

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

## **Summary Final Report**

**Name of the Institute:**

**Institute of Animal Physiology and Genetics of the CAS, v. v. i.**

**Evaluated teams and their leaders:**

1. Biomedical Research Team (Petr Vodička)
2. Team of Developmental Biology (Marcela Buchtová)
3. Biodiversity and Evolution Team (Petr Ráb)

## Part A: Evaluation of the institute

### Strengths and Opportunities

- The institute has undergone a major staff turnover during this evaluation period. Four new research groups were established, 2 were dissolved, and out of the 14 laboratories/groups in the institute, 8 are now being led by new group leaders. We are impressed by these organizational changes. The more flat structure promotes quality- and goal-oriented activity. The readiness to close and create research groups, which appears to be strong without being exaggerated, promotes a set of strong team leaders. Quality and productivity of output have very clearly improved.
- Unique Animal Model Capabilities: The availability of expertise as well as reputation in the development of transgenic, breeding of clones/hemiclones in lower vertebrates and mini pig models of human diseases is a great strength. The number of large animal research facilities in most countries is on the decline and such facilities are becoming rare. The IAPG institute has the unique strength of examining very relevant human diseases using mini pig models such as TgHD, KIHD, MeliM and Usher disease transgenic. This strength can also be seen as an opportunity in the innovation of an “European Centre of Excellence in Animal Research” jointly supported by EU sources as a Regional Facility for the EU and other users.
- Outputs and Funding Success: Another major strength is the high quality of research as evidenced by a good number of high impact publications with a steady, year over year, growth during the 5-year evaluation period. A similar trend of growth is also seen in grant funding (145 mil CZK in 2015 to 184 mil CZK in 2019) while institutional support showed a nominal increase in CZK amounts and in relative terms suffering a decline from 46% to 33%. Thus, there is need/opportunity for strategic increase in base funding.
- Training Program: There has been a growth in the number of postdoctoral trainees which is an obvious strength but there is a great need as well as opportunity to strengthen the number of PhD trainees. The suggested “Centre of Excellence” could have a strong component of “co-supervision or joint-training program” which would also promote intra-institute networking as well as more robust participation of European and other laboratories.
- Alumni Network: Institute trains hundreds of individuals at multiple levels who spread out and settle across the world. Keeping them connected with the parent Institute could offer opportunities for networking, technology transfer and in the long haul even financial support. Thus, creating a portfolio of „IAPG Alumni Affairs“ should prove to be a valuable addition.

### Weaknesses and Threats

- Funding by longer and larger strategic grants to provide stability to the institute over 5 years+ are not currently being explored at the level they should be to remain competitive on the international stage. Applications for international funding with collaborators are not being explored, and international connections are not being maximised in this regard.
- Lack of a steady growth in the institutional base funding could threaten the health of the unique Animal Research facility. Large Animal Care Facility (LACF) with transgenic and surgical expertise are becoming in greater demand by the universities, research based hospitals and industry. There is major threat that in the absence of a good base funding, the existing LACF may be reduced to “service for hire” facility. Thus, engaging a critical number of PhD students through a steady base funding would keep excellence in research and training in the mix.

- The geographical distribution of the teams within the institute means that sharing of large pieces of equipment across teams is not without challenge.
- The fact that most teams are bound to the Liběchov campus causes a lower interaction with other academic activities than if most teams were close to a university campus. It may be argued that a rural location is required for the animals, but Palacky University in Olomouc shows that a university campus can exist in a rural area.
- The international advisory board (IAB) is currently not functioning and was put in place late in the evaluation period. It would be important to get this activated as soon as possible, particularly given the enormous reshuffling that has taken place. Having impartial and unconnected international and national members of the IAB would be more desirable rather than those involved as collaborators in your research.

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

<b>H1.1</b>	<b>Quality of selected outputs of Phase I</b>
The quality of outputs based on phase 1 has been very good, in part excellent. All selected outputs are in tightly peer reviewed journals. The quantity in the excellent category has shown a steady as well as significant rise since 2017.	
<b>H1.2</b>	<b>Contribution of workers on the outputs reached</b>
Names of the Institute members appear frequently as the lead or corresponding senior author with a significant rise in the most recent year. Scientists from IAPG have provided important contributions in most of the outputs.	
<b>H1.3</b>	<b>Quality of all outputs and results</b>
Outputs have shown a major upslope in quality since 2016. A great majority of them was published in very good peer reviewed journals. Some of these have been published in excellent journals (first decile of journals ranked according to quality) with impact factors of 6 and higher. These publications mainly resulted from international collaborations.	
<b>H1.4</b>	<b>The most valuable discoveries and findings in the fields, their importance for the field</b>
<p>There are several fundamental as well as translational findings reported in outstanding journals by IAPG scientists, for example</p> <ul style="list-style-type: none"> <li>- Gene therapy for Huntington's disease, pre-clinically tested in IAPG developed TgHD mini pigs (in collaboration with UniCure) has received FDA approval, and the first human clinical trial is now in progress.</li> <li>- The development of a surgical technique of spinal subpial delivery for gene silencing to block motoneuron degeneration holds great promise for ALS patients.</li> <li>- Production and worldwide marketing (by ThermoFisher) of thermally stable FGF2.</li> <li>- Discovery of the spatio-temporal control of translation by the mTOR/el4F pathway during oocyte and early embryo development.</li> <li>- Discovery of the composition of signalling complexes associated with FGFR in models of skeletal dysplasia and cancer cell lines.</li> </ul>	
<b>H1.5</b>	<b>Contribution of the participation of the authors in large collaborations</b>
IAPG scientists have multiple collaborations with the counterparts in multiple countries in Europe, North America and far east as individual labs as well as one-on-one team networking.	

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

<b>H2.1</b>	<b>Societal relevance of outputs and results pursuant to CAS and institute mission</b>
Societal relevance is excellent. Activities and outputs are directed to a full spectrum ranging from a deeper understanding of fundamental biological phenomena to very concrete medical applications. Although the main stated goal of the IAPG institute is to conduct basic biological research in the fields of biomedicine and biotechnology, akin to the missions of the Institute as well as CAS, members are also actively engaged in Knowledge Translation, ultimately of great relevance to the Society.	
<b>H2.2</b>	<b>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</b>
IAPG outputs have really excelled in knowledge transfer which is at the cusp of going into practice or at least holds that promise, in human diseases such as Huntington's disease (HD) in cooperation with UniCure Inc. (Netherlands) and a novel knock-in mini pig HD model in cooperation with Takeda Pharmaceuticals Co. Ltd. (Japan); development of pig model of Stargardt's disease in cooperation with the University of Giessen, and pig model of Usher's syndrome with the University of Mainz (Germany). Listing of the microbiota of cow's rumen being done in the Anaerobic Microbiology Lab (LAM), has the potential of environmental conservation. LAM has also developed methods of mapping bacteriophages in improving dairy products. Thermally stable fibroblast growth factor 2 (FGF2) is already being marketed by ThermoFisher. However, IAPG share in the Wealth Generation from stable FGF2 was not made clear. It should also be mentioned that the three teams differ a lot in knowledge transfer activity.	
<b>H2.3</b>	<b>Relation to practice</b>
All the above listed (H2.2) outputs of IAPG have important practical applications for the betterment of the Society.	
<b>H2.4</b>	<b>Participation in AV21 strategy</b>
IAPG programs are quite active in supporting AV21 strategy by engaging in: the application of animal models in biomedicine including preclinical testing of novel approaches as well as all aspects of food handling such as food quality, production, processing, storage, wastage, etc.	
<b>H2.5</b>	<b>Cooperation with regions of the Czech Republic</b>
National cooperation of the IAPG can be grouped in the following categories: <ol style="list-style-type: none"> <li>1. Academic Programs: Participation of IAPG members through the supervision of PhD, MSc students as well as undergraduate seminars and teaching of courses;</li> <li>2. Joint research centres with the universities such as Center for Tumor Ecology and Joint Centre of Vertebrate Morphology;</li> <li>3. IAPG members serving on different University panels;</li> <li>4. Supervision of the protection of a threatened fish species; and</li> <li>5. Participation in networking for innovation in the Region of Central Bohemia.</li> </ol> <p>Some of the Universities where IAPG members are involved include: Charles University, Masaryk University, Vet and Pharma University, Mendel University, Czech University of Life Sciences, Ostrava University and South Bohemia University. Thus, regional cooperation appears to be fairly broadbased.</p>	

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

<b>D1.1</b>	<b>Comparison of the teams and the institute with similar international and national institutes</b>
<p>Given the multiple strengths of this Institute in research outputs (both quality and quantity), funding, cooperations, applied value of the ongoing research, state-of-the-art infrastructure, unique capabilities of genetically modified models and their breeding, and large animal models, IAPG is the leading Institute among institutes with a similar scope in the Czech Republic. In the international context, it is highly visible and recognized. Some groups are above the international average, some below.</p>	
<b>D1.2</b>	<b>Scope and quality of international and national cooperation and the role of the institute in such cooperation; engagement in broad international cooperation</b>
<p>Very good. IAPG has national as well as international cooperations at many levels including joint research projects; (5 projects with 20 other international institutes or companies); joint publications (50 other universities involved); contractual research and research grants. Role of the IAPG scientists in most of these activities is sole or central. After the evaluation period, the institute received significant funding from EU structural funds from Operational Programme OP VVV.</p>	
<b>D1.3</b>	<b>Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)</b>
<p>IAPG members have been very active in holding meetings of different scientific organizations through either conferences or workshops, or co-organization or serving as a member on the organizing committee. Among more than 30 such conferences, it is noteworthy that IAPG has held biannual conferences on the “Animal Models of Neurodegenerative Diseases”. This is viewed as a strategically important move in maintaining a lead in being centre for the large animal research.</p> <p>A particular note is made of the Inaugural Conference of the Visegrad Society for Developmental Biology (V45DB) organized by IAPG members which was made student centric. Based on this initiative, a new society, V45DB, has been launched and is based in the Czech Republic.</p>	

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

<b>D2.1</b>	<b>Direction in line with the perspective of the planned research directions</b>
<p>In the mission statement of IAPG CAS, the principal activity to be undertaken is scientific research in the fields of animal physiology and genetics. Implied in this statement is a list of many scholarly activities. The direction of activities detailed in the written report as well as in the virtual presentations is very much in line with the stated mission.</p>	
<b>D2.2</b>	<b>Assessment of the previous research objectives and their achievement</b>
<p>An excellent shift in organisation is part of the reason for an impressively improved output. Based on the previous international evaluation, the IAPG prioritized 11 topics in their 2015 – 2019 strategic plan. A good progress has been made on all the selected points. Some of the highlights are:</p>	

<p>Financing of Laboratories: Lab financing has been switched from being hierarchical to straight funding to each lab. Such funding, based on outputs, should promote a healthy and transparent competition.</p> <p>Laboratory Reorganization: 4 new laboratories were established in the stated period and 2 others were terminated to promote excellence.</p> <p>Expanding Physical Facilities: Pavilion S in Prague Campus has been expanded by 50% by the addition of a new floor. Plans are underway to add space in Brno to move out of the rented space.</p> <p>PIGMOD centre has been expanded to not only increase capacity from 150 to 490 mini-pigs but also to enhance the number of unique models with genetic manipulations.</p>	
<b>D2.3</b>	<b>Assessment of implementation of recommendations from past evaluation</b>
<p>The previous evaluation of the Institute was quite critical. In brief, the former commission(s) recommended an intense discussion to establish a coherent research concept, and the establishment of an international advisory board with a strong involvement in the discussion of the future research concept. Furthermore, the Institute should invest more into research initiated by the in-house scientists rather than by external partners, and the Institute should enhance internationalization, e.g. by recruiting international researchers. The Institute has taken action and implemented measures to improve all criticized points. In particular, the present commissions appreciate the establishment of an external advisory board, the rearrangements of teams and team leaders, and the marked improvement in the quality of outputs since 2015.</p>	
<b>D2.4</b>	<b>Success in receiving grants</b>
<p>There is a big increase (145 to 184 mil CZK) in funding attracted from 2015 to 2019, which is highly commendable. Institution funding over the same period, increased ever so slightly (48 – 53 mil CZK).</p>	
<b>D2.5</b>	<b>Adequacy of instrumental equipment</b>
<p>There has been some very significant additions in the infrastructure. Adequacy appears good but is difficult to evaluate with certainty.</p>	
<b>D2.6</b>	<b>Effectiveness of management</b>
<p>A significant change has been made in the funding approach for each lab. Overall effectiveness of the management is difficult to comment without face-to-face meetings. A significant increase in outputs as well as funding are very positive reflections on the effectiveness of management.</p>	
<b>D2.7</b>	<b>Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth</b>
<ul style="list-style-type: none"> <li>• IAPG is very proactive in all components listed in this column. Leaders of all the 14 laboratories are internationally recognized, and 8 of 14 have been recently appointed through an open competition selection process. There has been EU structural fund support to IAPG which will last for 10 years.</li> <li>• Age structure of the membership at this time is very favourable to the Institute, since most of the staff is in the 25 – 45 years age category.</li> <li>• There is a clear emphasis on quality recruitment as well as incentives for excellence.</li> </ul>	
<b>D2.8</b>	<b>Creating work-life balance conditions, assessment of approach towards possible gender issues</b>

Gender balance among leading scientists is skew, albeit less so than in some institutes. However, the IAPG has a very proactive approach towards work-life balance by making different provisions or flexibilities towards work hours. The possibilities include part time work, maternity leave, parental leave, redistribution of working hours and work from home.	
<b>D2.9</b>	<b>Relation of the institute with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.</b>
Received support from the Programme of Sustainability for institute development.	

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

<b>D3.1</b>	<b>Scope of cooperation with universities on national and international level</b>
<p>The Institute is very active in collaborations both at the national and international levels.</p> <p>Internationally: Scientists in IAPG have joint projects with the University of Arizona and Rutgers University in USA; University of Copenhagen, Denmark; and University of Giessen, Germany. Through contractual research with UniQure, Netherland and TAKEDA, Japan. FDA approved clinical trial is ongoing.</p> <p>Nationally: Cooperation with multiple national universities is at three levels: i) PhD/MSc training and undergraduate teaching at 7 different Czech universities; ii) joint research centres including Center for Tumor Ecology with Charles University, Prague; and iii) Centre of Vertebrate Morphology with University of Veterinary and Pharmaceutical Sciences in Brno.</p> <p>Both national and international cooperations also result in many research collaborations as well as high ranking publications.</p>	
<b>D3.2</b>	<b>Effectiveness of joint research centres</b>
IAPG has in the period collaborated with Czech universities in two joint research centres: The Centre for Tumour Ecology with Charles University, and the Joint Centre of Vertebrate Morphology with the University of Veterinary and Pharmaceutical Sciences in Brno. In addition, IAPG has multiple national as well as international joint projects with other universities, institutes and industry. Most of them are very vibrant and active.	
<b>D3.3</b>	<b>Success rate in supervision of PhD students</b>
During the evaluation period of 2015 – 2019, a total of 40 PhD have defended their thesis which is a significant number. This appears very good, but data on the total number in the PhD program were not presented.	
<b>D3.4</b>	<b>Participation of PhD students in the outputs</b>
Very good. Contribution of PhD students in the outputs is viewed by the institute as critically important. Students appear as the lead author or co-author in refereed journals, including some of the high-ranking journals.	
<b>D3.5</b>	<b>Participation of the institute in master or bachelor studies</b>
Very good supervision activity. During the evaluation period, a total of 48 Masters and 40 Bachelors program students defended their theses.	

<b>D3.6</b>	<b>Assessment of cooperation intensity with universities in the form of teaching</b>
IAPG members' contribution in semestrial lectures, seminars, and courses during 2015 – 2019 in seven universities, amounted to BSc, 49; MSc, 111, and; PhD 16 lectures. This extends IAPG services on the university committees, councils and boards. Presence in teaching also serves in identifying potential PhD students to be trained as highly qualified personnel by IAPG.	

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

<b>D4.1</b>	<b>Sufficiency of media strategy and activities in the area of research popularisation</b>
IAPG undertakes a very proactive approach in popularization of their activities. The efforts include organization of many seminars, workshops, visits of the public, semi-scientific talks, and open houses. All three locations of IAPG: Liběchov; Prague; and Brno take active part in The Open Days as a component of the Science and Technique Week of the CAS. Other instruments such as publishing in local print media, press releases, electronic media and TV are also used.	
<b>D4.2</b>	<b>Publishing activities and its quality</b>
Members of IAPG regularly publish in popular magazines, newspapers, participate in the preparation of textbooks for junior students. The institute does not act as publisher.	
<b>D4.3</b>	<b>Participation in professional organisations in the area of research and development</b>
The Team has numerous collaborations with private companies in the area of Research and Development.	

#### Other comments of the commission:

- In order to set a tone for excellence or higher standards, at the time of annual budget allocations, it may be helpful to list expectations in terms of outputs from each laboratory/program.
- Self-evaluation of the Graduate Training: IAPG trains a large number of PhD and MSc students and does a good job of training in research. However, the present Virtual Review process undertaken by CAS does not cover an in-depth evaluation of the Graduate Training Program of the Institute. Thus, a thorough “self-review” of this component of the entire institute should prove useful. A scholarly training program needs to ensure: teaching training; report writing/critiquing; paper reviews; platform presentations; etc. in a good PhD graduate to become a quality teacher cum researcher. This may be done already by the Institute but was not obvious to us in this virtual evaluation.
- We view favourably to strengthen the support to the Institute, strategically directed towards graduate training in animal research to ensure future availability of highly qualified personnel with that skill set in the Czech Republic.
- Considering the recent expansion of long-term infrastructure in and close to Liběchov, using not only national funds but also European funds, it is not immediately obvious to think of moving the major part of the institute to another location. However, we believe that the institute should have a long-term strategy of moving to a location close to a university campus. This may well have to be a rural location because of the animal facilities, but such place(s) exist, e.g. Palacky University in Olomouc. As the



institute points out for its laboratories located in Prague and Brno, close interaction with university environments is a definite strength for many reasons.

- The already praised shift to a less departmentalized structure can have other unwanted effects than the administrative burden mentioned by the institute, unless taken care of. One of these is the tendency of team activities to diverge away from institute strategy and mission. This may be caused by views of granting institutions and should be viewed as potentially positive, but only within limits. As a positive way to maintain synergy within the institute, we recommend that the institute Director reserves some of the institutional funds for projects that are collaborative between the laboratories within the institute.

## Part B: Evaluation of teams

### 1. Biomedical Research Team

#### Strengths and Opportunities:

Use of some important techniques has facilitated data that were published in some highly rated journals, e.g., Nature Comm. The expertise of investigators is diverse (e.g., neurochemistry, genetics, molecular biology, and microscopy), and enables a multidisciplinary approach to their studies. The use of the mini-pig in developing models of disease illustrates the ingenuity of the team and may be utilized as a core for both intramural and extramural investigators. Judged by outputs, the team's productivity is very good and some significant industrial collaborations have been developed. The institute consists of very good research groups, who utilize cutting-edge technology. Clinical relevance is indicated in most of the laboratories, indicated by disease models and some important neurological diseases. The investigators have developed gene therapies in their animal models that have promise as use for humans.

#### Weaknesses and Threats:

The major weakness is a lack of a theme, i.e., there is no central focus that links the research groups. Although important studies are conducted and significant data obtained, there is little evidence that the groups function as an institute. Besides the mini-pig model, there is little evidence of significant intramural collaborations. To rectify this problem, the institute needs to define a central research theme and then recruit individuals that facilitate the development of the theme. In reviewing the four laboratories of the team, the descriptions appear to emphasize approaches rather than testing hypotheses. Accordingly, the impression is that projects lack links to each other. Additional extramural funding would enhance the programs, but additional diversity of projects would not improve the cohesiveness of the groups and their function as a thematic institute. This problem was noted in the previous evaluation, i.e., the research of the team is driven by technologies and by the external collaborators. Another weakness is the distance between Brno and the Liběchov campus which does not encourage close collaborations between the 4 laboratories.

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

H1.1	Quality of selected outputs of Phase I
Most of the data have been published in quality journals: 48 of 134 papers within the evaluation period were published in first and second quartile journals (ranked according to quality). The frequency of publications indicates consistency.	
H1.2	Contribution of workers on the outputs reached
In some projects and papers resulting from collaborations, scientists from the team had a leading role. In all others, they provided essential contributions.	

<b>H1.3</b>	<b>Quality of all outputs and results</b>
Most outputs are of very good quality, and some are excellent according to journal rankings. A few publications are in outstanding journals, e.g., Nature Medicine.	
<b>H1.4</b>	<b>The most valuable discoveries and findings in the fields, their importance for the field</b>
The most valuable contributions are in the areas of biomarkers and technique development. One example of a key contribution is a gene editing system for Huntington's disease. Another is the development of computer-controlled compression of spinal cord injury in the mini-pig model that reliably simulates spinal cord injury in humans.	
<b>H1.5</b>	<b>Contribution of the participation of the authors in large collaborations</b>
There are several significant collaborations. These have value, but also place demands on the team members because their techniques may be required for the collaborators and dilute the time remaining for intramural studies.	

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

<b>H2.1</b>	<b>Societal relevance of outputs and results pursuant to CAS and institute mission</b>
The work conducted by the four Laboratories relates to health and disease and therefore is of high societal relevance. Outputs are highly relevant for CAS and IAPG mission.	
<b>H2.2</b>	<b>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</b>
All of the studies are relevant to human health and disease and the findings are related to clinical practice.	
<b>H2.3</b>	<b>Relation to practice</b>
See H2.2	
<b>H2.4</b>	<b>Participation in AV21 strategy</b>
No information on this criterion indicated in the report.	
<b>H2.5</b>	<b>Cooperation with regions of the Czech Republic</b>
Most of the cooperation within the Czech Republic is with universities.	

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

<b>D1.1</b>	<b>Comparison of the team with similar international and national institutes</b>
The team can be ranked among the leading groups in the Czech Republic with similar scope of research. In the international context, the team is visible and recognized.	
<b>D1.2</b>	<b>Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation</b>
All four laboratories have numerous and high-quality collaborations in Europe and the USA. These collaborations include obtaining and sharing data, collaborative funding and student exchanges, and aim at joint publications.	
<b>D1.3</b>	<b>Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)</b>
Many conferences have been organized and many were held in Liblice castle, not far from Prague. Seven invited lectures are listed in the report.	

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

<b>D2.1</b>	<b>Direction in line with the perspective of the planned research directions</b>
<p>The newly established Laboratory Neurobiology and Pathological Physiology is focused on genetic studies of multifactorial disease pathogenesis. The work addresses many diseases, e.g., Schizophrenia, Alzheimer's, alcohol disorders, but the link between others included (tooth agenesis, fatty acid taste perception, macular degeneration, blood sucking arthropods) indicates a lack of a central theme. The other laboratories appear to be continuing with the studies previously described.</p> <p>The research program of the Team addresses important questions and clinical problems. However, its major weakness is a lack of a theme, i.e., there is no central focus that links the research groups. There is little evidence that the groups function as a team. Besides the mini-pig model, there is little evidence of significant intramural collaborations. In the description of the four laboratories of the team, the research program appears fragmented. Accordingly, the impression is that the projects lack links to each other. This problem was noted in the previous evaluation.</p>	
<b>D2.2</b>	<b>Assessment of the previous research objectives and their achievement</b>
One laboratory is new (neurobiology and pathological physiology) and was not included in the last evaluation. The other 3 laboratories fulfilled most of their planned activities. Many of their objectives are related to mini-pig models and development of techniques. DNA and Integrity laboratory developed research in genome integrity.	
<b>D2.3</b>	<b>Assessment of implementation of recommendations from past evaluation</b>
The Team has markedly improved the quality of its publications. Other critical points of the recommendations were not fully addressed, e.g. the fragmentation and loose connections of projects. Furthermore, the dependence of the mini-pig model (PIGMOD) on external collaborations has not been sufficiently addressed (see first section of part B). Thus, it still seems that the research program is driven by the availability of grants, contract revenues as well as external collaborations, and not vice versa.	

<b>D2.4</b>	<b>Success in receiving grants</b>
The team was very successful in applying for domestic grants. It applied for EU funding (4 grants proposals) but was not successful.	
<b>D2.5</b>	<b>Adequacy of instrumental equipment</b>
This is clearly a plus in the institute, as the investigators have given it a focus.	
<b>D2.6</b>	<b>Effectiveness of management</b>
The main concern is a lack of sufficient interactions of the 4 laboratories, as previously noted in this report. There is a need to develop an institutional overall goal.	
<b>D2.7</b>	<b>Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth</b>
Strategies for development of scientists and training of graduate students and post-doctoral fellows are not defined, and need to be considered.	
<b>D2.8</b>	<b>Creating work-life balance conditions, assessment of approach towards possible gender issues</b>
No information as to this criterion was presented to the commission.	
<b>D2.9</b>	<b>Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.</b>
Not applicable.	

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

<b>D3.1</b>	<b>Scope of cooperation with universities on national and international level</b>
Members of the team are involved in academic teaching at Czech Universities, and gave 23 lectures for master students per year. Given the size of the team, this activity could be enhanced.	
<b>D3.2</b>	<b>Effectiveness of joint research centres</b>
The team participates in the Joint Research Centre for Tumour Ecology with the Faculty of Medicine, Charles University.	
<b>D3.3</b>	<b>Success rate in supervision of PhD students</b>
This aspect of the institution is generally successful. As noted by the investigators, they recruit the most appropriate students through their participation in the teaching of undergraduate students. Twenty PhD students successfully defended their thesis within the evaluation period.	
<b>D3.4</b>	<b>Participation of PhD students in the outputs</b>
Ph.D. students are important participants in the institute's program and are involved in the research, writing manuscripts and being co-authors of the papers.	
<b>D3.5</b>	<b>Participation of the team in master or bachelor studies</b>

The team participated in mentoring and supervision of bachelor and master students. 21 Bachelor and 20 master students successfully defended their theses.	
<b>D3.6</b>	<b>Assessment of cooperation intensity with universities in the form of teaching</b>
A Centre for Tumor Ecology was established in 2018 with Charles University. Faculties of Science, Medicine and Institute of Molecular Genetics form the joint centre. In Brno all research activities of Neurobiology and Pathological Physiology include student participation.	

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

<b>D4.1</b>	<b>Sufficiency of media strategy and activities in the area of research popularisation</b>
Popularisation publications number 23 and there were numerous popularisation lectures.	
<b>D4.2</b>	<b>Publishing activities and its quality</b>
The team published numerous articles in the area of research popularisation which appear to be of high quality.	
<b>D4.3</b>	<b>Participation in professional organisations in the area of research and development</b>
No specific information as to this point was given, but team members appear to be very active in tasks of the scientific community (as editors, reviewers, in scientific associations etc.).	

#### Other comments of the commission:

The major concern is one of organization to enable a more united effort of the laboratories into a visible theme. The potential of the groups is recognized a strength.

## 2. Team of Developmental Biology

### Strengths:

Effective team structure and excellent support for career development of junior scientists.

### Weaknesses:

Disproportionate production of research outputs within the team. Some research projects are narrow with limited impact.

### Opportunities:

The Team has a large network of collaborators which has the potential to translate into future funding and output opportunities.

### Threats:

Low number of grant support from the Institute could negatively impact the productivity of the Team.

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

<b>H1.1</b>	<b>Quality of selected outputs of Phase I</b>
Very good productivity of excellent selected outputs ( $N_{1,2}/FTE = 0.8$ ).	
<b>H1.2</b>	<b>Contribution of workers on the outputs reached</b>
Contribution of workers on the outputs reached is on the low range ( $FC_{1,2}/FTE = 0.2$ ) in comparison to the Institute level.	
<b>H1.3</b>	<b>Quality of all outputs and results</b>
Good number of outputs in the top two quartiles of journal ranking but lower representation in the top two quartiles by intensity of citations. Above average in excellent outputs but below average for all outputs.	
<b>H1.4</b>	<b>The most valuable discoveries and findings in the fields, their importance for the field</b>
First discovery is on the spatio-temporal control of translation by the mTOR/eIF4F pathway during oocyte and early embryo development. Second discovery is on the composition of signalling complexes associated with FGFR in models of skeletal dysplasias and cancer cell lines. These discoveries are significant in the respective field of research with potential impact for application in medical research.	
<b>H1.5</b>	<b>Contribution of the participation of the authors in large collaborations</b>
Not applicable.	

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

<b>H2.1</b>	<b>Societal relevance of outputs and results pursuant to CAS and institute mission</b>
Significant societal relevance for medical application.	
<b>H2.2</b>	<b>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</b>
Although there is a potential for application, the Team showed limited intention for knowledge transfer into practice.	
<b>H2.3</b>	<b>Relation to practice</b>
No applied result is reported, which is in disaccord with the potential application linked to the type of research undertaken by the Team.	
<b>H2.4</b>	<b>Participation in AV21 strategy</b>
Excellent popularisation of the research.	
<b>H2.5</b>	<b>Cooperation with regions of the Czech Republic</b>
None known.	

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

<b>D1.1</b>	<b>Comparison of the team with similar international and national institutes</b>
Team shows disproportionate performance in research outputs and position in international context between groups of the Teams. Overall, the Team is at average level in comparison with teams from similar international and national institutes. However, some groups (e.g. LBMBGC) are above average and have a strong international position while other groups (e.g. LCDCC) are below average and lack visibility.	
<b>D1.2</b>	<b>Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation</b>
Good amount of national and international cooperation including contribution to large consortium:  The Danish Council for Independent Research/Natural Sciences  COST/CA15214, EuroCellNet.	
<b>D1.3</b>	<b>Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)</b>
Excellent participation of the workers in scientific community activities (high number and diverse activities: workshops, conferences, invited lectures and awards).	



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

<b>D2.1</b>	<b>Direction in line with the perspective of the planned research directions</b>
Yes, it is.	
<b>D2.2</b>	<b>Assessment of the previous research objectives and their achievement</b>
The previous research objectives were achieved.	
<b>D2.3</b>	<b>Assessment of implementation of recommendations from past evaluation</b>
Most recommendations from past evaluation were implemented apart from the group of LCDC. It was recommended that the group continues the successful research topic. However, LCDC performed below expectation during the period of 2015-2019. The number of publications was limited, and the impact and relevance of the research outputs were low. Only 1 invited lecture was reported, and LCDC lacks visibility internationally.	
<b>D2.4</b>	<b>Success in receiving grants</b>
25 received grants with most grants as principal investigator. Some groups within the Team exhibit financial dependence on a single grant project.	
<b>D2.5</b>	<b>Adequacy of instrumental equipment</b>
Instrumental equipment is mostly adequate, but Team reports limited lab space.	
<b>D2.6</b>	<b>Effectiveness of management</b>
Team appears to have been managed effectively, but the disproportion in outputs between groups requires a new strategy for sustainability of the Team.	
<b>D2.7</b>	<b>Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth</b>
Excellent. Age structure is very good to maintain vitality. Very good strategy for career development of junior scientists and excellent support for students.	
<b>D2.8</b>	<b>Creating work-life balance conditions, assessment of approach towards possible gender issues</b>
Adequate working environment.	
<b>D2.9</b>	<b>Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.</b>
Not known.	

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

<b>D3.1</b>	<b>Scope of cooperation with universities on national and international level</b>
Excellent level of research cooperation with universities and adequate level of teaching and supervision of students.	
<b>D3.2</b>	<b>Effectiveness of joint research centres</b>
Effective joint research centres with universities which led to student supervision and publications.	
<b>D3.3</b>	<b>Success rate in supervision of PhD students</b>
Very good. 18 theses were defended in the period of 2015-2019.	
<b>D3.4</b>	<b>Participation of PhD students in the outputs</b>
Excellent participation of PhD students in the outputs: experiment, writing manuscripts, conferences, awards.	
<b>D3.5</b>	<b>Participation of the team in master or bachelor studies</b>
The Team actively participates in master (17) and bachelor (19) studies. Students are well integrated in research programs. LMM included master and bachelor students in grant proposals.	
<b>D3.6</b>	<b>Assessment of cooperation intensity with universities in the form of teaching</b>
Active cooperation with universities in the form of teaching. There is an adequate amount of teaching in the form of lectures provided by the Team, but the number of courses is disproportionate between group leaders. E.g. P. Krejci only had 1 course for the period of 2015-2019 while J. Kalous had 9.	

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

<b>D4.1</b>	<b>Sufficiency of media strategy and activities in the area of research popularisation</b>
Team should be praised for the high involvement in research popularisation. Activities are diverse: Open day, supervision of secondary schools, broadcasting.	
<b>D4.2</b>	<b>Publishing activities and its quality</b>
High volume of publishing activities and quality. Broadcasting at the national television, radio and newsletters. Team does not act as publisher.	
<b>D4.3</b>	<b>Participation in professional organisations in the area of research and development</b>
25 participations in activities of scientific community which include editorial board of journal, board of institute and member of committee.	

Other comments of the commission:

### 3. Biodiversity and Evolution Team

#### Strengths:

A vibrant new team leads the department of Biodiversity and Evolution. They have access to good to very good facilities and techniques. The team has established unique animal models to study very interesting and significant questions.

#### Weaknesses:

International collaboration resulting in grant funding for research projects should be initiated or expanded. There is a perceived bureaucracy associated for ERC style grants and there was resistance to exploring this avenue, but these are very generous grants and supply the longer funding durations sought so the benefits far outweigh the perceived challenges.

#### Opportunities:

The systems they are using likely have many applications – from both fundamental and applied/commercial science perspective, a small number of which could be explored in more detail. International connections of the group are good and there is real opportunity to continue with this momentum particularly with the HR award.

#### Threats:

International collaboration for vertebrate projects in particular is always challenging between licenses and various agreements – given the added complications of a pandemic the access to field sites and sampling etc is a serious threat. A post-pandemic strategy plan would be beneficial to mitigate any further loss of time/work/efforts due to such restrictions. As mentioned in the institute section above – the risks that a lull in funding brings to this group is significant – the cost of keeping these animals and facilities and associated technical supports is large yet it is not centrally covered and the majority of these running costs are from competitive grants which can be variable in success.

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

H1.1	Quality of selected outputs of Phase I
<p>The output from phase 1 evaluation: 48 outputs evaluated out of a total of 161. 2 in the top decile, 12 Q1, 24 Q2, 7 Q3. The publications evaluated in the 1*, Q1, Q2 range accounted for more than half of the citations on the evaluated output. The majority of the fields contributed to by the department are in the genetics/heredity, evolutionary biology, ecology and biochemistry-molecular biology areas which fits with their remit well.</p> <p>See section D1.1 for comparison with other departments etc.</p>	
H1.2	Contribution of workers on the outputs reached
<p>Many of the outputs evaluated involved international collaborations. The contribution of various team members is clearly stated. One might expect slightly more reprint author positions from a department of this size. Good participation by junior team members in output is recognized.</p> <p>See section D1.1 for comparison with other departments etc.</p>	

<b>H1.3</b>	<b>Quality of all outputs and results</b>
The department produced good to very good quality output. There is perhaps an issue with efforts that should be made to lower the Q3 output which could be refocussed upwards. The team profits from an extensive international collaboration network and has been involved in a large number of international efforts leading to very good output.	
<b>H1.4</b>	<b>The most valuable discoveries and findings in the fields, their importance for the field</b>
The group has made important contributions to understanding species adaptation to climate change (Proc B paper by Kotlik et al) and mouse hybrid zones (although I am not sure if 2020 papers can be considered in this evaluation period it was a highly relevant addition to this area). The sex chromosome evolution work is very exciting and producing interesting output, e.g. work published in Molecular Ecology and in MBE. The chromosome anchored approach and then the sequencing and assembling of the Komodo dragon are significant contributions and resulted in a number of great papers including one in Nature Ecology and Evolution and one in Cytogenet. Genome Research. The paper from the Ruminomics collaboration was published in Science Advances and is a real tour de force for microbiome research and agriculture and paves the way for future fruitful collaborations	
<b>H1.5</b>	<b>Contribution of the participation of the authors in large collaborations</b>
It is clear that the department in general is well connected globally and is collaborating with teams internationally to produce high quality output. However, for the larger collaborations they tend not to be the reprint authors – contributing in this way is also an important thing to do.	

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

<b>H2.1</b>	<b>Societal relevance of outputs and results pursuant to CAS and institute mission</b>
The team is contributing to teaching at various universities. They have produced a text book on phylogenetics, and have co-authored a book on human evolution and they are coediting a text book on the evolution of the house mouse. They have also contributed a number of lectures to the public and science fair activities.	
<b>H2.2</b>	<b>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</b>
The team members are contributing important knowledge. They are engaging with the public through appropriate channels.	
<b>H2.3</b>	<b>Relation to practice</b>
Nothing further to add.	

<b>H2.4</b>	<b>Participation in AV21 strategy</b>
See Section D2.9.	
<b>H2.5</b>	<b>Cooperation with regions of the Czech Republic</b>
No specific information provided in the documentation.	

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

<b>D1.1</b>	<b>Comparison of the team with similar international and national institutes</b>
Overall the department compares well with similar departments nationally and internationally. However, there are a couple of points of note: (1) there is probably a slightly lower number of reprint authored papers in their 3rd Quartile and up than one would expect given their high levels of output. (2) From Fig 3 in the report document, their level of world leading and world leading plus internationally excellent contributions is above the average. However, (3) from Fig 4 where output is corrected for FTE there are lower levels than expected in terms of world leading and or internationally excellent output.	
<b>D1.2</b>	<b>Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation</b>
LAM has the Ruminomics consortium with 6 EU countries where their responsibility was for anaerobic microbiology and DNA sequencing. There is room for improvement here - the department as a whole could be generating some collaborative links with international and national partners and engaging more with broad international efforts. In the documentation the other 3 teams state that they have no large international collaborations. However, they all have well-functioning network of international collaborations but perhaps just not on a scale that is classified as „large“ with whom they are producing high quality output.	
<b>D1.3</b>	<b>Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)</b>
Members of the team are involved as panel members for Czech Science Foundation, the ministry of agriculture, EU advisory board, board members for various governmental bodies and universities. They also serve on a range of international journal editorial boards. During the evaluation period group members attended a variety of conferences and workshops and also hosted/coorganised a number of events including international meetings such as the Genetics Society of AustralAsia, a workshop nested within the European Congress of Ichthyology. Some public lectures were also delivered in this time and some members of the team were invited to give talks but the number of invited talks is perhaps at a lower level than expected for a department of this size. Two awards that were earned in that time for example, were the L'Oreal -UNESCO women in science award and the student award from the Czech Academy of Microbiology.	

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

<b>D2.1</b>	<b>Direction in line with the perspective of the planned research directions</b>
The various groups within the department plan to continue to explore their diverse interests. These are all in line with their existing areas of research and include mouse colonisation of Europe, speciation and antispeciation barriers in hybrid zones, sex	

chromosome evolution and more generally genome organisation, microbiomes and stress and evolutionary adaptation to global climate change.	
<b>D2.2</b>	<b>Assessment of the previous research objectives and their achievement</b>
<p>The various groups within the department clearly set out to improve the quality of their output as judged by the IF of the international journals in which they publish – they have achieved this objective and have published important papers in the evaluation period. They also have continued to be successful in applying for and in gaining national funding. However, there are still a large number of their outputs in the 3rd and 4th Quartile (a total of 69/161 of their papers fall into this category). Focussing on what is necessary to move those into the 2nd Quartile could be really helpful.</p>	
<b>D2.3</b>	<b>Assessment of implementation of recommendations from past evaluation</b>
<p>Publication output – both quality and quantity have improved in the evaluation period as recommended</p> <p>Microbiota – host interactions – some projects have begun on this topic, specifically some equipment and some bioinformatics approaches. But it is early days.</p> <p>Integrate PhD students – whilst 8 students have successfully finished their PhDs in the evaluation period it is not clear what measures have been made to make PhD students more integrated during their PhDs. Some PhD graduates have been retained for postdoc which can help to get papers completed but it is usually advisable that PhD students leave and gain postdoc experience elsewhere – and then return after a postdoc elsewhere with those new skills that everyone benefits from.</p> <p>Continue to seek international funding – the ruminomics project ran during this time period but the grant would not have been developed and written in this evaluation period – it is not clear what other research-focussed grants have been developed, written and submitted in this evaluation period which would be helpful to assess sustained efforts in this regard.</p>	
<b>D2.4</b>	<b>Success in receiving grants</b>
<p>25 grants were running/successful in the period of the evaluation, these were from national agencies GACR, MEYS, MH and MA totalling approx. 6.5 Million Euro. Focus on national funding which is shorter term. Need to consider developing broader ecosystem for research funding – a mixture of longer and shorter term grants being the optimal. Thus, reducing the risk to the animal facilities that rely on shorter grants only.</p>	
<b>D2.5</b>	<b>Adequacy of instrumental equipment</b>
<p>The group has benefitted from various infrastructural funds which have contributed to providing very good level of instrumentation and other facilities for research.</p>	
<b>D2.6</b>	<b>Effectiveness of management</b>
<p>There seems to be a simple management structure within the department. It is difficult to comment on how truly effective this is given the interview/presentation and the documentation. It is believed that the different groups within this department have their own lab leaders that are doing the usual things needed to keep a research group functioning. Judging on their output alone (which as know is not a true reflection of management effectiveness in its full sense) they are functioning well and are making significant contributions to the progression of science.</p>	
<b>D2.7</b>	<b>Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth</b>

<p>There is a trend in this department that unfortunately exists right across the board, and that is that the number of females in leadership positions (scientist and senior scientist) is completely at odds in comparison to the proportion we see at earlier career stages. There need to be some measures put in place, starting with mentorship programs available for female researchers (with mentors outside of immediate dept/institute), and leadership programs to help to guide and prepare females for taking leadership roles.</p>	
<b>D2.8</b>	<b>Creating work-life balance conditions, assessment of approach towards possible gender issues</b>
<p>Nothing additional to add.</p>	
<b>D2.9</b>	<b>Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.</b>
<p>There is no specific detail provided in the written report on the Strategy AV21 involvement but the presentation showed involvement as follows (i) LFG are involved in identifying genetic markers and (ii) LAM are involved in the Foods for the Future where they are providing workshops. In summary, involvement is evident but at lower level than other departments.</p>	

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

<b>D3.1</b>	<b>Scope of cooperation with universities on national and international level</b>
<p>The Department cooperate with University of Ostrava, the Czech University of Life Sciences Prague and Charles University. There is an uneven distribution of contributions across the groups with LME contributing no regular semestrial teaching whilst other teams have more teaching load. It is not clear how this workload is distributed but currently looks unbalanced. The other three teams are contributing appropriate topics to Bachelor, MSc, Doctoral levels but it appears at low levels based on individual hours on particular modules. Nevertheless, the department is successful in attracting PhD students and if that is the goal of the teaching activities then it is clearly serving its purpose.</p>	
<b>D3.2</b>	<b>Effectiveness of joint research centres</b>
<p>No involvement in joint research centres.</p>	
<b>D3.3</b>	<b>Success rate in supervision of PhD students</b>
<p>12 PhD students successfully defended their PhDs in this timeframe - an average of 3 per group over a 5-year time period. This might be considered a little low but they are doing very careful studies that are time consuming. The distribution of PhD student registrations and successes across the across the groups is not clear, it looks like LME had 1 PhD student complete in the evaluation period whereas LAM had 8 for example. Overall the collective has a reasonable success rate.</p>	
<b>D3.4</b>	<b>Participation of PhD students in the outputs</b>
<p>There are some really nice examples of PhD student involvement in publications as witnessed by authorship in impressive international journals.</p>	
<b>D3.5</b>	<b>Participation of the team in master or bachelor studies</b>

See Section D3.1. The team also supervised a number of BSc and MSc level research projects (8 and 18 respectively within the evaluation period).	
<b>D3.6</b>	<b>Assessment of cooperation intensity with universities in the form of teaching</b>
See Section D3.1.	

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

<b>D4.1</b>	<b>Sufficiency of media strategy and activities in the area of research popularisation</b>
The team contributes to Živa, yearly open days for young students and features on national TV, press and radio.	
<b>D4.2</b>	<b>Publishing activities and its quality</b>
For outreach activities: they are publishing in Živa, and are on the editorial board (award received for this activity).	
<b>D4.3</b>	<b>Participation in professional organisations in the area of research and development</b>
They participate in a number of national and international societies: EIS, MGS, CZS, CSMS etc. They hold editorial positions on a number of international journals and have published a number of books.	

#### Other comments of the commission:

The lack of females in more senior positions is unfortunately not unique to this department/institute and really needs to be addressed by CAS and other influential agencies nationally. Gathering appropriate information to assess progress on this front is also essential, we would request that gender information at each career stage is gathered for future evaluations.



**Final report was elaborated by:**

**Commission 5.1 - Biological sciences A**

**Evaluated teams No.: 2**

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

Commission Deputy Chair: Graça Soveral

Commission Members:

Karl-Dieter Entian  
Christophe Lambing  
László Tretter  
Balázs Vajna  
Manfred Wuhrer  
László Zimányi

**Commission 6 - Biological sciences B**

**Evaluated teams No.: 3**

**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.: 1**

**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