

Evaluation of the Research and Professional Activity of the Institutes of the Czech Academy of Sciences (CAS) for the period 2010–2014

Final Report on the Evaluation of the Institute

Name of the Institute: Institute of Physiology of the CAS

Fields, in which the Institute registered its teams:

Chemical sciences

Observer representing the Academy Council of the CAS: Jiri Ctyroky

Observer representing the Institute: Ladislav Vyklický, substitute observer Jiří Pácha

Commission No. 4: Chemical sciences

Chair: Dr Habil, Academician Christian Amatore

Date(s) of the visit of the Institute: November 30 - December 4, 2015

Programme of the visit of the Institute: see attached Minutes from the visit

Evaluated research team:

- **Analysis of Biologically Important Compounds**

A. Evaluation of the Institute as a whole

General Evaluation

The Institute's mission is to deepen and broaden the fundamental knowledge on physiological and pathological processes involved in specific metabolic, cardiovascular, neuronal and brain functions. Although the evaluation Committee did not gather a sufficient level of expertise in the main medical and physiological research directions developed by the Institute, its feeling is that the Institute completely fulfils its announced goals and provides new approaches to prevention, diagnostics and therapeutic procedures required to tackle serious medical conditions in humans.

Since most of the Institute teams do not belong to the Chemical Science section of CAS, the evaluation Committee could only evaluate in detail an extremely small component of this institute. However, the general reports provided by the Director, Jan Kopecky, about its structure, scientific and educational accomplishments were found excellent in every respect.

The research infrastructures, including both core facilities and equipment available at its individual departments (90% internal users, 10% external ones), built thanks to long-term systematic efforts, offer a complex platform for *in vivo* phenotyping of physiological features (laboratory rodents, from cell organelle up to the whole-body level). Regarding its focus appropriately served by its facilities and expertise, the Institute appears to offer a unique platform seems apparently not available in any other biomedical institute in the country.

In conclusion, the organizational structure of the institute and the work groups, its funding and grant situation, co-operation partners (domestic-national-international), scientific output, editorial activities (including the publication of the Institute 'own' international scientific journal, *Physiological Research* since 1991), involvement in education (essentially 4 Faculties of Medicine of Charles University, the Faculty of Science of Purkinje University, etc.) and for dissemination towards general public audiences (TV, Radio, Internet) represent altogether an impressive organization.

The strategy and plans presented by the Director for the future, including his concern about the single team that this Committee evaluated (see report on this team below)

sound reasonable and prone to maintain its present highest standards and scientific visibility at the national and international levels.

Nota Bene: Since the Committee evaluated only a minor component of the Institute research structure, it did not feel appropriate commenting on the items 1-3 beyond the overall positive appreciations given above.

B. Evaluation of the individual teams

Evaluation of the Team: Analysis Of Biologically Important Compounds

1. Introduction

This group comprises a relatively small team in the Institute of Physiology that counts 23 research departments. This group is largely an analytical group which is performing service work for other groups in Institute of Physiology, hence the group's analytical equipment appears satisfactory in accordance with its role within the Institute and of the same quality level as the general equipment present in the other teams.

Its age profile is favorable: a small number of senior researchers (5) is supervising 2 graduate students. This has been relatively consistent throughout the period under evaluation. Besides its relatively modest involvement in the development of new separation tools (in collaboration with the CAS Institute of Organic Chemistry and Biochemistry and the University of Chemical Technology, Prague), the main role of this team seems to be in service and collaborations within the Institute of Physiology.

Some scientific interactions with the Medical Faculty of Charles University (proteomics of dental pulp and saliva), University of Adelaide (Australia), Museo Nacional in Spain, and the University of Verona are also evident although the corresponding selected research directions do not provide evidence of any recognizable scientific coherence, being apparently opportunistic and assembled based on personal relationships shaped between the Team Leader, Dr. Miksik, and other teams in the country or abroad (see below §5). As a consequence, the scientific outputs of the team are relatively modest, as is the strength of published work in terms of impact factors. The research activities with others in the Institute seem to happen at a random fashion and without long-term trends being indicated.

2. Strengths and Opportunities

When looking at the orientation of the many departments in the Institute of Physiology and its national impact and international reputation, there must be many exciting possibilities to utilize the equipment and this team's expertise in various systems biology applications. These opportunities should be more effectively tapped than what is presently indicated.

3. Weaknesses and Threats

There seems to be much unused potential in this team. With the availability of exciting biological problems and samples in the Institute, why trying to improve capillary electromigration (CE) separations techniques of polycyclic aromatics or synthetic peptides elsewhere?

4. Recommendations

The directions and objectives of this team should be re-evaluated to develop proper analytical strategies. The Commission found it hard to appreciate the research directions of this Team. It is important that the Team Leader seeks effective collaboration throughout the Institute whose investigations offer a wide panel of analytical problems of scientific importance and that the team has apparently the savoir-faire and knowledge to undertake with efficiency and chances of success.

While it was clearly stated by the Institute's Director that more involvement in translational research is one of the major objectives for future, this team's did not report any role in such activities that would seem essential.

Might there be some problems of understanding between the Team Leader and the overall management concerning the integration of this team within the institutional objectives? There was an intensive discussion of these problems with the institutional representatives as well as the Director.

5. Detailed Evaluations

There is not any unifying strategy in the different aspects of the researches performed by this team. As a result, there are publications (collaborative research) with multiple authors on steroids, or on the use of gold nanoparticles to modify the separation systems in capillary electrophoresis, then about the proteome of human teeth, or proteins from the avian cuticle eggshells, and deamidation of proteins in mummies, etc. There is little of any unifying theme.

The quality of results is acceptable, but not outstanding. The reports are in the journals of modest impact.

The number of students involved in this team's research is relative small, though the Team Leader is teaching selected lectures at the University of Pardubice and the Faculty of Science in Hradec Kralove.

Except for the institutional service, the societal relevance of this research is hard to judge. However, the Committee recognizes that several of research outcomes may capture the interest of a general public (e.g., eggshells molecular structure and microbial protection; effect of burial conditions on mummies collagen degradation, etc.) well beyond its true scientific value.

Yet, the team leader is known to his peers for publishing useful reports in the past and for serving on editorial boards and symposium organizing committees. This shows that the apparent scientific divergence of interest between this team and its Institute are not related to any intrinsic scientific weakness, but rather to a poor appreciation of its role. The fact that the plans for future research are incompletely developed falls perfectly in line with this view.

Date: December 23, 2015

Commission Chair: Dr Habil, Academician Christian Amatore