects and obtain foreign funding.

Threats:
The wide range of topics addressed by a small number of researchers poses a danger that the research will not go deep enough and fails addressing some issue in sufficient depth.

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

H1.1	Quality of selected outputs of Phase I
Nine publications from a total output of 139 between 2015 and 2019 were evaluated in the first phase. Seven of them were in the first decile or quartile, 1 in the second quartile. According to the quality one paper was evaluated in the group 1 (world leading) and 5 in the group 2 (Internationally excellent), with the rating 2.33, which is above the average of the evaluated group of biological teams.	
H1.2	**Contribution of workers on the outputs reached**
Researchers of the team were corresponding authors in 1 out of 9 evaluated outputs in the Phase I (11%) and the overall ratio of excellent publications to the number of employees was low ($FC_{1.2}$ / FTE = 0,17, $N_{RP1.2}$ / FTE = 0.13).	
H1.3	**Quality of all outputs and results**
In the evaluated period, a total of 139 papers were published, distributed in all quartiles. The number of works is large in relation to the number of researchers, but the published research often results from the work of larger teams, in which team members have only a limited share. The most cited outputs do not fit into the evaluation by quartiles (these may be internet publications, books or book chapters).	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
The team worked in a broad spectrum of topics: biology and ecology of microsporidial infection and possibilities of treatment, food as the potential of microsporidium infection, ecology and distribution of vector-borne diseases of wild and domestic animals, effect of	

the colonization by a benign tapeworm on healthy and diseased state, epidemiological study on the occurrence of intestinal protists in the modern society, etc. The team published in all those topics quality-impacted publications. The share of professional books is also very important, of which Parasitology of Apes should be picked up in particular.

H1.5	Contribution of the participation of the authors in large collaborations
The team has built an extensive network of international cooperation, which gives them the opportunity to work on a wide range of different topics, parasitic pathogens and hosts. Most of these collaborations are based on cooperation on joint publications, funded mostly from national sources. The team is member of two larger consortia, one with 13 international research and industrial partners and another one in a Cost action (FA1408).	

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

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
It seems that many of the outputs could potentially have direct and indirect societal relevance, which is already being implemented.	
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**
Thanks to close links to human and veterinary medical services, the results are directly translated in form of general recommendations and specific consultations, and set in practice.	
H2.3	**Relation to practice**
Although most of the results are mainly of theoretical scientific significance, there is considerable potential for application in practice and popularization in society. This potential is implemented in the form of links with general practitioners and veterinarians and the solution of specific situations or in the form of general recommendations. This opportunity should be further strengthened.	
H2.4	**Participation in AV21 strategy**
No information provided**.**	
H2.5	**Cooperation with regions of the Czech Republic**
Regional cooperation takes place at the level of contact with general practitioners or veterinarians.	

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 an internationally recognized scientific team. At the national level, in terms of scientific focus, this is a unique group. At the international level, there are a number of similar teams with which this group cooperates. The strength is provided by the methodological	

background, the use and provision of elaborated animal models and collections of selected parasitic pathogens.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
It is a numerically small team with an extensive network of international cooperation. Cooperation at the national level is not mentioned, at the international level it is a broad cooperation based primarily on work on joint publications.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Team members are involved in a number of professional societies and activities: they are members of the editorial boards of scientific journals, members of scientific boards of institutions and universities, members of the board for doctoral programs in parasitology. They were organizers of the 2nd Czech and Slovak Parasitological Days in 2016, training workshops of methods in parasitology, set of training workshops for capacity building in Rwanda. Compared with the small number of members they have gave many invited lectures at various levels. K. Jirků Pomajbíková obtained an award for young scientists.	

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

D2.1	**Direction in line with the perspective of the planned research directions**
The team is well conceived with a quality staff and a clear line of research. It continues with the necessary research and is therefore quite well in line with the perspective of the planned research. Due to the wide thematic scope, the number of core researchers is critical. It is desirable to further stabilize the group by expanding the number of core researchers, or by formalizing international cooperation by obtaining international grants.	
D2.2	**Assessment of the previous research objectives and their achievement**
The results of the research of the previous period covered a wide range of topics and brought a number of mostly high-quality results. However, the topic is somewhat fragmented and lacks the main research focus.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
According to the recommendations, the group strengthened ties with the human and veterinary health service. Already in the past period, a small number of core researchers and the lack of a senior researcher were pointed out. This shortcoming persists to some extent, although some scientists have become internationally respected scientists over time. The group also improved the approach to addressing the impact of microbiome on the development of IBD.	
D2.4	**Success in receiving grants**
The group is successful in obtaining national grants and is thus financially sufficiently saturated. Although they are involved in international consortia, it would be desirable to increase the supply of funds from international sources as well.	
D2.5	**Adequacy of instrumental equipment**

The research group has sufficient instrumentation. They have a unique animal facility and a wide range of parasitic models, which is sufficient both for their own work and as a starting point for international cooperation.	
D2.6	**Effectiveness of management**
The team is highly qualified and consists of internationally recognized experts. Thanks to the small number of employees, the team management is relatively simple. The individual core researchers are independent in their work, but they cooperate well with each other. An important element is the organization of the work of a large group of graduate students.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
The research team relies on the ability of a small number of core researchers and key technicians surrounded by a large number of students. Gradually, researchers are also maturing into respected scientific personalities. However, this structure is somewhat vulnerable, because even the loss of one key worker could disrupt the fulfilment of the set research goals.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
The group consists of young and middle-aged workers. Researchers are 4: 2 men / women, technicians are all women. It is not known whether the group makes any efforts to optimize age, gender balance, etc. This should be a goal for the next period.	
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.**
No information provided.	

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**
Cooperation with universities is at a high level, most researchers are also involved in teaching, either at the University of South Bohemia in České Budějovice or the Veterinary and Pharmaceutical University in Brno. Researchers are involved in both teaching and university bodies. These ties also stem from their ability to attract postgraduate students as collaborators in their work. A significant advantage is the involvement of a number of foreign students in the projects.	
D3.2	**Effectiveness of joint research centres**
International cooperation on the basis of joint works and publications is wide and successful, but the effectiveness of joint research centres is not entirely clear.	
D3.3	**Success rate in supervision of PhD students**
The work of the whole team includes supervision of and important input by students. During the last evaluated period, 11 bachelor, 6 master and 9 PhD degrees were successfully completed.	

D3.4	Participation of PhD students in the outputs
Students of various degrees participated in at least two thirds (more than 100) of the published results.	
D3.5	**Participation of the team in master or bachelor studies**
Researchers are full-time teachers in bachelor and master degree programs at the University of South Bohemia České Budějovice, the University of Veterinary and Pharmaceutical Sciences Brno, and Palacky University in Olomouc. Team members also participate in teaching in Italy (University of Padova and Bari).	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Cooperation with universities is intensive. In some teaching subjects, the members of the team are guarantors of the field, but also members of doctoral program boards and scientific boards and as such they have an impact on the operation of universities, especially in České Budějovice and Brno.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
With regard to the growing tourism and global globalization, the workers published the UCN Best Practice Guidelines for Health Monitoring and Disease Control in the Great Ape Populations. The team members had a number of outputs and demonstrations of practical activities in high schools.	
D4.2	**Publishing activities and its quality**
The members participated in the popularization of research results in professional journals. Their quality is good, but the quantity could be greater.	
D4.3	**Participation in professional organisations in the area of research and development**
The team was invited to present and make practical results of their results in the Czech Parliament.	

Other comments of the commission: n/a

8. Aquatic Microbial Ecology

Strengths:
The team is internationally well recognised with wide scope of research that utilizes a combination of classical limnological methods with high-throughput microbial isolation techniques and state-of-the-art (meta) genomic and bioinformatic techniques. The team has profound knowledge of microbial food webs based on both field and experimental approaches. The team has also a well-established network of international collaboration, practices successful recruitment of talented scientists from abroad, has an excellent publication record and conducts many funded research projects.

Weaknesses:
The self-reported insufficient seating capacity (in both office and laboratory space) limits further growth and delays experimental work.

Opportunities:
Deeper integration of the team research into the existing consortia and infrastructure, allows for increased international visibility and provides potential for excellent science and ground-breaking results at a global scale. The number of PhD students has been low, but increased to the end of evaluated period.

Threats:
Some of the key senior researchers will be retiring soon, and optimal recruit is always a challenge, if even possible. Threats arise from the self-reported excessive bureaucracy distracting scientists from their primary research goals and the absence of long-term funding stability with excessive reliance on the projects often from a single funding agency.

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

H1.1	Quality of selected outputs of Phase I
Twenty four publications from a total output of 105 between 2015 and 2019 were evaluated in the first phase. Average rating of outputs is 2,21, that can be considered as internationally close to excellent in terms of originality, significance and rigour. The distribution of quality of submitted outputs based on Phase I is also very good with 16,7% as World Leading (1) and 66,7% of outputs as WL + Internationally excellent (1+2).	
H1.2	**Contribution of workers on the outputs reached**
Fractional count indicates that contribution of workers in the produced world leading papers of Phase I outputs is very high, more than three times the average of the field, while the contribution in world-leading plus internationally excellent level outputs was lower than the average of the field. The researchers from the team contribute a substantial part to the achieved excellent results and in most cases they appear as corresponding authors ($FC_{1,2}$/FTE: 0,5, $N_{RP,12}$/FTE: 0,83).	
H1.3	**Quality of all outputs and results**
Outputs and quality of results are of excellent level. The distribution of quality of total outputs by bibliometrics is excellent, with 36,2% of outputs in 1* or 1 quartile, and 69,5% of outputs in the quartile 1* - 2.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**

The team has provided discoveries and findings from several topics, for example, including 1) Ecology of bacterivorous and omnivorous flagellates and ciliates by using a broad suite of single-cell microscopy and molecular approaches, including research on bacterial production quantification in shallow hypertrophic lakes, 2) Metagenomics of microbial and viral communities; including demonstration of transitioning of sediment/soil planctomycetes to aquatic environments, evolutionary history and lifestyles of freshwater and marine Chloroflexi, and microbial diversity in brackish sediments, 3) Cultivation and eco-genomics of abundant planktonic freshwater microbes, 4) Freshwater prokaryote diversity and ecophysiology, 5) Phytoplankton ecology, reservoir limnology and time-series analyses, 6) Taxonomy, genomics, and ecotoxicology of cyanobacteria, 7) Methane dynamics in rivers and 8) Ecology of complex microbial communities. Many of the findings have an internationally notable importance to the field.
H1.5 Contribution of the participation of the authors in large collaborations
Many of the outputs are product of large collaboration efforts.

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

H2.1	**Societal relevance of outputs and results pursuant to CAS and institute mission**
Some of the outputs have direct and indirect 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**
N/A.	
H2.3	**Relation to practice**
The research of the team has provided some applicable information which could be translated to better management of aquatic waterbodies.	
H2.4	**Participation in AV21 strategy**
No information available.	
H2.5	**Cooperation with regions of the Czech Republic**
No information available.	

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 an internationally recognized strong team.	
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 research groups of the team do have active national and international cooperation activities. The advantage of the team is also the fact that a number of foreign workers participated in the evaluated period.
D1.3 **Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Team has been actively involved in scientific community activities like memberships in scientific commissions and panels, and in organizing scientific 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**
The research direction is quite well in line with the perspective of the planned research.	
D2.2	**Assessment of the previous research objectives and their achievement**
Good number of high-quality outputs was produced.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
Team has really made great progress in publishing in top journals such as the ISME Journal (11), Microbiome (5), Limnology and Oceanography (3) and Nature Microbiology (1). There has been an increasing number of invited international lectures given at various conferences and collaborating institutions.	
D2.4	**Success in receiving grants**
The grant funding amounted to 2,270 M€, equalling 0,146M € per FTE, which is good to very good.	
D2.5	**Adequacy of instrumental equipment**
Instrumental equipment is adequate and effective.	
D2.6	**Effectiveness of management**
Management is effective.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Age structure is not very balanced as some of age groups are clearly missing.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
The team aims to keep in mind diversity of gender and career stage in recruits but more information would have been needed for judging on this. The team sees importance to provide a stimulating laboratory environment, by organizing regular meetings on ongoing work or published manuscripts or challenges to future goals.	
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.**
No information provided.	

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 active cooperation with universities both on national and international level.	
D3.2	**Effectiveness of joint research centres**
No official joint research centres mentioned.	
D3.3	**Success rate in supervision of PhD students**
Four doctoral theses were defended 2015-2019, but the “Personal structure of team“ sheet yet indicates low proportion of FTE of PhD students. The proportion is greatly increasing, though.	
D3.4	**Participation of PhD students in the outputs**
PhD students co-authored in 20 outputs that equals nearly one fifth of all the outputs produced by the team.	
D3.5	**Participation of the team in master or bachelor studies**
Teaching courses at the universities is active.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
The team has active teaching cooperation with universities (mostly with University of South Bohemia), including several bachelor and master level courses.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Research popularisation, both nationally and internationally, has been active and sufficient, including various media communication, articles, general public lectures, exhibitions, etc.	
D4.2	**Publishing activities and its quality**
Several articles in newspapers and popular science magazines were produced.	
D4.3	**Participation in professional organisations in the area of research and development**
No information available.	

Other comments of the commission: n/a

9. Ecology of Fish and Zooplankton

Strengths:
The team has expertise in several fish sampling and surveying methods (hydroacoustics, gillnetting, trawling, telemetry). The team has received funding from various sources and types, including research grants, applied grants and commercial contracts. The team has access to unique database of reservoir fish and zooplankton communities' long-term patterns. The team has established various levels of international collaboration that has resulted in several joint projects and publications.

Weaknesses:
The team has low use of collected data in a holistic way including macroecological and trophic web studies, and fairly limited contribution to large-scale research among international research groups. The team may still have to increase the focus on the wider scientific questions. The team lacks in-house expertise in genetic and molecular techniques.

Opportunities:
The team is using a fully functional databases with tailored data management and this could allow for more efficient data extraction and data processing. The team has implemented modern state-of-the-art monitoring-sampling-processing methods (eDNA, microchemistry etc.). The team is able to forecast the fish population dynamics under different climatic and management scenarios based on validated models and is generally working on many climate change-related topics and conservation-related topics.

Threats:
The team self-reports increasing burden of bureaucracy and insufficient institutional support in project management, especially in international projects. Recruiting top scientists seems difficult because of low salary levels. The team experiences also a declining supply and quality of university students that results in a low recruitment of young enthusiastic and perspective researchers.

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

H1.1	Quality of selected outputs of Phase I
28 publications from a total output of 99 publications between 2015 and 2019 were evaluated in the first phase. Average rating of outputs is 2.44, that can be considered as somewhat below the internationally excellent level (but yet clearly at the internationally recognized level) in terms of originality, significance and rigour. The distribution of quality of submitted outputs based on Phase I is very good with 11.1% as World Leading (1) and 50.0% of outputs as WL + Internationally excellent (1+2).	
H1.2	**Contribution of workers on the outputs reached**
Fractional count indicates that the contribution of team members in the produced world-leading papers of Phase I outputs is reasonable, but that the contribution is only about half of the average of the field, while contribution in world-leading plus internationally excellent level outputs is also less than half of the average of the field. The researchers from the team contribute still quite well to the achieved excellent results and in many cases they appear as corresponding authors ($FC_{1,2}$/FTE: 0.14, $N_{RP,12}$/FTE: 0.19). Nevertheless, there is space for improvement.	
H1.3	**Quality of all outputs and results**

Outputs and quality of results are of good level. The distribution of quality of total outputs by bibliometrics is excellent, with 23.2% of outputs in 1* or 1 quartile, and 56.6% of outputs in the quartile 1* - 2.

H1.4	The most valuable discoveries and findings in the fields, their importance for the field
The team has provided discoveries and findings from several topics, including 1) fish community analyses, 2) diurnal vertical migrations of larval and juvenile fish, 3) fish cohort strength variability, 4) fish habitat use and spatial dynamics, 5) fish aggregative behaviours, 6) foraging behaviour and food web interactions, 7) functional role of herbivorous fish and macrophytes in lake, 8) factors shaping zooplankton communities, 9) ecological quality assessments using fish communities, 10) biological invasions, 11) extinction risk and extinction threats, and 12) conservation science. Research findings play generally important role to the field, nationally and also internationally.	

H1.5	Contribution of the participation of the authors in large collaborations
Some of the outputs are the product of large collaborative efforts, including work on developing parameters for monitoring and evaluation of the ecological quality of waterbodies. Also fish telemetry research has involved large international collaboration.	

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

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
Some of the outputs have direct and indirect societal relevance, especially in relation to conservation 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
Research results of the team contribute to improved protection of fish species and improved management of their populations. This is of high relevance for human nutrition.	

H2.3	Relation to practice
Research has provided some applicable information that could be translated in improved management of natural fish resources.	

H2.4	Participation in AV21 strategy
No information available.	

H2.5	Cooperation with regions of the Czech Republic
No information available.	

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 an internationally well recognized team with upward trajectory in its outputs, activities and team size.	

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 research groups of the team do have very active national and international cooperation activities.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Team has been actively involved in scientific community activities like memberships in scientific commissions and panels, and in organizing scientific 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
The research direction is quite well in line with the perspective of the planned research and has a convincing focus on the strongest expertise areas of the team.	
D2.2	**Assessment of the previous research objectives and their achievement**
Reasonable number of high-quality outputs was produced.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The team's main goal has been to significantly increase the publishing effort, both in terms of the number of published papers and especially in terms of higher quality and broader applicability in fields of aquatic ecology and ecology in general. This aim has been successful and the team has clearly improved its performance, indicated by an increase of 44 % of papers published in impact factor journals. Also the average impact factor of the ten best papers published in each year of the evaluated period has increased from 2.085 in the previous period to 4.260 in 2015-2019, and there has been a continuous increasing trend.	
D2.4	**Success in receiving grants**
Funding by grants comprised 5.059 M €, equalling 0.314M € per FTE. This is a very good figure.	
D2.5	**Adequacy of instrumental equipment**
Instrumental equipment is adequate and effective.	
D2.6	**Effectiveness of management**
Management is effective.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Age structure is quite good, but not optimally balanced as age class 45-50 is missing. Senior aged researchers are spread to several age classes that is good.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
The team self-reported that it aims to keep the same treatment of all people without any bias on gender, sexual orientation, age or physical condition. The team‘s policy is focused	

on anti-harassment and non-discrimination in the friendly working environment. Good employee conduct includes readiness to work at their scheduled tasks and times, standard policies on work confidentiality, conflicts of interest, drug and alcohol abuse and workplace violence. Also a policy of flexible working hours is being applied, allowing their team members to maximize their productivity adjusted to the individual needs.	
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.**
No information provided.	

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 active cooperation with universities both on national and international level.	
D3.2	**Effectiveness of joint research centres**
The team is not part of any of the official joint research centres.	
D3.3	**Success rate in supervision of PhD students**
In total, five doctoral theses were defended 2015-2019, but the “Personal structure of team“ sheet yet indicates low proportion of FTE of PhD students. This proportion is greatly increasing, though.	
D3.4	**Participation of PhD students in the outputs**
PhD students authored or co-authored in 30 outputs that equals ~30% of all the outputs produced by the team.	
D3.5	**Participation of the team in master or bachelor studies**
The team members are very active in teaching courses at the universities.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
The team has active teaching cooperation with universities (mostly with University of South Bohemia and Charles University in Prague), including several bachelor and master level courses.	

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

D4.1	**Sufficiency of media strategy and activities in the area of research popularisation**
Research popularisation, both nationally and internationally, has been active and sufficient, including various media communication, articles, general public lectures, exhibitions, etc.	
D4.2	**Publishing activities and its quality**
Several articles in newspapers and popular science magazines were produced.	

D4.3	Participation in professional organisations in the area of research and development
The team has been involved in these activities, including collaboration with the European Committee for Standardization (CEN).	

Other comments of the commission: n/a

10. Plant Virology

Strengths:
The team is highly competent to identify novel viruses in plants as well as algae and fungi. Good expertise has been built up on phytoplasmas. They have developed the necessary know how in HTS and bioinformatics in recent years. The team is well connected with the international community in viral taxonomy. They recently established a link with the Entomology Institute that will aid to open up studies towards viral vectors.

Weaknesses:
Their work remains largely descriptive. They do not seem to have an established specific viral disease model where they can go deeper and elucidate mechanisms of viral transmission, spread, and infection. The team is less involved in teaching and therefore lacks attractiveness for recruiting young researchers.

Opportunities:
The team could develop innovative virus detection methods that could aid their fundamental research approaches but also could be translated into practice. More connections with agricultural institutes would benefit the group.

Threats:
They might be too isolated as a virology group to be effective. Integration with other virology groups or agricultural institutes might be beneficial to propel their research.

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

H1.1	Quality of selected outputs of Phase I
The team has selected 12 outputs for phase I. Two of these were in the top decile of journals, representing a collaborative work where team members are contributing authors. They have 1 and 3 outputs in the top 1 and 2 quartiles of journals, respectively, in which team members are corresponding authors. Altogether, the productivity of the team is stable, but quality-wise somewhat below the average. Many of the outputs that were ranked higher were on topics about viral-algae-fungal interactions, fungal systematics. These are interesting topics run by the team without major funding and largely in collaboration.	
H1.2	**Contribution of workers on the outputs reached**
Highly rated outputs are collaborative work where the team has contributed. These are in well recognised journals of the field, such as Virology and Fungal Diversity.	
H1.3	**Quality of all outputs and results**
The team of ~8 members has published ~75 peer reviewed papers (~10 each over the 5 years). A good proportion of these papers are descriptive focusing on the identification of novel viruses. These are important contributions to the field irrespective of the journal ranking.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
One of the main discovery dealt with viral infection using viral variants and the investigation of the possible mechanisms in cherry. They provided the complete genome sequence of the strawberry crinkle virus. They established an experimental system for virus transmission by aphids that will be extremely useful for future studies. They demonstrated	

the infection of algae with CaMV and studied the evolution of the virus in algae compared to higher plant hosts. They collaborated to establish the molecular taxonomy of Phellinus and Inonotus fungal genera. Their published works on phytoplasma has great practical importance.

H1.5	Contribution of the participation of the authors in large collaborations
The team has collaborated with several international institutes both on the identification and characterisation of viruses. This was also underpinned by a COST action. They also successfully collaborated with Wageningen University on fungal and lichen viruses.	

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

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
The group represents a strong plant virology base in Czech Republic for identifying novel plant viruses and phytoplasma strains. This must be maintained to underpin disease diagnosis and control in agriculture.	
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 built two important links that allow them to transfer their findings to agricultural practices, one with the Research and Breeding Institute of Pomology Holovousy on apple and strawberry and the other one with Havlickuv Brod Ltd on controlling potato bacterial pathogens by phages.	
H2.3	**Relation to practice**
It would be advisable to make further links with agronomy research institutes. It is recommended to work more closely together to find innovative solutions to the detection and control of viral diseases.	
H2.4	**Participation in AV21 strategy**
In spite of the importance of viral diseases in food security, the team is not part of AV21 projects at the moment. They should make efforts to link with teams in food security.	
H2.5	**Cooperation with regions of the Czech Republic**
As mentioned above, the cooperative efforts are limited to two institutes, 1. The Research and Breeding Institute of Pomology Holovousy and 2. The Havlickuv Brod Ltd.	

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 Plant Virology team is somewhat isolated in the Biology Centre and does not have considerable international standing. It would be beneficial to integrate this group with other national and international teams in virology.	

D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
This was limited to a participation in a COST action. The Plant Virology team has demonstrated its potential to build cooperations and integrate with international projects on specific topics of, e.g., strawberry and cherry tree viruses and phytoplasma. Developing innovative test kits for the novel viruses they have discovered could give them more ground for these collaborations.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Prof Petrzik and Dr Kolonuk are members of the International Committee on Virus Taxonomy and participated in organisation of several 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
The group is strong in identification of new viruses. During the last evaluation period the team has successfully established the technology and bioinformatics pipeline for HTS. They should continue building on this and design innovative virus detection methods that can be used both for agronomy practices and in research. The collaboration with the Entomology Institute and establishing aphid vector experimental systems is very promising and could give them an edge to move from descriptive to more fundamental research.	
D2.2	**Assessment of the previous research objectives and their achievement**
The group continued with the research directions within their central expertise, namely the description of viruses. They also made good progress with their phytoplasma research.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
Moving from descriptive studies to more functional analysis, investigation of the mechanisms of viral infection appears to be beyond the scope of the team at present. This should be rethought.	
D2.4	**Success in receiving grants**
The team is reasonably successful in attracting grants that are mostly towards practical applications. They could capitalise on this strength with more innovation. Finding ways how their research can be made relevant to increasing number of agricultural applications could be attractive and productive.	
D2.5	**Adequacy of instrumental equipment**
They have access to sequencing, bioinformatics and good microscopy facility as well as facilities to work with aphids.	
D2.6	**Effectiveness of management**
The team has a young group leader who is building up his publication record and visibility in the field. This small team of 8 workers has a good balance of research scientists, assistants and post docs. Only one PhD student is involved. This should be increased.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**

Seems appropriate for a small team	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
No issues were identified	
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.**
No information was provided	

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 minimal teaching activity at the master's level. However, this activity already shows an effect on attracting students.	
D3.2	**Effectiveness of joint research centres**
Joined research activity with Czech University appear to be missing.	
D3.3	**Success rate in supervision of PhD students**
A single PhD student was successfully integrated to the research team.	
D3.4	**Participation of PhD students in the outputs**
The participation of the student in 6 research outputs, two as first author, is very good.	
D3.5	**Participation of the team in master or bachelor studies**
The exclusive involvement in master level teaching is quite minimal and should be improved.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
This activity is minimal as well.	

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

D4.1	**Sufficiency of media strategy and activities in the area of research popularisation**
The team maintains an informative webpage. They run the usual social media and open day channels. There are links with high school activities.	
D4.2	**Publishing activities and its quality**
No publication in popular science.	
D4.3	**Participation in professional organisations in the area of research and development**
Member of the International Committee of virus Taxonomy.	

Other comments of the commission: n/a

11. Soil Ecology

Strengths:
The team Soil Ecology is a multidisciplinary group allowing it to cover all the basic aspects of soil ecology. The team is well equipped and develops strong international relations and is involved in EU projects.

Weaknesses:
The cooperation level with universities is limited to lectures and supervision of students. This is a main weakness of the team.

Opportunities:
The team is composed of many young and talented early-career members. The team also integrates many young talented foreign researchers.

Threats:
Many key members of the team will be close to retirement age over the next period.

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

H1.1	Quality of selected outputs of Phase I
The quality of outputs was very good. The average rating of the selected outputs of the Phase I is 2.36 which can be considered as a very good level, being higher than the majority of the evaluated teams. The distribution of quality is excellent since among the twenty seven outputs evaluated, 41.7% are in the first decile (Q1*) and 59.3% in the first quartile (Q1* or Q1). Compared to the field (Biological Sciences), the production of the Soil Ecology team is below the range for the productivity of teams in excellent outputs (per FTE) rated as „world-leading“ as well as „world-leading + internationally excellent“. However, it is more pertinent to compare the productivity level with other teams in the field of biogeosciences.	
H1.2	**Contribution of workers on the outputs reached**
The contribution was excellent. Most of the research studies were conceived, designed, conducted and/or finalized almost exclusively by members of the department.	
H1.3	**Quality of all outputs and results**
The quality of all outputs and results is very good with 8% in the first decile (Q1*), 15.5% in the first quartile (Q1* or Q1) and 23.8% in the second quartiles, among the 214 outputs. So, 39.3% of all outputs are within the first/second quartile. The quality should be prioritized over quantity.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
The most valuable discoveries and findings in the fields were about the litter decomposition and the soil organic matter transformation and stabilization, the invertebrate-microbial interactions, the greenhouse gas production, the anthropogenic effects on soil biodiversity and the ecosystem restoration. In all these topics, the team takes a world-leading position. Most of these findings were published in well-established specialist (Q1* and/or Q1) journals in the field.	

H1.5	Contribution of the participation of the authors in large collaborations
The team is part of many research collaborations within international research area (Germany, China, Scotland, Canada, Netherlands, Poland, USA, Japan, etc.). Many outputs are produced in large international collaborations of the authors of the teams. In most cases the team's authors have a leading position in the contributions.	

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

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
The societal relevance is high. The team results are significant in solving practical problems of ecosystem functioning, such as soil fertility preservation and restoration, greenhouse gas pollution control, carbon sequestration, water flow regulation in the landscape, pollutant detoxification, and many others. Many human activities related to soil and environment, such as agriculture, forestry, land use, landscape planning, environmental management, biodiversity conservation, and many others, could benefit from this knowledge.	
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 takes a prominent action in many research projects with clearly applied objectives. These projects are financed both by national and international (EU) grants that have a clear impact at both societal and humanity levels. To give two examples of this impact: i) the strategic project LIFE funded by EU, led by the Ministry of Environment of the Czech Republic, with the activity of the team dedicated to the mapping ecosystem services across the Czech Republic with specific focus on the Natura 2000 sites have a clear societal impact, whereas ii) the EU project ***Qualitative parameters of nanofibrous scaffolds for human, veterinary, food and special applications*** has a strong impact in the area of humanity.	
H2.3	**Relation to practice**
The relation to practice is high. The desire to transfer knowledge, especially those dealing with environmental technology and that bordering on medicine research, from the team to the applications is obvious. The U.S. Patent No. 9,447,062 (Washington, DC) dealing with the biosynthesis of polyketides of the manumycin family perfectly illustrates this trend.	
H2.4	**Participation in AV21 strategy**
The team makes a significant contribution to the AV21 agenda by currently leading the program 21 Land Conservation and Restoration and previously leading the program 9 Biodiversity and Ecosystem Health.	
H2.5	**Cooperation with regions of the Czech Republic**
Members of the team are active with a number of government agencies that establish national environmental policies.	

Among these cooperations, the most important is a major commitment to the government plan "Czech Republic 2030". The strong cooperation with the SoWa research infrastructure has to be noted as well.

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 clearly appears as an international leader in different fields of soil ecology and biodiversity and environmental management as illustrated by its strong and leading involvement in many EU projects and/or plans.	
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 international cooperation is broad, both in the EU: Germany, Scotland, Belgium, for examples, and oversea: USA, Japan, China, etc.. This is one of the main strengths of the team. The team has a leading position in these cooperation with some of the world leading international groups. This should help to maintain the significant increase in the quality of the team's publications from the previous evaluation.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Members of the team are engaged in a wide variety of scientific community activities, including work as editors, organizing and coordination of conferences and seminars. The team members also gave many talks as invited speakers for international research centres and organizations. Also worth to be mentioned is the Otto Wichterle Award for young researchers.	

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

D2.1	Direction in line with the perspective of the planned research directions
The team has continued to conduct studies in its main research areas with a solid track record and a clear progress in the publication production. The team also maintained its strong international cooperation and integrated its efforts with EU-funded larger consortia. Several young researchers from abroad have reinforced the new team and stimulated new studies.	
D2.2	**Assessment of the previous research objectives and their achievement**
The team has met all of the previously identified objectives and has obtained high-quality results.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
All of the previous evaluation recommendations have been considered and addressed by the team.	
D2.4	**Success in receiving grants**

The team was very successful in receiving grants from both national and international, including EC, fundings.	
D2.5	**Adequacy of instrumental equipment**
Based on the details given, the available equipment seems to be highly adequate and partly unique. The team is technically well equipped and possesses some very unique pieces of instrumentation such as an anaerobic microbial lab, IRMS lab, ddPCR and the world unique artificial experimental catchment. Furthermore, the team's integration in major national (such as SoWa) and European consortia and organizations makes this adequacy excellent.	
D2.6	**Effectiveness of management**
Only limited information is provided on this point. The team follows the HR award rules of the Biological Centre.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
Many of the team members (8 members have an age of 60 or more) will be close to retirement age. However, many team members are in their early careers (14 are under the age of 35), promising long-term sustainability of the team and its skills.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Good integration of young talented foreign researchers and good gender balance of researchers are noted.	
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.**
Team members are members of various scientific boards and important governmental bodies including as a part of the Scientific Board of the Ministry of Environment of the Czech Republic, Section Government Commission for Sustainability.	

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**
Within the national area, cooperation occurs mainly with the University of South Bohemia in České Budějovice Charles University in Prague, Masaryk University in Brno and University of Ostrava, mainly in form of lectures. International: lectures are given at BOKU in Vienna (Austria).	
D3.2	**Effectiveness of joint research centres**
There exists an effective and highly productive official collaboration with SoWa.	
D3.3	**Success rate in supervision of PhD students**
The number of PhD projects is excellent with 32 supervised or co-supervised PhD students by team members within the evaluated period, both from Czech Republic Universities and abroad.	

D3.4	Participation of PhD students in the outputs
Excellent. PhD students appear in the publications on a regular basis, usually as first authors of publications that cover the subjects of their doctoral theses, as well as co-authors of other team publications.	
D3.5	**Participation of the team in master or bachelor studies**
Excellent: 30 bachelor and 25 baster thesis were defended during the 2015-2019 period.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
According to the provided information, the cooperation with universities is limited to the lectures at bachelor, master and doctoral levels as well supervision of students. This is an area that could be improved further.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
The team has been very active in popularizing its research by giving lectures to the general public, appearing in many radio and television programmes, writing papers for popular science publications, and attending activities and meetings intended at popularizing their research work.	
D4.2	**Publishing activities and its quality**
The team has been very active in producing popularization papers and books.	
D4.3	**Participation in professional organisations in the area of research and development**
Excellent. The team has a major contribution to the Czech Republic's government strategy for future development plan.	

Team categorisations and a brief commentary:

☐ strengthen the support of the team ☒ keep the support of the team at the current level ☐ reduce the support of the team
The team is part of the group of world-leading teams in this particular research field. The quality of the results is excellent and has been clearly improved compared to the previous evaluation. The team must continue in this direction and quality must now be prioritized over quantity. The strong national, in particular with SoWa, and international (both EU: Germany, Scotland, Belgium, for example, and overseas: USA, Japan, China, etc.) cooperations is one of the major assets of the team. This contributes to its great ability to obtain both national and international funding, and to have a recognized position in strategic decision-making in its areas of expertise. A particular attention has to be paid in the future because many key members of the team will be close to retirement over the next period. Many members of the team are at the start of their careers and this may contribute to a long-term sustainability of the team and its skills. Also the successful integration of young talented foreign researchers is a good point for the future of the team. Cooperation with universities is limited to lectures at Bachelor, Master and Doctorate levels as well as

student supervision. This is an area that should be improved. The team has been active in outreach activities. This effort must be continued or even amplified in the future.

Other comments of the commission: n/a

12. Molecular Cytogenetics of Plants

Strengths:
The research focus of the team addresses two connected areas: 1. repetitive DNA and 2. centromere structure. They have developed all the necessary and world-leading know how both in bioinformatics and cytogenetics techniques. It is a small but effective group structure with excellent national and international collaborations. They have established bioinformatics pipelines that they developed and maintain themselves and make accessible to the scientific community. In this way the team has an excellent visibility for Czech science.

Weaknesses:
The excellent collaboration on one hand is a strength but on the other it is taking away some of the credit for their work. We see this group in the next phase to come up with further ground-breaking works that they fully own.

Opportunities:
The team may be able to keep up with the evolving sequencing technologies including nanopore sequencing. Further activities in the crop genome projects may be develop. The team should strive for having ERC projects both for recognition and for stable long-term financing both at senior and for upcoming talented young scientists within this group.

Threats:
There is the need to train and develop the upcoming young scientists in the area.

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

H1.1	Quality of selected outputs of Phase I
8 outputs out of 34 were carefully selected by the team to be submitted for phase I evaluation not based on journal impact factor, but its importance to the group and field. Most are collaborative work with leading groups in the field. All of these works represent clear breakthroughs, see below. The quality of these outputs is clearly outstanding and well above the average. Journals include Nature Genetics, PNAS, NAR, New Phytologist to name just few.	
H1.2	**Contribution of workers on the outputs reached**
The contribution of the team members in the output is clearly defined and substantial. On a good number of high profile publications they are in the corresponding/lead author positions.	
H1.3	**Quality of all outputs and results**
The total number of outputs are 34, which from a team of 5 members is quite amazing. Specifically, when considering that most of these publications are in the top quartile journals.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
A few major breakthroughs are as follows: 1. Repeat-based phylogenetic analysis, 2. expansion of genomes due to lack of repeat clean up, 3. co-evolution of centromeric DNA and CenH3, 4. build of holocentromers with interspersed repeat arrays, 5. legume family genome size-repeat array analysis, 6, TAREAN computational tool for identification of	

satellite repeat, 7. participation in the pea genome project, and 8. LTR retrotransposon classification.

H1.5	Contribution of the participation of the authors in large collaborations
The team is an important contributor to the European genome project infrastructure, ELIXIR consortium. The bioinformatics platform that they have developed and optimized over many years (RepeatExplorer and TAREAN) has been made accessible for the broad research community and annual trainings are organised through EMBO Workshops.	

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

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
Eukaryotic genomes largely vary in size, mostly due to the variable presence of repetitive (junk) DNA. Understanding the evolution and functional relevance of these sequences is fundamentally important. Bioinformatics processing of the repetitive part of the genome is critical for genome projects.	

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
This group made an exemplar of how to facilitate the transfer of knowledge to the broader scientific community and thus for the usefulness for the society by developing computational bioinformatics platforms with ease of use and training.	

H2.3	Relation to practice
Genome projects undoubtedly revolutionised biology and have many practical implications from medicine to agriculture and nature preservation. This group by developing the know how to analyse repetitive sequences significantly contributes to acceleration of the release of genome sequences of large crop genomes.	

H2.4	Participation in AV21 strategy
Not specifically stated, but their work is directly relevant to Food security through better understanding of crop genomes.	

H2.5	Cooperation with regions of the Czech Republic
They have well working active collaborations not only internationally but within the Czech Republic. The most obvious one is with the group of Dolecel at IEB.	

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 clearly an international leader in the field of repetitive and satellite DNA, crop genomes, genome size regulation and centromere organisation. This is evidenced by their collaborations with the most outstanding groups in the field worldwide.	

D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
All of their collaborations are based on a high degree of expertise in the bioinformatics of repetitive sequences and cytogenetics of the centromere. As the group evolves further and further in some areas they do not necessarily need collaborations to complete their studies as they have the know-how for most elements required, but they like it that way.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The largest contribution to the scientific community is the maintaining of the RepeatExplorer pipeline and the annual training workshops. This also helps the group to establish new collaboration and attract international researchers.	

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

D2.1	Direction in line with the perspective of the planned research directions
The research directions of the group are well thought through and clearly spelled out. In the next period it will be nice to see the research moving to utilise all the expertise they built to further progress on the road they are already taking and using it to answer fundamental biological questions on the purpose of maintaining or not the repeats, regulation of genome size as well as understanding the different organisation of centromere, interaction of centromere proteins and the DNA structure. They keep in pace with the emerging novel sequencing technologies and how these can be utilised for their research. Nanopore is a good example.	
D2.2	**Assessment of the previous research objectives and their achievement**
They fully achieved their objectives and showed an impressive progress.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
This is a group that does not need recommendation from this committee but should set their own high standards.	
D2.4	**Success in receiving grants**
They have a clear strategy for applying only for projects that are in the core of their interest, and they always get those grants. Having such a high standing, it would be nice to see an ERC project succeeding. They clearly have the potential both for the group leader or the developing young researchers. It would be good for the institute to give them access to mentorship from successful ERC applicants.	
D2.5	**Adequacy of instrumental equipment**
They have built the necessary infrastructure for their work. However, it is important to note that the genomics field is rapidly developing and it will be important that they continue to incorporate the latest technologies and computational capacity to stay at the far front.	
D2.6	**Effectiveness of management**
This team is an exemplar how a well-functioning group should be managed. It appears that they purposefully keep the group size small and manageable and have long term collaborations with leading groups. In this way they both keep up with the dynamics of the field and remain competitive.	

D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
In long term they will need a strategy of developing the career for the upcoming young scientists who can establish either a subgroup within, can move to other institutes within the Czech R and start research groups abroad.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
No issues noted	
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 clear to the assessor	

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 contributes teaching on bioinformatics at the master level. It would be nice to see young talented researchers from this group taking up university positions at Czech universities and spread the knowledge and good science.	
D3.2	**Effectiveness of joint research centres**
No evidence presented.	
D3.3	**Success rate in supervision of PhD students**
An excellent research led supervision to masters and PhD students.	
D3.4	**Participation of PhD students in the outputs**
All students get their share of outputs without fail.	
D3.5	**Participation of the team in master or bachelor studies**
Teaching includes 3 hours at the master level. It would be nice to see from this group more teaching commitment, but this could only be achieved if they develop young senior scientists within the group to do this job.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
At the moment minimal, would need to increase the personnel to have capacity for more teaching.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
This small group does not seem to have, a present the capacity for further activities. They are focussed on their research.	
D4.2	**Publishing activities and its quality**
Not evidence presented	
D4.3	**Participation in professional organisations in the area of research and development**
Not evident	

Other comments of the commission: n/a

13. Biophysics and Biochemistry of Plants

Strengths:

The team is involved in developing methods and instruments that are or will be very useful for the community, leading ultimately to a large panel of collaborations. This is partially due to the multidisciplinary approach and skills of the team members. The paper output is good in good journals, and they are able to attract important funding at the national and European level. Plus, the team just acquired a COST action funding, with a large consortium of nearly 60 co-applicants.

Weaknesses:

The publications of Team 13 presented in the report are of good quality in high impact journals but their citation index could be improved when compared to other articles in the same journals. Nevertheless, the citation index of Team 13 is above BC average. On the societal relevance aspect, the team has high potential and the research topics are highly relevant for the society, with credible applications to agricultural processes. Unfortunately, the direct evaluation of the societal relevance is difficult and the commission only noticed that this is not reflected in patents.

Opportunities:

The team is working on metal metabolism and toxicity in plants and light harvesting. These fields present very large opportunities for the future and potential societal interest that are extremely broad from agriculture, breeding to plant-pathogens interactions. The multidisciplinarity aspect of the group is a great strength of the team, which will have no issue facing new challenges.

Threats:

The recruitment of PhD students and especially post-doctoral researchers might be complicated as they need to be educated in multiple disciplines. Overall, Team 13 is moderately active in translating their scientific findings into societal interests, team members put relevant effort into teaching, participating in public science awareness events and communicating by TV interview or a YouTube video."

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

H1.1	Quality of selected outputs of Phase I
The quality of the selected outputs is good.	
H1.2	**Contribution of workers on the outputs reached**
The team contribution to the outputs is high.	
H1.3	**Quality of all outputs and results**
Good.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**

Their work on Ceratophylium is good and presents a large interest for a better understanding of environmental pollutant effect in real conditions. These outputs have high potential for societal benefits.
H1.5 **Contribution of the participation of the authors in large collaborations**
The team just was granted a large COST action project on metal metabolism in plants including nearly 60 co-applicants in 20 different countries.

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

H2.1	**Societal relevance of outputs and results pursuant to CAS and institute mission**
The societal relevance of the findings is high, but was not yet been effectively exploited and translated to patents.	
H2.2	**System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team´s activity on proper practice in society in the area of social sciences and humanities**
The research topics of the Team 13 are surely relevant for society from a medium to long term perspective, with some application in agriculture and risk assessments possible.	
H1.3	**Relation to practice**
Some of the knowledge produced by Team 13 has the potential to be used in agricultural processes from a medium- or long-term perspective.	

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 seems to be well integrated in its niche and would be rather well placed among the few labs having so many diverse competencies.	
D1.2	**Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation**
This is clearly good due to the COST action grant recently awarded. Plus, the team leader and co-workers have long standing collaborations nationally and internationally. No problems have been detected here.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The team is active in organising conferences, and HK has been invited to provide many lectures. However, Only HK is on one editorial board as handling editor.	

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

D2.1	Direction in line with the perspective of the planned research directions
The line of the planned research is reasonable and logical.	
D2.2	**Assessment of the previous research objectives and their achievement**
The team has been established in 2014, there was no recommendation from the previous evaluation.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The team has been established in 2014, there was no recommendation from the previous evaluation.	
D2.4	**Success in receiving grants**
Good. Team 13 was remarkably successful in obtaining grants, with over 660 k€ per FTE.	
D2.5	**Adequacy of instrumental equipment**
The instrumental equipment and skills to handle them is an extremely strong point of the team. The equipment is cutting edge.	
D2.6	**Effectiveness of management**
The management seems effective regarding outputs and method developments, education of PhD students and international cooperations.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
There is no main concern on this aspect.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
Gender balance seems respected among the workers. The leading position is held by a man.	
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 cooperation is good in terms of teaching and student education at the level of bachelor, Master, and PhD.	
D3.2	**Effectiveness of joint research centres**

D3.3	Success rate in supervision of PhD students
3 PhD students defended during the evaluation period and the PhD students are participating in the team outputs. The team is defined as successful in supervision of PhD students.	
D3.4	**Participation of PhD students in the outputs**
The participation of PhD in the outputs is excellent.	
D3.5	**Participation of the team in master or bachelor studies**
The team is very active in master and bachelor students.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
The team participates extensively in teaching in the University of South Bohemia.	

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

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
The media participation of the team is mainly through TV interviews and YouTube videos, in Czech, that have been viewed more than 300 000 times. Other media outlets are not exploited. Team members participated in public outreach events like Doors Open days or Summer Camps.	
D4.2	**Publishing activities and its quality**
They are publishing very little in popular science formats.	
D4.3	**Participation in professional organisations in the area of research and development**
None indicated.	

Other comments of the commission:

14: Molecular Genetics of Plants

Strengths:
The main strength of this group is based on the development of methods and technology to study hops. This is not an easy task as hops is not a model plant but has a high potential for societal relevance. The team makes tremendous effort to tackle these obstacles. The societal and economical interest of hops is another strength of the team.

Weaknesses:
The missing possibility to make field trials in the centre. The group is also not participating in any large funded collaborative project. The economic aspect of their research is not exploited at all with no patent filed and no clear and direct development of projects with industry.

Opportunities:
The researchers should spend more energy in connecting directly with industry and exploit a great potential there for them to get funded projects.

Threats:
The leader is going to retire and there are not so many opportunities for the young researchers of the team to take over the lead unless they are funded. The overall future of the team is uncertain.

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

H1.1	**Quality of selected outputs of Phase I**
The quality of selected outputs is medium.	
H1.2	**Contribution of workers on the outputs reached**
The contribution of the team members to the outputs is excellent.	
H1.3	**Quality of all outputs and results**
Overall the quality is medium.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
The establishment of CRISPR-Cas9 gene editing in hops.	
H1.5	**Contribution of the participation of the authors in large collaborations**
None are indicated in the report or were mentioned in the presentation.	

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 could be high but is not highly exploited by the team.	
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 patents have been filed.	
H1.3	**Relation to practice**
None.	

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 seems well integrated in the hops field and is in contact with several international 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**
The national and international collaborations are good.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The team members are on different journal editorial boards and of scientific committees. Overall, it is good.	

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

D2.1	**Direction in line with the perspective of the planned research directions**
The direction conforms with what was planned.	
D2.2	**Assessment of the previous research objectives and their achievement**
The research objectives have been reached.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The recommendations have been followed.	
D2.4	**Success in receiving grants**
Good.	
D2.5	**Adequacy of instrumental equipment**
The general equipment seems correct, and the team is in direct collaboration with a hops research society which helps a lot in greenhouse access.	
D2.6	**Effectiveness of management**
The management is effective, the team has integrated young and international researchers.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**

The professional structure is correct, the strategy development is good. The way the future leadership will be established is however unclear.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
The leader and senior researchers are all male.	
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 numerous and fruitful collaborations at the national and international levels.	
D3.2	**Effectiveness of joint research centres**
D3.3	**Success rate in supervision of PhD students**
No PhD students defended during the period of evaluation. At least one student has left the lab before the end of her/his PhD.	
D3.4	**Participation of PhD students in the outputs**
Good.	
D3.5	**Participation of the team in master or bachelor studies**
No Bachelor or Master students were doing research in the team during the evaluation period.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
The team is participating in one course at the master level at the University of South Bohemia (Science faculty, 12 lectures).	

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

D4.1	**Sufficiency of media strategy and activities in the area of research popularisation**
The team participated in a couple of outreach activities.	
D4.2	**Publishing activities and its quality**
Low. The team has published one chapter in a professional book.	

D4.3	Participation in professional organisations in the area of research and development

Other comments of the commission:

15. Hydrochemistry and Ecosystem Modelling

Strengths:
Very good publication output per FTE; performs research that is relevant for the society; good age structure of the team.

Weaknesses:
As stated in the Report of the research activity of the team: Fragmentation of research interests of the team members.

Opportunities:
Finding sufficient funding.

Threats:
No special ones.

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

H1.1	**Quality of selected outputs of Phase I**
Very good; is the second highest of all teams that were evaluated.	
H1.2	**Contribution of workers on the outputs reached**
Very good; is among the highest of all teams that were evaluated.	
H1.3	**Quality of all outputs and results**
Very good; is the highest of all teams that were evaluated.	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
The effects of reduced deposition of strong acid anions on lake water chemistry.	
H1.5	**Contribution of the participation of the authors in large collaborations**
Very good; is the highest of all teams that were evaluated.	

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

H2.1	**Societal relevance of outputs and results pursuant to CAS and institute mission**
Very good.	
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**
Very good.	
H2.3	**Relation to practice**
Very good.	

H2.4	Participation in AV21 strategy
Rather weak; nothing on this mentioned in the report and presentation of the team.	
H2.5	**Cooperation with regions of the Czech Republic**
Average.	

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
Fine.	
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 fine.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Fine, the activity in national conferences and workshops is OK, but that in international ones could be increased.	

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

D2.1	Direction in line with the perspective of the planned research directions
Fine.	
D2.2	**Assessment of the previous research objectives and their achievement**
Very fine.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
Very good.	
D2.4	**Success in receiving grants**
Very good.	
D2.5	**Adequacy of instrumental equipment**
Fine.	
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**
Very good.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**

Very fine.	
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.**
Unclear, nothing on this mentioned in the report and presentation of the team.	

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

D3.1	**Scope of cooperation with universities on national and international level**
Very fine.	
D3.2	**Effectiveness of joint research centres**
Unclear.	
D3.3	**Success rate in supervision of PhD students**
Fine.	
D3.4	**Participation of PhD students in the outputs**
Fine.	
D3.5	**Participation of the team in master or bachelor studies**
Very fine in bachelor, weak in master studies.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Fine.	

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

D4.1	**Sufficiency of media strategy and activities in the area of research popularisation**
Very fine.	
D4.2	**Publishing activities and its quality**
Very fine.	
D4.3	**Participation in professional organisations in the area of research and development**
Fine.	

Other comments of the commission:

16. Functional Genomics of Trypanosomes

Strengths and Opportunities:
According to their report, the team's strength is the broad combination of approaches and methodologies that are employed to understand the functional biology of trypanosomes at the cellular and molecular level. These include genetic screens, 'omics' and bioinformatic approaches as well as confocal and electron microscopy. Because of the very broad and diverse research program, the team embodies a unique combination of experts in most aspects of parasite biology and function. Its research potential is enhanced by numerous collaborations with distinguished international groups. Furthermore, the high number of postdocs and students from abroad is considered a particular strength of the team.

Weaknesses and Threats:
The broad and diverse research program may impair the quality of the research. There is a striking diversity of organisms (e.g. Trypanosoma brucei, Discoba, Diplonemids, Leishmania species and others) and functions studied (e.g. mRNA processing, tRNA biology, iron metabolism, mitochondrial biology, ATP hydrolysis and others), creating the impression of considerable fragmentation.
Another weakness of the team is its dependence on external funding through grants: Salaries of the majority of the team must be procured from external sources. In order to secure its high quality, the team's research program must be driven by the scientific value of the projects rather than by the availability of grant money.
The team acknowledged facing a potential problem of recruiting top-quality students and postdocs. On an international level, salaries are generally lower, and it is difficult to attract qualified postdocs from the Western countries.

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

H1.1	Quality of selected outputs of Phase I
The quality of the selected outputs of Phase I (33 papers) is very good and in large part excellent. The results have predominately (24) been published in high-quality international journals (quartile 1). 20 of these were published in excellent journals (decile 1). Citation frequency of the outputs is adequate.	
H1.2	**Contribution of workers on the outputs reached**
In publications resulting from national and/or international collaborations, members of the team were frequently leading, and/or provided essential and important contributions.	
H1.3	**Quality of all outputs and results**
The quality of all outputs of Phase I is very good. The results have been published in 153 peer-reviewed international journals, more than 40% in high-quality journals (first quartile). Of these, 36 were published in excellent journals (decile 1).	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
The following results of the team are of major importance for the field of parasite function (selection from numerous important results): - Identification of diplonemids as an abundant component of marine ecosystems, and single cell-genome sequencing as well as morphological and life cycle studies of these protists.	

- Synthesis, processing, nuclear export and re-export of tRNAs in *Trypanosoma brucei* was successfully investigated.
- The crystal structure of F1-ATPase from T. brucei mitochondria was solved and may aid structure-based drug discovery.
- Purine phosphoribosyltransferases (PRTase) were validated as a drug targets by RNAi silencing of the three 6-oxopurine PRTases, demonstrating that the combined activity of these enzymes is critical for the parasite's viability. Numerous acyclic nucleoside phosphonates (ANPs) were designed, synthesized and tested as inhibitors.

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
Parasites such as Trypanosoma brucei are a global health problem. Therefore, the outputs of the team are of 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**
Knowledge transfer of team's results is of high importance for diagnosis and treatment of parasitic disease. The impact of the team's activity on society in the area of social sciences and humanities is limited.	
H2.3	**Relation to practice**
The research has the potential to improve the medical practice, since progress was made in the search for novel drug targets and therapeutics.	
H2.4	**Participation in AV21 strategy**
No information as to this point was presented to the commission.	
H2.5	**Cooperation with regions of the Czech Republic**
The team cooperates with several Czech institutes that can provide relevant contributions to its research program.	

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 in a leading position among institutes with a similar scope in the Czech Republic and is highly visible and recognized in the 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
Members of the team are involved in numerous international collaborations that have generated excellent publications. In some of these, the team was in a leading position. In all others, they contributed essential data or methods.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
Members of the team organized 2 conferences and gave numerous invited lectures. Students of the team received awards for best PhD and Master thesis.	

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

D2.1	Direction in line with the perspective of the planned research directions
The research plan for the next 5 years builds on the previous achievements of the team, and on the development of the whole field of parasite research and of its methodology. The plan is convincing, and fully in line with the mission of CAS and the Biology Centre.	
D2.2	**Assessment of the previous research objectives and their achievement**
As shown by the impressive publication record, the team has reached the majority of their research objectives.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
In the past evaluation, the team was evaluated as excellent with a unique position in the Czech Republic and well recognized internationally. The commission recommended that in continuation of the research plan, the team should concentrate its resources on the most important goals. Where possible, the principle investigators prioritized their projects and focused on the most important parts of the research plan.	
D2.4	**Success in receiving grants**
No specific information was provided in the report or the presentation of the team. The report merely states that the principle investigators were successful in procuring funding from various national and international sources.	
D2.5	**Adequacy of instrumental equipment**
The team has access to all equipment required for their research.	
D2.6	**Effectiveness of management**
No specific information was presented as to this point. However, the commission concludes that the successful research of the team indicates strong leadership and effectiveness of management.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
No specific information as to this point was presented. The commission had the impression that the team leader and the principle investigators were successful in recruiting excellent junior scientists in particular from abroad, and also and in supporting their career and qualification. The age structure of the team is favourable.	

D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
No specific information as to this topic was presented, but the commission noted a good gender balance of the scientists. Importantly, the team appears to be highly attractive for foreign scientists.	
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 applicable here.	

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 cooperates with Czech universities in the education of bachelor, master and PhD students. Senior scientists gave a total of 321 seminars/lectures/courses within the evaluation period. Senior scientists of the team also cooperated with international partners by participating in the training of undergraduate students at the University of Arizona.	
D3.2	**Effectiveness of joint research centres**
The principle investigators are participants in the Centre of Excellence in parasitology which is a research infrastructure of the Charles University in Prague, the Institute of Parasitology of the University of South Bohemia, and the University of Ostrava.	
D3.3	**Success rate in supervision of PhD students**
Within the evaluation period, 9 students successfully defended their thesis. Given the size of the team, this number appears low.	
D3.4	**Participation of PhD students in the outputs**
The contribution of students to the publications of the team is very important. According to the report of the team, every student who is involved in the benchwork should become co-author on a good publication. The team hosts visiting students from Scotland, the Netherlands and Germany, who spent 3 to 8 months in the lab working on collaborative projects with their home labs. The majority of papers published by the team has at least one student as co-author.	
D3.5	**Participation of the team in master or bachelor studies**
The team participates in master and bachelor studies; 7 and 9 master and bachelor students, respectively, finished their theses in the evaluation period.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Cooperation with universities in teaching is restricted to education of bachelor and 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
The team lists numerous activities in the area of research popularization (in Czech language).	
D4.2	**Publishing activities and its quality**
No information as to publications in the area of research popularization was given to the commission.	
D4.3	**Participation in professional organisations in the area of research and development**
No specific information as to this topic was given to the commission.	

Other comments of the commission:

17. Ticks and Tick-borne Pathogens

Strengths and Opportunities:
According to the report of the T&TBP team, its major strengths are (i) the multidisciplinary approach to its research goals and (ii) the excellent research infrastructure including the tick-rearing facility and large collections of Borrelia strains. In addition, (iii) the T&TBP team has established unique experimental platforms such as laboratory transmission models for TBPs, in-vitro membrane feeding of ticks, and functional studies based on high-throughput RNAi experiments. This research potential of the T&TBP team is enhanced by numerous international collaborations. An additional strength is the high involvement of undergraduate students (BSc, MSc) in the research and in the publication of results.

Weaknesses and Threats:
While the research aims of the T&TBP team are concrete and clearly defined, its pursuance by multiple loosely connected projects creates the impression of fragmentation of the research program. Some projects appear to have little connection with others, and this diversity may weaken the potential of the team. According to the statements of the T&TBP team, this fragmentation reflects the financial situation in that more than 50% of the budget from smaller, short term grants which impairs the pursuit of long-term and ambitious goals. With this financial modality, it cannot be excluded that research activities are driven by the availability of grant money rather than by purely scientific criteria.

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

H1.1	Quality of selected outputs of Phase I
The quality of the selected outputs of Phase I (33) is very good, in part excellent. The results have predominantly been published in high-quality international journals (20 in first quartile, 10 of these in first decile journals). Citation frequency of the outputs is adequate.	
H1.2	**Contribution of workers on the outputs reached**
In publications resulting from national and/or international collaborations, the team provided essential and important contributions.	
H1.3	**Quality of all outputs and results**
The quality of all outputs of Phase I is very good, in part excellent. The results have been published in 164 papers, 36 of these in high-quality journals (first quartile) 12 in excellent journals (first decile).	
H1.4	**The most valuable discoveries and findings in the fields, their importance for the field**
The following results are of major importance for the field of tick-borne pathogens: - Elucidation of the molecular epidemiology of tick-transmitted pathogens of medical importance. - Development of novel antivirals active against arboviruses and development of a novel TBEV vaccine for veterinary use. - Use of a tick in vitro feeding system that allows unique experiments of tick heme auxotrophy and metabolism. - Functional characterization of protease inhibitors from tick saliva such as Iristatin or miRNAs.	

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
TBPs are a major and increasing health problem in the Czech Republic and also worldwide. Therefore, the results of the team are of highest 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**
Knowledge transfer of results is of highest importance for diagnosis and treatment of tick-born disease. The impact of the team's activity on society in the area of social sciences and humanities is limited.	
H2.3	**Relation to practice**
The research has a high potential to improve the medical practice; In this regard, progress was made in the search for novel therapeutics derived from tick salivary components, the characterization of protease inhibitors from tick saliva such as Iristatin or miRNAs, and novel strategies of vaccination.	
H2.4	**Participation in AV21 strategy**
No information as to this point was presented to the commission.	
H2.5	**Cooperation with regions of the Czech Republic**
The team cooperates with most leading Czech institutes relevant for TBP research.	

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
Collaborations, publications and reception of results indicate that the team is nationally leading, and internationally 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 is engaged in 6 national and 44 international collaborations with institutes/groups of highest standing; the team makes essential contributions in these collaborations, and is leading in some.	
D1.3	**Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)**
The senior members of the team have been involved in numerous activities such as organizing conferences (7) and have received international invitations for lectures (17). Fourteen members of the team have received prestigious awards.	

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

D2.1	Direction in line with the perspective of the planned research directions
The research plan is convincing, builds on the results of the last 5 years and is in line with the mission of CAS and the Institute.	
D2.2	**Assessment of the previous research objectives and their achievement**
The team reached a large part of its research objectives.	
D2.3	**Assessment of implementation of recommendations from past evaluation**
The report of the team describes a detailed and convincing consideration and (in-part) implementation of the recommendations from the past evaluation.	
D2.4	**Success in receiving grants**
The team received grants covering more than 50% of their budget; it was successful in obtaining a European grant (FP7-Health consortium project ANTIDotE, until 2018). The commission considers the funding of the team through grants as very good.	
D2.5	**Adequacy of instrumental equipment**
The commission concludes that the instrumental equipment of the team appears adequate.	
D2.6	**Effectiveness of management**
The commission received only scant information as to this point but has the impression that management of the team is effective.	
D2.7	**Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth**
The commission considers the strategies for recruitment and keeping best students and scientists convincing. The age structure of the team is balanced.	
D2.8	**Creating work-life balance conditions, assessment of approach towards possible gender issues**
There were no specific measures for work-life balance conditions and possible gender issues described by the 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 applicable here.	

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 been involved in numerous collaborations with national and international universities; all of these resulted in joint publications. Of note, the team established a dual Czech-French PhD program with ORIS, Nantes.	

D3.2	Effectiveness of joint research centres
No joint research centres were listed in the report of the team.	
D3.3	**Success rate in supervision of PhD students**
Seven PhD students finished their thesis within the time period to be evaluated.	
D3.4	**Participation of PhD students in the outputs**
All PhD students contributed to the research program of the team and co-authored its papers.	
D3.5	**Participation of the team in master or bachelor studies**
28 master students and 41 BSc students finished their thesis.	
D3.6	**Assessment of cooperation intensity with universities in the form of teaching**
Five senior members of the team give lectures at 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
The members of the T&TBP team are very active and also very successful in communicating their results to the general public.	
D4.2	**Publishing activities and its quality**
Research popularization is achieved through the media (30 TV appearances, 25 radio interviews, 80 newspaper/magazine articles, and 161 e-magazines), through events for the general public and by lectures for the general public. These activities are very important because of the relevance of the health problem and are very well received.	
D4.3	**Participation in professional organisations in the area of research and development**
No specific information as to this point was given to the commission, but senior members of the team appear to be very active as members of scientific commissions and councils and on editorial boards.	

Other comments of the commission: n/a

Final report was elaborated by:

Commission 4 - Earth and environmental sciences
Evaluated teams No.: 15

Commission Chair: Prof. (pens.) Dr. Franz Fiedler
Commission Deputy Chair: Jakub Velímský
Commission Members:
- Jesus Ibanez
- Peter Isaacson
- Jürgen Kriwet
- Thomas Leisner
- Willy Maenhaut
- Roland Oberhänsli
- Michael Rycroft
- Ludwig Zoeller

Commission 5.2 - Biological sciences A
Evaluated teams No.: 13, 14

Commission Chair: Professor Bryan Cullen
Commission Deputy Chair: Marcela Chmelařová
Commission Members:
- Nicholas Foulkes
- Josef Glössl
- Michael Hausmann
- Stéphanie Robert
- Didier Stainier
- Martin Teichmann
- Stéphane Thore
- Jianlong Wang
- Alexandre G. de Brevern

Commission 6 - Biological sciences B
Evaluated teams No.: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

Commission Chair: Prof. Dr. Karl-Josef Dietz
Commission Deputy Chair: Miroslav Toman
Commission Members:
- Laszlo Bogre
- Christophe Hano
- Klaus Hoffmann
- Raine Kortet
- Alberto Maria Luciano
- David Marshall
- Mary O'Connell
- Joseph Tzanopoulos

Commission 8 - Medical and health sciences
Evaluated teams No.: 16, 17

Commission Chair: Prof. Dr. Hans-Georg Joost
Commission Deputy Chair: Thomas Krieg

Commission Members:

Achim Aigner
Ferenc Bari
William Blalock
Nicolas Catz
Tammo Delhaas
Jeremy Fauconnier
Pawan Singal
Robert Tomanek
Viviana Trezza