STRATEGIC PLAN OF THE INSTITUTE OF MOLECULAR AND CELL BIOLOGY

Approved by the council of the Institute on 12 October 2021

The Institute of Molecular and Cell Biology (IMCB) has, since its establishment, conducted research in molecular biosciences at a high international level and science-based teaching of white biology courses to students of all three levels of higher education.

EVALUATION OF THE CURRENT SITUATION:

Strengths:

1. The institute has extensive competence in various fields of biological research, including biochemistry, bioinformatics, biotechnology, developmental biology, molecular biology, cell biology and experimental genetic research focusing on microorganisms (viruses, bacteria, yeasts) as well as multicellular organisms (fruit fly, mouse, human). IMCB-coded courses are mostly taught by people who work at the institute and whose research supports the fundamental disciplines they teach.

2. Theoretical knowledge is supported by diverse course-related practical classes, which take place in premises specifically designed for teaching laboratories. Students are involved in the acquisition of practical skills, as people with such skills are needed in various research, academic and medical institutions and biotechnology enterprises.

3. IMCB research groups have close research cooperation with other groups in the institute and the university, as well as with different research institutions in Estonia and abroad.

4. IMCB is undergoing a generational change. For example, in the course of staff renewal in the recent years, three new professors have come from outside the institute and are currently setting up their own laboratories and research areas.

5. IMCB cooperates closely with general education schools (for example, Youth Academy, Travelling Bioclass, AHHAA Centre, Genetics Workshops) to improve the quality of upper secondary education in biology; both the staff and the students of the institute contribute to this cooperation. Good cooperation with the Bioscience Students' Association (BSA) offers the necessary feedback for better organisation of teaching and studies at the institute, and BSA students help with science popularisation at general education schools.

6. IMCB cooperates with Estonian and some international biotechnology companies to conduct in-company traineeship for master's students (for example, Synlab, Icosagen, Thermo Fisher Scientific), in the course of which IMCB and the companies constantly exchange information and collaborate to update the curricula. Several companies actively participate and our alumni are involved in information days held for students (for example, the BioEntrepreneurship Day).

Problems:

1. Due to the chronic underfunding of higher education and research in Estonia, the number of employees at the institute has decreased.

In some chairs, the number of employees has dropped to a critically low level. Some employees have moved to other institutes or companies. Outsourcing more teaching to other institutes is not a sustainable solution.

2. The rise in research funding to 1% of GDP, however, does not cover the needs of research and teaching in the sciences. The competition for research grants has not diminished and, according to current forecasts, the situation is unlikely to improve in the coming years. The Ministry of Education and Research lacks a viable plan to solve the universities' problems.

3. Although the relevance and proportion of baseline research funding has grown in Estonia, the baseline funding to the IMCB is sufficient only to cover the administration costs – this inevitably results from the university's financing system but is in sharp conflict with the statutory objectives of baseline research funding. This is why the institute has very limited opportunities to give the so-called "bridging" grants to workgroups that have remained without funding. Academic staff salaries can be raised and bridging grants for research can only be paid at the expense of the institute's internal resources through a zero-sum game of redistribution.

4. The number of admitted students – particularly in master's and doctoral studies – has decreased (due to both demographic reasons and the low value many employers attach to research degrees in Estonia). So far, the IMCB has had no problems with admissions to the bachelor's curriculum of Gene Technology. However, the dropout rate after the first year is high due to various reasons: it is easier to switch from Gene Technology to Medicine; some students' academic progress at the university is poor; some students are dissappointed in the curriculum as there are a lot of mathematics, chemistry and physics courses and too few specialist courses in the first year.

5. Research infrastructure that is also used for teaching and studies (practical classes, graduation theses) is becoming outdated (the newest parts of it were bought in the period 2006–2017) and as the equipment is expensive, the maintenance, updating and renovation costs of infrastructure may prove unaffordable for the institute.

IMCB DEVELOPMENT IN THE FOLLOWING YEARS:

The priorities of the IMCB is, and continues to be providing science-based higher education and conducting research at an internationally high level. In order to carry out high-quality teaching while remaining in close competition for research funding, the number of IMCB academic staff needs to increase 1.5 times in the coming years. The number of employees, however, can only grow if the budget of the institute increases. New staff members must be able to bring in money. Larger staff enables to better divide the taught classes between the staff members, and this results in more time for research. To ensure the balanced development of the institute and a new generation of academic staff, additional people and workgroups are primarily needed in chairs where the number of employees has dropped the most (for example, the chairs of Evolutionary Biology, Biotechnology, Biophysics and Plant Physiology).

Objectives and lines of action:

I Research

1. The capability of IMCB researchers to receive grants both in Estonia and internationally increases. Growth in competitiveness requires closer cooperation within the institute, cooperation within the Faculty of Science and Technology and more widely in Estonia, participation in centres of excellence, and finding new cooperation partners and funding opportunities abroad, participation in international cooperation networks.

2. The IMCB must become an attractive environment for young people building their independent academic career. This presumes active communication with degree-seeking students and researchers who have gone abroad to study or work, informing them of the possibilities to return to Estonia (for example, ERC, EMBO starting grants, ERA Chair, starting grants in Estonia) and the possibilities offered to returning researchers by the institute (for example, the existing laboratory premises, the possibility to use the infrastructure, financial support).

3. Besides fundamental research, also the number and volume of applied research studies must grow considerably, especially in fields related to the digital and green transition. Also, the percentage of medical research studies must increase.

4. The position of each lecturer and doctoral student (junior research fellow) must be accompanied with a fixed amount of research money allocated from the UT's baseline research funding budget.

5. Closer business cooperation, more cooperation contracts with enterprises. In order to have more contacts, we have to make ourselves more visible and find points of cooperation to offer.

6. Renewal of research infrastructure is inevitable for ensuring the sustainability of internationally high-level research because the existing equipment is becoming outdated. Purchase of equipment requires funding from the structural funds of the European Union and/or national investments, and the purchase of more expensive equipment must be coordinated with other institutes of the Faculty of Science and Technology, to avoid duplication. The university should head towards greater integration, where a system is created that enables the joint use of research equipment within the faculty and across faculties. Infrastructure renewal also includes the building of new core facilities (for example, building of the bioimaging core facility at the IMCB – from earlier infrastructure projects the institute has already acquired a transmission electron microscope, a confocal microscope, fluorescence microscopes, which are extensively used also outside the institute). In addition to the use of the infrastructure across research institutions, the infrastructure services should also be offered to enterprises.

7. Participation in research policy-making: expressing opinion, making proposals, for example, in the university's decision-making bodies, committees, giving explanations in the media, writing opinion pieces. Measures are needed to support young researchers' career in Estonia; it must be explained that the application of research results requires a strong base in fundamental research, etc.

II Teaching and studies

1. The Gene Technology curriculum needs updating to enhance the attractiveness of the curriculum for entrants, to motivate students to continue their studies at the second level of

higher education, and to reduce the dropout rate during studies (for example, more specialisation subjects and specialisation-related problem-solving tasks in the first year of study, motivation to be competitive after graduation on the labour market).

2. Continuous curricula development at all levels of higher education in line with the needs of society and the labour market.

3. Linking learning more closely with practical skills – more opportunities to link one's graduation thesis or degree studies to entrepreneurship, to spark young people's interest in industry doctorates. Widening the in-company traineeship base for master's students. To that end, cooperation with enterprises and institutions is enhanced by finding and making closer contacts.

4. We increase the use of digital solutions in teaching and studies with the aim to offer, for example, international e-learning possibilities. It should not be overlooked, however, that face-to-face teaching is a priority.

5. Increasing internationalisation in teaching and studies – doctoral studies in cooperation with foreign enterprises (for example, joint doctorates with Thermo Fisher Scientific, where IMCB master's students have done their in-company traineeship for years already). Creating joint master's programmes in cooperation with Nordic universities, which would enable active student exchange and enhance the attractiveness of master's studies.

6. More effective teacher education: the acquisition of specialised knowledge in the subject is essential for teachers. Curricula should be reorganised in such a way that those admitted to a bachelor's or master's curriculum at the IMCB are able to acquire the profession of basic school or upper secondary school teacher as an additional specialisation. Also other curricula of the Faculty of Science and Technology should offer a similar possibility. Education of subject teachers must take place in the faculty where such subject courses are taught, and the percentage of specialised subject courses in teacher education must increase.

7. Involvement of private funds in teaching and studies: the IMCB offers courses to prepare secondary school students for university entrance exams, and continuing education courses for adults where cell biological processes are explained. In the longer term, if the laws allow, those who failed to get a state-funded student place could be offered a paid student place in Estonian-taught curricula.

III Service to society

All our teaching and research and development activities are our main contribution to serving the needs of society. In addition, we attach importance to the following:

1. Writing of university textbooks in Estonian, modernising textbooks that have been published earlier, compiling e-textbooks and dictionaries.

2. Continued development of Estonian scientific terminology.

3. Creating an online platform to enhance the education of the general public, explaining biological processes at the cellular and organism level (for example, what is a gene, what is GMO, why viruses mutate, how vaccines work, what causes mutations, etc.).

4. Increasing the visibility of research carried out at the IMCB: more active communication of the research results and their relevance to science, and communicating them to society via different media channels; writing popular science articles.

5. Strengthening cooperation with general education schools and the Youth Academy: although the IMCB has been working closely with them for years, it is always possible to do more and better.

6. Maintaining and developing the Estonian microbial collection.

IV Work environment

1. Giving recognition to employees: staff members are congratulated on behalf of the institute on their jubilee or other important occasions; an appreciation event is organised when a valued colleague retires or is granted the emeritus status, and these persons are remembered in the following years on their important days; colleagues are nominated for university recognition for excellent performance at work; employees are appreciated within the institute.

2. Creating a positive working environment: trusting working relationships; problems are noticed and solved by the management; equal treatment of staff members, while respecting their individuality; common events creating the sense of "us" (for example, the annual conference, Christmas party, opening and closing of the academic year, in-house seminars, anniversary of the institute, the summer days event of the institute and other joint activities).

3. Employees are involved in decision-making and having a say on the development of the institute and, more widely, the university, through discussions held at the institute (for example, discussion of the strategic plan of the institute).

4. Communication of information to employees: the institute’s management organises information hours where a part of the time is dedicated to questions and answers, and where employees are informed of management decisions and new regulations (for example, arrangements related to the doctoral study reform), of discussions held by the institute council and of the decisions made.