INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI 2005–2010

RC-Specific Evaluation of HelDevBio – Helsinki Developmental Biology Research Community

Seppo Saari & Antti Moilanen (Eds.)
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Summary:
Researcher Community (RC) was a new concept of the participating unit in the evaluation. Participation in the evaluation was voluntary and the RCs had to choose one of the five characteristic categories to participate.

Evaluation of the Researcher Community was based on the answers to the evaluation questions. In addition a list of publications and other activities were provided by the TUHAT system. The CWTS/Leiden University conducted analyses for 80 RCs and the Helsinki University Library for 66 RCs. Panellists, 49 and two special experts in five panels evaluated all the evaluation material as a whole and discussed the feedback for RC-specific reports in the panel meetings in Helsinki. The main part of this report is consisted of the feedback which is published as such in the report.

Chapters in the report:
1. Background for the evaluation
2. Evaluation feedback for the Researcher Community
3. List of publications
4. List of activities
5. Bibliometric analyses

The level of the RCs' success can be concluded from the written feedback together with the numeric evaluation of four evaluation questions and the category fitness. More conclusions of the success can be drawn based on the University-level report.

RC-specific information:

Main scientific field of research: Biological, Agricultural and Veterinary Sciences

Participation category: 1. Research of the participating community represents the international cutting edge in its field

RC's responsible person: Thesleff, Irma

RC-specific keywords: embryonic development, cell signaling, stem cells, cell differentiation, organogenesis, patterning, gene regulation, model organisms, transgenic (GM) animals

Keywords: Research Evaluation, Meta-evaluation, Doctoral Training, Bibliometric Analyses, Researcher Community

Series title and number: University of Helsinki, Administrative Publications 80/21, Evaluations

ISSN: 1795-5513 (Online)  ISBN: 978-952-10-7441-7 (PDF)

Total number of pages: 70 Language: English

Additional information:
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Foreword

The evaluation of research and doctoral training is being carried out in the years 2010–2012 and will end in 2012. The steering group appointed by the Rector in January 2010 set the conditions for participating in the evaluation and prepared the Terms of Reference to present the evaluation procedure and criteria. The publications and other scientific activities included in the evaluation covered the years 2005–2010.

The participating unit in the evaluation was defined as a Researcher Community (RC). To obtain a critical mass with university-level impact, the number of members was set to range from 20 to 120. The RCs were required to contain researchers in all stages of their research career, from doctoral students to principal investigators (Pis). All in all, 136 Researcher Communities participated in this voluntary evaluation, 5857 persons in total, of whom 1131 were principal investigators. PIs were allowed to participate in two communities in certain cases, and 72 of them used this opportunity and participated in two RCs.

This evaluation enabled researchers to define RCs from the “bottom up” and across disciplines. The aim of the evaluation was not to assess individual performance but a community with shared aims and researcher-training activities. The RCs were able to choose among five different categories that characterised the status and main aims of their research. The steering group considered the process of applying to participate in the evaluation to be important, which lead to the establishment of these categories. In addition, providing a service for the RCs to enable them to benchmark their research at the global level was a main goal of the evaluation.

The data for the evaluation consisted of the RCs’ answers to evaluation questions on supplied e-forms and a compilation extracted from the TUHAT – Research Information System (RIS) on 12 April 2011. The compilation covered scientific and other publications as well as certain areas of scientific activities. During the process, the RCs were asked to check the list of publications and other scientific activities and make corrections if needed. These TUHAT compilations are public and available on the evaluation project sites of each RC in the TUHAT-RIS.

In addition to the e-form and TUHAT compilation, University of Leiden (CWTS) carried out bibliometric analyses from the articles included in the Web of Science (WoS). This was done on University and RC levels. In cases where the publication forums of the RC were clearly not represented by the WoS data, the Library of the University of Helsinki conducted a separate analysis of the publications. This was done for 66 RCs representing the humanities and social sciences.

The evaluation office also carried out an enquiry targeted to the supervisors and PhD candidates about the organisation of doctoral studies at the University of Helsinki. This and other documents describing the University and the Finnish higher education system were provided to the panellists.

The panel feedback for each RC is unique and presented as an entity. The first collective evaluation reports available for the whole panel were prepared in July–August 2011. The reports were accessible to all panel members via the electronic evaluation platform in August. Scoring from 1 to 5 was used to complement written feedback in association with evaluation questions 1–4 (scientific focus and quality, doctoral training, societal impact, cooperation) and in addition to the category evaluating the fitness for participation in the evaluation. Panellists used the international level as a point of comparison in the evaluation. Scoring was not expected to go along with a preset deviation.

Each of the draft reports were discussed and dealt with by the panel in meetings in Helsinki (from 11 September to 13 September or from 18 September to 20 September 2011). In these meetings the panels also examined the deviations among the scores and finalised the draft reports together.

The current RC-specific report deals shortly with the background of the evaluation and the terms of participation. The main evaluation feedback is provided in the evaluation report, organised according to the evaluation questions. The original material provided by the RCs for the panellists has been attached to these documents.
On behalf of the evaluation steering group and office, I sincerely wish to thank you warmly for your participation in this evaluation. The effort you made in submitting the data to TUHAT-RIS is gratefully acknowledged by the University. We wish that you find this panel feedback useful in many ways. The bibliometric profiles may open a new view on your publication forums and provide a perspective for discussion on your choice of forums. We especially hope that this evaluation report will help you in setting the future goals of your research.

Johanna Björkroth
Vice-Rector
Chair of the Steering Group of the Evaluation

Steering Group of the evaluation
Steering group, nominated by the Rector of the University, was responsible for the planning of the evaluation and its implementation having altogether 22 meetings between February 2010 and March 2012.

Chair
Vice-Rector, professor Johanna Björkroth

Vice-Chair
Professor Marja Airaksinen

Chief Information Specialist, Dr Maria Forsman
Professor Arto Mustajoki
University Lecturer, Dr Kirsi Pyhältö
Director of Strategic Planning and Development, Dr Ossi Tuomi
Doctoral candidate, MSocSc Jussi Vauhkonen
Panel members

CHAIR
Professor Ary A. Hoffman
Ecological genetics, evolutionary biology, biodiversity conservation, zoology
University of Melbourne, Australia

VICE-CHAIR
Professor Barbara Koch
Forest Sciences, remote sensing
University of Freiburg, Germany

Professor Per-Anders Hansson
Agricultural engineering, modeling, life cycle analysis, bioenergy
Swedish University of Agricultural Sciences

Professor Danny Huylebroeck
Developmental biology
Katholieke Universiteit Leuven, Belgium

Professor Jonathan King
Virus assembly, protein folding
Massachusetts Institute of Technology MIT, USA

Professor Hannu J.T. Korhonen
Functional foods, dairy technology, milk hygiene
MTT Agrifood Research Finland

Professor Kristiina Kruus
Microbiological biotechnology, microbiological enzymes, applied microbiology
VTT Technical Research Centre of Finland

Professor Joakim Lundeberg
Biochemistry, biotechnology, sequencing, genomics
KTH Royal Institute of Technology, Sweden

Professor Dominiek Maes
Veterinary medicine
Ghent University, Belgium

Professor Olli Saastamoinen
Forest economics and policy
University of Eastern Finland

Professor Kai Simons
Biochemistry, molecular biology, cell biology
Max-Planck-Institute of Molecular Cell Biology and Genetics, Germany

The panel, independently, evaluated all the submitted material and was responsible for the feedback of the RC-specific reports. The panel members were asked to confirm whether they had any conflict of interests with the RCs. If this was the case, the panel members disqualified themselves in discussion and report writing.

Added expertise to the evaluation was contributed by the members from the other panels and by one evaluator outside the panels.
External Expert
Professor Anders Linde
Oral biochemistry
Faculty of Odontology
Göteborg University
Sweden

Experts from the Other Panels
Professor Caitlin Buck, from the Panel of Natural Sciences
Professor Ritske Huismans, from the Panel of Natural Sciences
Professor Johanna Ivaska, from the Panel of Medicine, biomedicine and health sciences
Professor Lea Kauppi, from the Panel of Natural Sciences
Professor Holger Stark, from the Panel of Natural Sciences
Professor Peter York, from the Panel of Medicine, biomedicine and health sciences

EVALUATION OFFICE
Dr Seppo Saari, Doc., Senior Adviser in Evaluation, was responsible for the entire evaluation, its planning and implementation and acted as an Editor-in-chief of the reports.

Dr Eeva Sievi, Doc., Adviser, was responsible for the registration and evaluation material compilations for the panellists. She worked in the evaluation office from August 2010 to July 2011.

MSocSc Paula Ranne, Planning Officer, was responsible for organising the panel meetings and all the other practical issues like agreements and fees and editing a part the RC-specific reports. She worked in the evaluation office from March 2011 to January 2012.

Mr Antti Moilanen, Project Secretary, was responsible for editing the reports. He worked in the evaluation office from January 2012 to April 2012.

TUHAT OFFICE
Provision of the publication and other scientific activity data
Mrs Aija Kaitera, Project Manager of TUHAT-RIS served the project ex officio providing the evaluation project with the updated information from TUHAT-RIS. The TUHAT office assisted in mapping the publications with CWTS/University of Leiden.

MA Liisa Ekebom, Assisting Officer, served in TUHAT-RIS updating the publications for the evaluation. She also assisted the UH/Library analyses.

BA Liisa Jäppinen, Assisting Officer, served in TUHAT-RIS updating the publications for the evaluation.

HELSINKI UNIVERSITY LIBRARY
Provision of the publication analyses
Dr Maria Forsman, Chief Information Specialist in the Helsinki University Library, managed with her 10 colleagues the bibliometric analyses in humanities, social sciences and in other fields of sciences where CWTS analyses were not applicable.
Acronyms and abbreviations applied in the report

External competitive funding
AF – Academy of Finland
TEKES - Finnish Funding Agency for Technology and Innovation
EU - European Union
ERC - European Research Council
International and national foundations
FP7/6 etc. /Framework Programmes/Funding of European Commission

Evaluation marks
Outstanding (5)
Excellent (4)
Very Good (3)
Good (2)
Sufficient (1)

Abbreviations of Bibliometric Indicators
P - Number of publications
TCS – Total number of citations
MCS - Number of citations per publication, excluding self-citations
PNC - Percentage of uncited publications
MNCS - Field-normalized number of citations per publication
MNJS - Field-normalized average journal impact
THCP10 - Field-normalized proportion highly cited publications (top 10%)
INT_COV - Internal coverage, the average amount of references covered by the WoS
WoS – Thomson Reuters Web of Science Databases

Participation category
Category 1. The research of the participating community represents the international cutting edge in its field.
Category 2. The research of the participating community is of high quality, but the community in its present composition has yet to achieve strong international recognition or a clear break-through.
Category 3. The research of the participating community is distinct from mainstream research, and the special features of the research tradition in the field must be considered in the evaluation.
Category 4. The research of the participating community represents an innovative opening.
Category 5. The research of the participating community has a highly significant societal impact.

Research focus areas of the University of Helsinki
Focus area 1: The basic structure, materials and natural resources of the physical world
Focus area 2: The basic structure of life
Focus area 3: The changing environment – clean water
Focus area 4: The thinking and learning human being
Focus area 5: Welfare and safety
Focus area 6: Clinical research
Focus area 7: Precise reasoning
Focus area 8: Language and culture
Focus area 9: Social justice
Focus area 10: Globalisation and social change
1 Introduction to the Evaluation

1.1 RC-specific evaluation reports

The participants in the evaluation of research and doctoral training were Researcher Communities (hereafter referred to as the RC). The RC refers to the group of researchers who registered together in the evaluation of their research and doctoral training. Preconditions in forming RCs were stated in the Guidelines for the Participating Researcher Communities. The RCs defined themselves whether their compositions should be considered well-established or new.

It is essential to emphasise that the evaluation combines both meta-evaluation\(^1\) and traditional research assessment exercise and its focus is both on the research outcomes and procedures associated with research and doctoral training. The approach to the evaluation is enhancement-led where self-evaluation constituted the main information. The answers to the evaluation questions formed together with the information of publications and other scientific activities an entity that was to be reviewed as a whole.

The present evaluation recognizes and justifies the diversity of research practices and publication traditions. Traditional Research Assessment Exercises do not necessarily value high quality research with low volumes or research distinct from mainstream research. It is challenging to expose the diversity of research to fair comparison. To understand the essence of different research practices and to do justice to their diversity was one of the main challenges of the present evaluation method. Understanding the divergent starting points of the RCs demanded sensitivity from the evaluators.

1.2 Aims and objectives in the evaluation

The aims of the evaluation are as follows:

- to improve the level of research and doctoral training at the University of Helsinki and to raise their international profile in accordance with the University’s strategic policies. The improvement of doctoral training should be compared to the University’s policy.\(^2\)
- to enhance the research conducted at the University by taking into account the diversity, originality, multidisciplinary nature, success and field-specificity,
- to recognize the conditions and prerequisites under which excellent, original and high-impact research is carried out,
- to offer the academic community the opportunity to receive topical and versatile international peer feedback,
- to better recognize the University’s research potential.
- to exploit the University’s TUHAT research information system to enable transparency of publishing activities and in the production of reliable, comparable data.

1.3 Evaluation method

The evaluation can be considered as an enhancement-led evaluation. Instead of ranking, the main aim is to provide useful information for the enhancement of research and doctoral training of the participating RCs. The comparison should take into account each field of science and acknowledge their special character.

\(^1\) The panellists did not read research reports or abstracts but instead, they evaluated answers to the evaluation questions, tables and compilations of publications, other scientific activities, bibliometrics or comparable analyses.
\(^2\) Policies on doctoral degrees and other postgraduate degrees at the University of Helsinki.
The comparison produced information about the present status and factors that have lead to success. Also challenges in the operations and outcomes were recognized.

The evaluation approach has been designed to recognize better the significance and specific nature of researcher communities and research areas in the multidisciplinary top-level university. Furthermore, one of the aims of the evaluation is to bring to light those evaluation aspects that differ from the prevalent ones. Thus the views of various fields of research can be described and research arising from various starting points understood better. The doctoral training is integrated into the evaluation as a natural component related to research. Operational processes of doctoral training are being examined in the evaluation.

**Five stages of the evaluation method were:**

1. Registration – Stage 1
2. Self-evaluation – Stage 2
3. TUHAT\(^3\) compilations on publications and other scientific activities\(^4\)
4. External evaluation
5. Public reporting

### 1.4 Implementation of the external evaluation

**Five Evaluation Panels**

Five evaluation panels consisted of independent, renowned and highly respected experts. The main domains of the panels are:

1. biological, agricultural and veterinary sciences
2. medicine, biomedicine and health sciences
3. natural sciences
4. humanities
5. social sciences

The University invited 10 renowned scientists to act as chairs or vice-chairs of the five panels based on the suggestions of faculties and independent institutes. Besides leading the work of the panel, an additional role of the chairs was to discuss with other panel chairs in order to adopt a broadly similar approach. The panel chairs and vice-chairs had a pre-meeting on 27 May 2011 in Amsterdam.

The panel compositions were nominated by the Rector of the University 27 April 2011. The participating RCs suggested the panel members. The total number of panel members was 50. The reason for a smaller number of panellists as compared to the previous evaluations was the character of the evaluation as a meta-evaluation. The panellists did not read research reports or abstracts but instead, they evaluated answers to the evaluation questions, tables and compilations of publications, other scientific activities, bibliometrics and comparable analyses.

The panel meetings were held in Helsinki:

- On 11–13 September 2011: (1) biological, agricultural and veterinary sciences, (2) medicine, biomedicine and health sciences and (3) natural sciences.
- On 18–20 September 2011: (4) humanities and (5) social sciences.

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\(^3\) TUHAT (acronym) of Research Information System (RIS) of the University of Helsinki

\(^4\) Supervision of thesis, prizes and awards, editorial work and peer reviews, participation in committees, boards and networks and public appearances.
1.5 Evaluation material

The main material in the evaluation was the RCs’ self-evaluations that were qualitative in character and allowed the RCs to choose what was important to mention or emphasise and what was left unmentioned.

The present evaluation is exceptional at least in the Finnish context because it is based on both the evaluation documentation (self-evaluation questions, publications and other scientific activities) and the bibliometric reports. All documents were delivered to the panellists for examination.

Traditional bibliometrics can be reasonably done mainly in medicine, biosciences and natural sciences when using the Web of Science database, for example. Bibliometrics, provided by CWTS/The Centre for Science and Technology Studies, University of Leiden, cover only the publications that include WoS identification in the TUHAT-RIS.

Traditional bibliometrics are seldom relevant in humanities and social sciences because the international comparable databases do not store every type of high quality research publications, such as books and monographs and scientific journals in other languages than English. The Helsinki University Library has done analysis to the RCs, if their publications were not well represented in the Web of Science databases (RCs should have at least 50 publications and internal coverage of publications more than 40%) – it meant 58 RCs. The bibliometric material for the evaluation panels was available in June 2011. The RC-specific bibliometric reports are attached at the end of each report.

The panels were provided with the evaluation material and all other necessary background information, such as the basic information about the University of Helsinki and the Finnish higher education system.

Evaluation material
1. Registration documents of the RCs for the background information
2. Self evaluation material – answers to the evaluation questions
3. Publications and other scientific activities based on the TUHAT RIS:
   3.1. statistics of publications
   3.2. list of publications
   3.3. statistics of other scientific activities
   3.4. list of other scientific activities
4. Bibliometrics and comparable analyses:
   4.1. Analyses of publications based on the verification of TUHAT-RIS publications with the Web of Science publications (CWTS/University of Leiden)
   4.2. Publication statistics analysed by the Helsinki University Library - mainly for humanities and social sciences
5. University level survey on doctoral training (August 2011)
6. University level analysis on publications 2005–2010 (August 2011) provided by CWTS/University of Leiden

Background material

University of Helsinki
- Basic information about the University of the Helsinki
- The structure of doctoral training at the University of Helsinki
- Previous evaluations of research at the University of Helsinki – links to the reports: 1998 and 2005

The Finnish Universities/Research Institutes
- Finnish University system
- Evaluation of the Finnish National Innovation System
- The State and Quality of Scientific Research in Finland. Publication of the Academy of Finland 9/09.

The evaluation panels were provided also with other relevant material on request before the meetings in Helsinki.
1.6 Evaluation questions and material

The participating RCs answered the following evaluation questions which are presented according to the evaluation form. In addition, TUHAT RIS was used to provide the additional material as explained. For giving the feedback to the RCs, the panellists received the evaluation feedback form constructed in line with the evaluation questions:

1. Focus and quality of the RC's research
   - Description of
     - the RC's research focus.
     - the quality of the RC's research (incl. key research questions and results)
     - the scientific significance of the RC's research in the research field(s)
   - Identification of the ways to strengthen the focus and improve the quality of the RC's research

The additional material: TUHAT compilation of the RC's publications, analysis of the RC's publications data (provided by University of Leiden and the Helsinki University Library)

A written feedback from the aspects of: scientific quality, scientific significance, societal impact, innovativeness
   - Strengths
   - Areas of development
   - Other remarks
   - Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

2. Practises and quality of doctoral training
   - Organising of the doctoral training in the RC. Description of the RC's principles for:
     - recruitment and selection of doctoral candidates
     - supervision of doctoral candidates
     - collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes
     - good practises and quality assurance in doctoral training
     - assuring of good career perspectives for the doctoral candidates/fresh doctorates
   - Identification of the RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.

The additional material: TUHAT compilation of the RC's other scientific activities/supervision of doctoral dissertations

A written feedback from the aspects of: processes and good practices related to leadership and management
   - Strengths
   - Areas of development
   - Other remarks
   - Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

3. The societal impact of research and doctoral training
   - Description on how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).
   - Identification of the ways to strengthen the societal impact of the RC's research and doctoral training.

The additional material: TUHAT compilation of the RC's other scientific activities.

A written feedback from the aspects of: societal impact, national and international collaboration, innovativeness
   - Strengths
   - Areas of development
   - Other remarks
   - Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)
4. **International and national (incl. intersectoral) research collaboration and researcher mobility**
- Description of
  - the RC's research collaborations and joint doctoral training activities
  - how the RC has promoted researcher mobility
- Identification of the RC’s strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.

A written feedback from the aspects of: scientific quality, national and international collaboration
- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

5. **Operational conditions**
- Description of the operational conditions in the RC’s research environment (e.g. research infrastructure, balance between research and teaching duties).
- Identification of the RC’s strengths and challenges related to operational conditions, and the actions planned for their development.

A written feedback from the aspects of: processes and good practices related to leadership and management
- Strengths
- Areas of development
- Other remarks
- Recommendations

6. **Leadership and management in the researcher community**
- Description of
  - the execution and processes of leadership in the RC
  - how the management-related responsibilities and roles are distributed in the RC
  - how the leadership- and management-related processes support
    - high quality research
    - collaboration between principal investigators and other researchers in the RC
    - the RC's research focus
    - strengthening of the RC’s know-how
- Identification of the RC’s strengths and challenges related to leadership and management, and the actions planned for developing the processes

7. **External competitive funding of the RC**
- The RCs were asked to provide information of such external competitive funding, where:
  - the funding decisions have been made during 1.1.2005-31.12.2010, and
  - the administrator of the funding is/has been the University of Helsinki
- On the e-form the RCs were asked to provide:
  1) The relevant funding source(s) from a given list (Academy of Finland/Research Council, TEKES/The Finnish Funding Agency for Technology and Innovation, EU, ERC, foundations, other national funding organisations, other international funding organisations), and
  2) The total sum of funding which the organisation in question had decided to allocate to the RCs members during 1.1.2005–31.12.2010.

Competitive funding reported in the text is also to be considered when evaluating this point.

A written feedback from the aspects of: scientific quality, scientific significance, societal impact, innovativeness, future significance
- Strengths
- Areas of development
- Other remarks
- Recommendations

8. **The RC’s strategic action plan for 2011–2013**
- RC's description of their future perspectives in relation to research and doctoral training.

A written feedback from the aspects of: scientific quality, scientific significance, societal impact, processes and good practices related to leadership and management, national and international collaboration, innovativeness, future significance
- Strengths
- Areas of development
9. Evaluation of the category of the RC in the context of entity of the evaluation material (1-8)

The RC's fitness to the chosen participation category
A written feedback evaluating the RC's fitness to the chosen participation category

- Strengths
- Areas of development
- Other remarks
- Recommendations

numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

10. Short description of how the RC members contributed the compilation of the stage 2 material
Comments on the compilation of evaluation material

11. How the UH's focus areas are presented in the RC's research?
Comments if applicable

12. RC-specific main recommendations based on the previous questions 1-11

13. RC-specific conclusions

1.7 Evaluation criteria

The panellists were expected to give evaluative and analytical feedback to each evaluation question according to their aspects in order to describe and justify the quality of the submitted material. In addition, the evaluation feedback was asked to be pointed out the level of the performance according to the following classifications:

- outstanding (5)
- excellent (4)
- very good (3)
- good (2)
- sufficient (1)

Evaluation according to the criteria was to be made with thorough consideration of the entire evaluation material of the RC in question. Finally, in questions 1-4 and 9, the panellists were expected to classify their written feedback into one of the provided levels (the levels included respective descriptions, 'criteria'). Some panels used decimals in marks. The descriptive level was interpreted according to the integers and not rounding up the decimals by the editors.

Description of criteria levels

Question 1 – FOCUS AND QUALITY OF THE RC’S RESEARCH

Classification: Criteria (level of procedures and results)

Outstanding quality of procedures and results (5)

Outstandingly strong research, also from international perspective. Attracts great international interest with a wide impact, including publications in leading journals and/or monographs published by leading international publishing houses. The research has world leading qualities. The research focus, key research questions scientific significance, societal impact and innovativeness are of outstanding quality.

In cases where the research is of a national character and, in the judgement of the evaluators, should remain so, the concepts of "international attention" or "international impact" etc. in the grading criteria above may be replaced by "international comparability".
Operations and procedures are of outstanding quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are in alignment with the documentation. The ambition to develop the community together is of outstanding quality.

**Excellent quality of procedures and results (4)**

Research of excellent quality. Typically published with great impact, also internationally. Without doubt, the research has a leading position in its field in Finland.

Operations and procedures are of excellent quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of excellent quality.

**Very good quality of procedures and results (3)**

The research is of such very good quality that it attracts wide national and international attention.

Operations and procedures are of very good quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of very good quality.

**Good quality of procedures and results (2)**

Good research attracting mainly national attention but possessing international potential, extraordinarily high relevance may motivate good research.

Operations and procedures are of good quality, shared occasionally in the community. The improvement of research and other efforts are occasionally documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of good quality.

**Sufficient quality of procedures and results (1)**

In some cases the research is insufficient and reports do not gain wide circulation or do not have national or international attention. Research activities should be revised.

Operations and procedures are of sufficient quality, shared occasionally in the community. The improvement of research and other efforts are occasionally documented and operations and practices are to some extent in alignment with the documentation. The ambition to develop the community together is of sufficient quality.

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Question 2 – DOCTORAL TRAINING
Question 3 – SOCIETAL IMPACT
Question 4 – COLLABORATION

**Classification: Criteria (level of procedures and results)**

**Outstanding quality of procedures and results (5)**

Procedures are of outstanding quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are in alignment with the documentation. The ambition to develop the community together is of outstanding quality. The procedures and results are regularly evaluated and the feedback has an effect on the planning.

**Excellent quality of procedures and results (4)**

Procedures are of excellent quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of excellent quality. The procedures and outcomes are evaluated and the feedback has an effect on the planning.

**Very good quality of procedures and results (3)**

Procedures are of very good quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and
management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of very good quality.

**Good quality of procedures and results (2)**

Procedures are of good quality, shared occasionally in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of good quality.

**Sufficient quality of procedures and results (1)**

Procedures are of sufficient quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are occasionally documented and operations and practices are to some extent in alignment with the documentation. The ambition to develop the community together is of sufficient quality.

**Question 9 – CATEGORY**

**Participation category – fitness for the category chosen**

The choice and justification for the chosen category below should be reflected in the RC's responses to the evaluation questions 1–8.

1. The research of the participating community represents the international cutting edge in its field.
2. The research of the participating community is of high quality, but the community in its present composition has yet to achieve strong international recognition or a clear breakthrough.
3. The research of the participating community is distinct from mainstream research, and the special features of the research tradition in the field must be considered in the evaluation. The research is of high quality and has great significance and impact in its field. However, the generally used research evaluation methods do not necessarily shed sufficient light on the merits of the research.
4. The research of the participating community represents an innovative opening. A new opening can be an innovative combination of research fields, or it can be proven to have a special social, national or international demand or other significance. Even if the researcher community in its present composition has yet to obtain proof of international success, its members can produce convincing evidence of the high level of their previous research.
5. The research of the participating community has a highly significant societal impact. The participating researcher community is able to justify the high social significance of its research. The research may relate to national legislation, media visibility or participation in social debate, or other activities promoting social development and human welfare. In addition to having societal impact, the research must be of a high standard.

**An example of outstanding fitness for category choice (5)**

The RC's representation and argumentation for the chosen category were convincing. The RC recognized its real capacity and apparent outcomes in a wider context to the research communities. The specific character of the RC was well-recognized and well stated in the responses. The RC fitted optimally for the category.

- Outstanding (5)
- Excellent (4)
- Very good (3)
- Good (2)
- Sufficient (1)

The above-mentioned definition of outstanding was only an example in order to assist the panellists in the positioning of the classification. There was no exact definition for the category fitness.

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5 The panels discussed the category fitness and made the final conclusions of the interpretation of it.
1.8 Timetable of the evaluation

The main timetable of the evaluation:

1. Registration   November 2010
3. External peer review    May–September 2011
4. Published reports    March–April 2012
   - University level public report
   - RC specific reports

The entire evaluation was implemented during the university’s strategy period 2010–2012. The preliminary results were available for the planning of the following strategy period in late autumn 2011. The evaluation reports will be published in March/April 2012. More detailed time schedule is published in the University report.

1.9 Evaluation feedback – consensus of the entire panel

The panellists evaluated all the RC-specific material before the meetings in Helsinki and mailed the draft reports to the evaluation office. The latest interim versions were on-line available to all the panellists on the Wiki-sites. In September 2011, in Helsinki the panels discussed the material, revised the first draft reports and decided the final numeric evaluation. After the meetings in Helsinki, the panels continued working and finalised the reports before the end of November 2011. The final RC-specific reports are the consensus of the entire panel.

The evaluation reports were written by the panels independently. During the editing process, the evaluation office requested some clarifications from the panels when necessary. The tone and style in the reports were not harmonized in the editing process. All the reports follow the original texts written by the panels as far as it was possible.

The original evaluation material of the RCs, provided for the panellists is attached at the end of the report. It is essential to notice that the exported lists of publications and other scientific activities depend how the data was stored in the TUHAT-RIS by the RCs.
2 Evaluation feedback

2.1 Focus and quality of the RC’s research

- Description of
  - the RC’s research focus
  - the quality of the RC’s research (incl. key research questions and results)
  - the scientific significance of the RC’s research in the research field(s)
- Identification of the ways to strengthen the focus and improve the quality of the RC’s research

ASPECTS: Scientific quality, scientific significance, societal impact, innovativeness

The identification of the genetic and molecular mechanisms that make cells change their fate in early animal embryos and steer cell differentiation in early embryogenesis but also later during organogenesis is one of the major breakthroughs in the last 20 years of developmental biology. Overall, it has led to the identification of the major signals that govern cell-cell communication including by paracrine action of growth factors and, through inclusion of biochemical methods addressing signal transduction, the downstream intracellular signal transduction effector proteins and participating transcription factors, their action mechanism(s) and their protein-protein interaction networks. It is these players that regulate processes of induction, cell migration, proliferation and differentiation, and patterning and morphogenesis, and eventually fetal growth. These molecular pathways are evolutionary conserved and many are reiterated at different time points and sites in the embryo. This is clearly also the case during organogenesis, where in most cases cell types derived from different germ layers of the embryo have to interact in order to make a 3-dimensionally functional and correctly shaped embryonic organ that after birth has to function as an organ in the adult organism. This “shaping” aspect is still poorly understood but a better understanding during the embryonic phase will eventually prove important for regenerative medicine in adult animals. So, in general, functional studies of this type in embryos and/or their organs will indeed turn out to be instrumental for treating repair of injured tissue from cells with stem cell like properties and, in addition, links to chronic (fibrosis, cancer) and congenital disease as well.

This RC seeks for continuation after their pioneering role of their very successful past and current activities, which join 12 PIs over more than one campus on a voluntary basis, each of them being active in a multi-disciplinary fashion in projects in developmental biology that furthermore incorporate the most modern “omics” technologies. This exemplary RC has a strong affinity with stem cell research, human genetics and human pathology, is strongly committed to teach and train at undergraduate and graduate levels in this field that is very popular with students, attracts many foreign students and post-docs as well, and is internationally recognized for the last 15 years. The power of this RC is clearly its excellent research whilst keeping a keen eye on enduring community building, strong interaction and hence exchange of information, striving at excellence in undergraduate, graduate and post-doc multi-disciplinary training (typical for the developmental biology field) with a significant international component, and an excellent outward and forward looking behavior. Furthermore, it offers a perfect fit with RC EvoDevo.

The RC has an impressive array of proven expertise. This includes – for example in the case of the coordinator - descriptive studies (tooth gene expression database, also expression profiling in hanging drop tissue explants), insight in gene networks in all phases of tooth morphogenesis, frontline discoveries in this field (identification of primary signaling center in teeth, enamel knots in teeth, reiterative epithelial-mesenchymal signaling, stem cell like cells and apoptosis in developing teeth). Each of these seminal contributions already belongs to the text books and courses of Organogenesis at the best universities at the masters level, and extends now also into other cytokine (e.g. TNF) family signaling in teeth, signal execution by transcription factors and their target genes), and functional studies in imported relevant knockout and transgenic mouse strains combined with innovative organ cultures. Equally valid statements and illustrations of the high quality can be put forward for other members of this RC, ranging from projects addressing sensory development to stem cell biology, kidney development, and neuronal differentiation.
and brain development. Important to mention is also the incorporation of projects addressing the cell biology of growth factor signaling and the underlying cellular machinery that regulates the spatiotemporal aspects of signaling at the cellular level. The RC uses also the surrounding or co-established core facilities very adequately, some of which enable the partners within this RC to move their work into a more omics-type. This is a multidisciplinary network of the highest quality in the field, with perfect integration of the approaches, and relevance of the results reaching beyond each subfield, which the panel felt as vital points of this evaluation as well. While many research groups have a rather narrow focus, the lead investigators of this RC will definitely make a strong effort to integrate a wide range of approaches and technologies.

Numeric evaluation: 5 (Outstanding)

2.2 Practises and quality of doctoral training

- **Organising of the doctoral training in the RC. Description of the RC’s principles for:**
  - recruitment and selection of doctoral candidates
  - supervision of doctoral candidates
  - collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes
  - good practises and quality assurance in doctoral training
  - assuring of good career perspectives for the doctoral candidates/fresh doctors
- **Identification of the RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.**
- **Additional material: TUHAT compilation of the RC’s other scientific activities/supervision of doctoral dissertations**

**ASPECTS:** Processes and good practices related to leadership and management

Obviously, this ambitious high-quality RC requires a certain density of qualified researchers and necessary infrastructure. The panellists are of the opinion that there is a critical mass of dedicated local talent (graduate students and post-docs) in addition to the outstanding quality of the research, to ensure eminent success also in training. The sizes of the groups are ideal (not too big, not too small) to foster strong collaborations with efficient and direct interaction and information exchange, and ready to integrate an important international collaboration package as well, each also contributing to the quality of the training. In addition, this RC will strive at an optimal ratio of post-docs versus graduate students, which indeed is crucial. Taken together, this RC represents a fantastic virtual institute with excellent research, interaction and training programs, the latter accompanied by excellent supervision of the principal investigators on a daily basis and regularly also by external senior scientists.

Members of this RC have already proven to be capable of offering high-quality doctoral training. A very good, pragmatic and lean selection protocol is in place. The leadership by I. Thesleff is excellent, and the emphasis is on the multi-disciplinary character of developmental biology enabled in an excellent mix of courses, seminars, retreats, journal clubs and work-in-progress meetings, also to find out about, and use, also upcoming novel technologies in sequencing, bio-informatics, stem cell biology, certain aspects of cancer, microscopy, live imaging, transgenesis etc.

Numeric evaluation: 5 (Outstanding)

2.3 The societal impact of research and doctoral training

- **Description on how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).**
- **Identification of the ways to strengthen the societal impact of the RC’s research and doctoral training.**
- **Additional material: TUHAT compilation of the RC's other scientific activities.**

**ASPECTS:** Societal impact, national and international collaboration, innovativeness
The excellent training in the multi-disciplinary field that developmental biology is, prepares young scientists optimally for the future, also for further research leaning towards medicine and health care. In addition, the impact of this RC is already internationally visible as it “exports” well-trained post-docs to universities and institutes of the highest reputation. In addition, the PIs contribute at different levels, and set the best examples of commitment towards university education but also communication with the lay public.

**Numeric evaluation: 5 (Outstanding)**

### 2.4 International and national (incl. intersectoral) research collaboration and researcher mobility

- **Description of**
  - the RC’s research collaborations and joint doctoral training activities
  - how the RC has promoted researcher mobility
- **Identification of the RC’s strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.**

**ASPECTS: Scientific quality, national and international collaboration**

Outstanding, see sections 2.1 and 2.2 of this evaluation report.

**Numeric evaluation: 5 (Outstanding)**

### 2.5 Operational conditions

- **Description of the operational conditions in the RC’s research environment (e.g. research infrastructure, balance between research and teaching duties).**
- **Identification of the RC’s strengths and challenges related to operational conditions, and the actions planned for their development.**

**ASPECTS: Processes and good practices related to leadership and management**

Outstanding (see sections 2.1 and 2.2). The RC expects a certain delay with regard to the full use of mouse as a model because of the building of the new facilities and the inevitable delay caused by re-deriving the mouse strains in the new facilities.

### 2.6 Leadership and management in the researcher community

- **Description of**
  - the execution and processes of leadership in the RC
  - how the management-related responsibilities and roles are distributed in the RC
  - how the leadership- and management-related processes support
    - high quality research
    - collaboration between principal investigators and other researchers in the RC
    - the RC’s research focus
    - strengthening of the RC’s know-how
- **Identification of the RC’s strengths and challenges related to leadership and management, and the actions planned for developing the processes**

**ASPECTS: Processes and good practices related to leadership and management**
Many of the PIs of this RC have a **longstanding commitment to teaching and training**, and constantly set the example of how developmental biology knowledge should be acquired and how this is relevant for other disciplines reaching eventually till human health. In addition, some of their research – even the more recent papers - should already be incorporated in updated courses of organogenesis at other universities. The leadership with regard to research but also teaching by the coordinator is outstanding.

### 2.7 External competitive funding of the RC

- The RCs were asked to provide information of such external competitive funding, where:
  - the funding decisions have been made during 1.1.2005–31.12.2010, and
  - the administrator of the funding is/has been the University of Helsinki
- On the e-form the RCs were asked to provide:
  1. The relevant funding source(s) from a given list (Academy of Finland/Research Council, TEKES/The Finnish Funding Agency for Technology and Innovation, EU, ERC, foundations, other national funding organisations, other international funding organizations), and
  2. The total sum of funding which the organisation in question had decided to allocate to the RCs members during 1.1.2005–31.12.2010.

Competitive funding reported in the text is also to be considered when evaluating this point.

**ASPECTS:** Scientific quality, scientific significance, societal impact, innovativeness and future significance

Developmental Biology, despite its relevance and value for other life science disciplines, suffers internationally – and certainly in the large instruments (i.e. integrated projects) within the EC framework programs – from lack of funding. However, the partners of this RC have properly adjusted to this fact and apply also in other – more medical – funding circuits, including those of cancer. This RC has also set the best example for going international by its strong participation in Marie Curie training initiatives (both networks but also individual grants) and Finnish-German collaborations. We are convinced this RC will continue to be successful in this.

### 2.8 The RC’s strategic action plan for 2011–2013

- RC’s description of their future perspectives in relation to research and doctoral training.

**ASPECTS:** Scientific quality, scientific significance, societal impact, processes and good practices related to leadership and management, national and international collaboration, innovativeness, future significance

The major strength of this RC is of course its lean mode of operation but its strong commitment for community building through excellent research and training. In addition, the multi- and inter-disciplinarity of its research program and training program is a very strong bonus.

### 2.9 Evaluation of the category of the RC in the context of entity of the evaluation material (1-8)

The RC’s fitness to the chosen participation category.

**Category 1. The research of the participating community represents the international cutting edge in its field.**

Clearly the category (‘The research of the participating community represents the international cutting edge in its field’) fits perfectly: This is cutting edge, forward looking research coupled to top training.

**Numeric evaluation:** 5 (Outstanding)
2.10 Short description of how the RC members contributed the compilation of the stage 2 material

Just like it can be seen from the other aspects of the operational mode of this RC, each PI has contributed in a very dedicated and committed manner to this evaluation.

2.11 How the UH’s focus areas are presented in the RC’s research

Focus area 2: The basic structure of life

This RC perfectly fits University of Helsinki’s (UH’s) focus area ‘The basic structure of life’, where this RC represents in the true sense of the word a centre of excellence in developmental biology, and its relevance for human health.

2.12 RC-specific main recommendations

None.

2.13 RC-specific conclusions

This RC is a true centre of excellence in the developmental biology field worldwide. It is in a position to take the RC concept at UH as one of the first even further by taking its multi-disciplinary approach further into interdisciplinary ones at the appropriate time, for example by extending towards tissue repair and have in addition to biologists also engineers (scaffolds, ...) and bio-informatics work on its topics and projects. It is also one of the best examples how well-conceived basic research, carried out by a true community, can foster advancements and future applications in human health.

2.14 Preliminary findings in the Panel-specific feedback

This RC has the necessary skills to carry out multi-disciplinary projects in developmental biology that furthermore incorporate the most modern “omics” technologies that are available at the UH. It has a strong affinity with stem cell research, human genetics and human pathology, is strongly committed to teach and train at undergraduate and graduate levels in this field that is very popular with students, attracts many foreign students and post-docs as well, and is internationally recognized for the last 15 years. The power of this RC is clearly its excellent research whilst keeping a keen eye on enduring community building, strong interaction and hence exchange of information, striving at excellence in undergraduate, graduate and post-doc multi-disciplinary training (typical for the developmental biology field) with a significant international component, and an excellent outward and forward looking behaviour.

This RC is a true centre of excellence in the developmental biology field worldwide, and is in a position to take the RC concept at UH as one of the first even further. Indeed, it can take its multi-disciplinary approach into an interdisciplinary one at the appropriate time for example by extending towards tissue repair and have in addition to biologists also engineers (scaffolds, ...) and bio-informatics work on the topics and projects.
2.15 Preliminary findings in the University-level evaluation

One of the best examples how well-conceived basic research, carried out by a true community, can foster advancements and future applications in human health.
3 Appendices

A. Original evaluation material
   a. Registration material – Stage 1
   b. Answers to evaluation questions – Stage 2
   c. List of publications
   d. List of other scientific activities

B. Bibliometric analyses
   a. Analysis provided by CWTS/University of Leiden
   b. Analysis provided by Helsinki University Library (66 RCs)
International evaluation of research and doctoral training at the University of Helsinki 2005-2010

RC-SPECIFIC MATERIAL FOR THE PEER REVIEW

NAME OF THE RESEARCHER COMMUNITY:
Helsinki Developmental Biology Research Community (HelDevBio)

LEADER OF THE RESEARCHER COMMUNITY:
Professor Irma Thesleff, Institute of Biotechnology

RC-SPECIFIC MATERIAL FOR THE PEER REVIEW:

- Material submitted by the RC at stages 1 and 2 of the evaluation
  - STAGE 1 material: RC’s registration form (incl. list of RC participants in an excel table)
  - STAGE 2 material: RC’s answers to evaluation questions
- TUHAT compilations of the RC members’ other scientific activities 1.1.2005-31.12.2010
  (analysis carried out by CWTS, Leiden University)

NB! Since Web of Science(WoS)-based bibliometrics does not provide representative results for most RCs representing humanities, social sciences and computer sciences, the publications of these RCs will be analyzed by the UH Library
(results available by the end of June, 2011)
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

1 RESPONSIBLE PERSON

Name: Thesleff, Irma
E-mail: irma.thesleff@helsinki.fi
Phone: 19159401, 0503016897
Affiliation: Institute of Biotechnology
Street address: Viikinkaari 9

2 DESCRIPTION OF THE PARTICIPATING RESEARCHER COMMUNITY (RC)

Name of the participating RC (max. 30 characters): Helsinki Developmental Biology Research Community
Acronym for the participating RC (max. 10 characters): HelDevBio

Description of the operational basis in 2005-2010 (eg. research collaboration, joint doctoral training activities) on which the RC was formed (MAX. 2200 characters with spaces):

All 12 PIs in this research community are current or previous principal investigators of the Developmental Biology Research Program at the Institute of Biotechnology (BI). The program was started in 1996 and was elected as a Center of Excellence of the University of Helsinki (UH) in 1997-2001, and of the Academy of Finland in 2002-2007. Three PIs moved in 2001 from BI to the Faculty of Medicine, one to the Faculty of Biosciences in 2003, one to the Faculty of Veterinary Medicine in 2008, and one PI has an affiliation to BI after taking professorship at the Department of Biosciences in 2010. In addition, Scott Gilbert is a FiDiPro professor in the program since 2010. The RC has extensive interactions both in research collaboration and doctoral training.

The common scientific interests of this RC are centered on the genetic, molecular, and cellular mechanisms that control embryonic development. Mouse and Drosophila are used as the main model organisms and also chicken and zebrafish are exploited by several PIs. The main approaches include transgenic animals, tissue and stem cell cultures, as well as sophisticated imaging and modern molecular biology methods linked to genome-wide assays for gene regulatory networks.

The RC is an active inter-campus and inter-faculty research and doctoral training network. The members organise a weekly joint seminar/journal club as well as an annual 2-day retreat to the Tvärminne biological station where new scientific advances of the RC are discussed. All PIs have active research groups and most doctoral students are members of the four Graduate Schools operating at the two UH campuses. The doctoral training in the RC has a strong international aspect and the network attracted funding from EU to run a Marie Curie Early Stage Training Program with seven fellowships for foreign PhD students in 2006-2010. In addition, the network has been active in a Finnish-German Doctoral Training Network in developmental biology since 2007. To enhance training nationally, the RC members wrote an award-winning textbook in Developmental Biology in Finnish that is used by students at the Faculties of Biosciences, Medicine and Veterinary Medicine.
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

3 SCIENTIFIC FIELDS OF THE RC

Main scientific field of the RC’s research: biological, agricultural and veterinary sciences

RC’s scientific subfield 1: Developmental Biology

RC’s scientific subfield 2: Genetics and Heredity

RC’s scientific subfield 3: Evolutionary Biology

RC’s scientific subfield 4: Cell Biology

Other, if not in the list: Pediatrics, Dentistry

4 RC’S PARTICIPATION CATEGORY

Participation category: 1. Research of the participating community represents the international cutting edge in its field

Justification for the selected participation category (MAX. 2200 characters with spaces): The RC has a long track record in high quality basic research as evidenced by the publication record and the status of Center of Excellence of the University of Helsinki as well as of the Academy of Finland. Three PIs are full professors at the University and one is a FiDiPro professor. As described above the RC has a long history of working as a coherent program. In addition the PIs have documented expertise in supervision of PhD students and in particular the program has had an own international EU funded doctoral program and is currently participating in another international PhD training network.

5 DESCRIPTION OF THE RC’S RESEARCH AND DOCTORAL TRAINING

Public description of the RC’s research and doctoral training (MAX. 2200 characters with spaces): Developmental biology research has long and internationally recognized traditions in Finland, and it is among the rapidly progressing fields of biology and biomedicine. The research groups in this RC form the biggest research and training program in this field in Finland. The scientific focus is in the genetic, molecular, and cellular mechanisms that control embryonic development. The PIs have gained international recognition for their scientific achievements. The groups collaborate actively and have numerous international collaborators. The program has taken an active role in doctoral training, and in addition to Finnish students it has provided training opportunities for many foreign students.

The program was started in 1995 as a research program of the Institute of Biotechnology. Currently the groups work at 4 different faculties and institutes at the Viikki Biosciences and Meilahti Biomedical Campuses, and the program continues to have an important impact in linking the activities of the groups in the field of developmental biology, and in functioning as an inter-campus and inter-faculty doctoral training program of the University of Helsinki.

Significance of the RC’s research and doctoral training for the University of Helsinki (MAX. 2200 characters with spaces): This RC forms a significant and unique research and training network and while it crosses the UH organisatorial and geographical boundaries it is kept together by common research interests. Since its start for 15 years ago it covers today groups on two campuses in three faculties and a
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

research institute linking developmental biology research actively with other biosciences at UH as well as with human and veterinary medicine. The research in the RC is highly multidisciplinary covering not only many aspects of developmental biology but also molecular, cell and evolution biology, biomedicine, biochemistry, dentistry, stem cell biology and cancer, genetics and bioinformatics. In addition, the members have strong links to clinical medicine and even paleontology. The research carried out by the RC members has resulted in high quality publications and has attracted national and international funding and a Center of Excellence status for 11 years.

The HelDevBiol RC has gained marked international visibility for UH through high quality research (publications, invited speakers in meetings) and by attracting a substantial number of foreign PIs, postdocs, graduate students, and a FiDiPro professor. In addition to international collaborations, the RC has organized major international conferences: in 2007 the Sigrid Juselius Symposium “Cell Communication in Morphogenesis”, in Hanasaari, and in 2010 the “EU Fp6 Marie Curie PhD program DevSignalNet Final Symposium”, in Viikki. Regarding doctoral training, the RC has been unique in its strong international character indicated especially by the EU funded Marie Curie Early Stage Training Program with seven foreign PhD students trained at the UH in 2006-2010. To our knowledge this was the first time UH was awarded this type of training and mobility funding. In addition, the RC participates actively in a Finnish-German Developmental Biology training program. The RC is also highly active in organizing and promoting undergraduate and postgraduate training across the faculties. In fact, almost all courses/lectures organized for postgraduate students at UH in the field were initiated and are still provided by the RC members.

Keywords: embryonic development, cell signaling, stem cells, cell differentiation, organogenesis, patterning, gene regulation, model organisms, transgenic (GM) animals

6 QUALITY OF RC’S RESEARCH AND DOCTORAL TRAINING

Justified estimate of the quality of the RC’s research and doctoral training at national and international level during 2005-2010 (MAX. 2200 characters with spaces): High quality of research:

- High numbers of citations to the articles.
- Many of the PIs are frequently invited as speakers in international conferences.
- Success of PIs in previous research evaluations by international panels: Group leaders of the Institute of Biotechnology are appointed based on recommendations of an international scientific advisory board.
- Some groups have been selected as members of Biocentrum Helsinki, also based on international peer review

High quality and quantity of doctoral training:

- Strong international character of the doctoral training.
- Providing multidisciplinary training.
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

- International collaboration in doctoral training increasing the possibilities to organize high quality special courses.
- Active organization of undergraduate and postgraduate training across the faculties.
- Introducing/developing several new research techniques to the UH involving for example model organisms and transgenic techniques.
- High quality of lecture and practical courses, seminars and journal clubs.
- High quality research training in an international environment.
- Training in presentation of own results in national and international meetings.
- Opportunity to practice publishing by participating in the making of the Students’ own journal: Development & Communication.
- Almost all doctoral students have got the highly competed Graduate School positions.
- Number of completed doctoral theses supervised by the PIs during 2005-2010 = 23.

Comments on how the RC’s scientific productivity and doctoral training should be evaluated (MAX. 2200 characters with spaces):
Publication of original articles in top-level journals and the internationally recognized leading journals in the dev biol field. Review articles.

The numbers of citations to the articles.
Invited presentations in scientific conferences.
Career development of the former PhD students.
Student presentations at international conferences.

Publication strategy: To continue publishing original articles in excellent international journals. To write review articles.
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Name of the RC’s responsible person: Thesleff, Irma
E-mail of the RC’s responsible person: irma.thesleff@helsinki.fi
Name and acronym of the participating RC: Helsinki Developmental Biology Research Community, HelDevBio
The RC’s research represents the following key focus area of UH: 2. Elämän perusrakenne – The basic structure of life

Comments for selecting/not selecting the key focus area: The fundamental question of developmental biology and of the HelDevBio RC is: How does the fertilized egg develop into an adult organism? In other words, how is the inherited genome “read,” such that cells differentiate into specific types of cells such as neurons and red blood cells (differentiation), and how do these different cells become organized into tissues and organs within the embryo (morphogenesis). HelDevBio has been at the forefront of integrating cellular and molecular techniques into mammalian and Drosophila development, and it has pioneered certain aspects of evolutionary developmental biology, bringing together developmental and molecular biology with paleontology, ecology and mathematical modeling. Moreover, our research concerning the origins of human birth defects, and the use of stem cells for the regeneration of tissues and organs, as well as our work on cancer stem cells would also fit the focus area “Clinical research” which covers research projects that combine basic and clinical research in translational manner.

1 Focus and quality of RC’s research (max. 8800 characters with spaces)

- Description of the RC’s research focus, the quality of the RC’s research (incl. key research questions and results) and the scientific significance of the RC’s research for the research field(s).

The RC is an active inter-campus and inter-faculty research and doctoral training network with a focus on the mechanisms regulating development. All 12 principal investigators (PIs) in this research community are current or previous PIs of the Developmental Biology Research Program at the Institute of Biotechnology (BI) of the University of Helsinki (UH). The program started in 1996 and was elected as Center of Excellence of UH in 1997-2001, and of the Academy of Finland in 2002-2007. During the years new PIs have joined the program at BI, and several PIs have moved to other Institutes in UH and established developmental biology research and teaching programs.

At present, the RC is composed of the following PIs having extensive interactions both in research and doctoral training.

Institute of Biotechnology:
Irma Thesleff (IT) (Coordinator): Development and regeneration of teeth and hair.
Mikko Frilander (MF): RNA splicing mechanisms wherein one gene can make several different proteins.
Marja Mikkola (MM): Molecular and cellular regulation of epithelial morphogenesis.
Ulla Pirvola: (UP) Development and regeneration of the inner ear.
Osamu Shimmi (OS): Mechanisms by which BMP signaling specifies the parts of Drosophila embryos.
Kirmo Wartiovaara (KW): Oncogenes and tumor suppressors in neural stem cells and tumors regulating their differentiation and proliferation.
The research focus of the RC is the molecular mechanisms that regulate morphogenesis and cell differentiation during development. These include studying the molecular communication that cells use to form organs and investigating how the production and differentiation of stem cells is regulated such that there are always cells to replace dying cells, yet tumors do not form. Most groups focus on gene regulatory networks and the functions of conserved signaling molecules in these networks and in mediation of cell and tissue interactions.

The diversity of the organs and animals studied by members of the RC is an important strength, since similar genetic, molecular and cellular mechanisms are examined by the different groups. Thus, the PIs are genuinely interested in each others’ work, share results and expertise, and create interactions and collaborations. Examples of joint interest include the epithelial budding and branching of organs such as the kidney, tooth, and mammary glands, the formation of ectodermal placodes in the skin and ear, the migration of different cell types, differentiation, and cell cycle regulation. Many PIs are internationally known experts in the embryonic functions of specific signal pathways, such as FGF, Wnt, BMP, Eda (Ectodysplasin), GDNF and MANF.

Most of the scientific key questions in this RC address the gene regulatory networks regulating stem cells, patterning, morphogenesis and differentiation. Recent results have shown for example that:

* Wnt/b-catenin signaling in the developing kidney mediates nephron differentiation and GDNF/Ret signaling mediates ureteric bud branching, respectively (HS, KS).

* Stimulation of Wnt/b-catenin signaling induces continuous tooth formation (IT).

* Complex signal network regulates the stem cells of enamel producing ameloblasts (IT).

* Eda (TNF signal activating the NF-kB pathway) is necessary in the development of teeth and other skin appendages, and regulates important signaling pathways involved in cell fate choices in the ectoderm (MM, IT).

* Gata factors control inner ear morphogenesis and sensory hair cell differentiation in mouse models (MS) and induce GABAergic neurons in chicken brain (MS, JP).

* Intercellular signaling (FGF) and cell type specific transcription factors (Gata etc) control neural stem cell differentiation in the midbrain (JP).

* The first neurotrophic factor in Drosophila, MANF, was characterized and shown to be specifically required for the maintenance of neurites in the dopamine neurons (TH).
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

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* The cell cycle regulators pRb, CKIs, Cyclins and the transcription factors Prox1, Gfi1, and Atoh1 regulate the differentiation of inner ear (UP).

* Tumor suppressors p53 and pRb inhibit the proliferation of neural stem cells, whereas oncogenes c-myc, CIP2A, E6 and E7 increase proliferation and suppress differentiation, supporting the hypothesis that cancer is a stem cell disease (KW)

There is specific expertise and increasing interest within the RC also in the interdisciplinary field of evolutionary developmental biology (evo-devo) focusing on evolutionary links between the genotype and phenotype. The specific question is how the changes in signaling networks lead to morphological changes during evolution and diversity of organisms. The main evo-devo expert in the RC is Jukka Jernvall who works on the molecular principles of tooth shape evolution, but could unfortunately not participate in the evaluation of this RC because he coordinates another RC at UH. He collaborates actively with the tooth development group (IT). Their results indicate that fine tuning of signaling networks affects the numbers and shapes of teeth and have led to the hypothesis that these mechanisms underlie the diversity of teeth during evolution. Scott Gilbert joined the RC in 2010 when appointed as Finland Distinguished Professor (FiDiPro) by the Academy of Finland and is known for evo-devo interest and work on changes in bone development during evolution. His results indicate that the turtle plastron has developed by the re-specification of trunk neural crest cells into cranial (skeletogenic) neural crest cells. Other PIs in the RC addressing evo-devo questions include MF who identified recently a feedback loop regulating the intron splicing, which is evolutionarily conserved in both the animal and plant kingdoms. OS is developing and testing hypotheses connecting conserved signaling pathways and morphological diversity in vertebrates and invertebrates based on his recent findings on BMP transport machinery in Drosophila early embryo and wing veins.

The scientific significance of the work in the RC is indicated by international visibility. In addition to articles in high-impact journals, the PIs have been invited to write review articles and to present their work in international conferences. The work has significantly advanced the fields of basic developmental biology and evolutionary developmental biology. In addition, our studies on stem cells and on abnormal development have contributed significantly to clinical fields such as nephrology, dentistry, neurology, orthopedics, and otorhinolaryngology.

- Ways to strengthen the focus and improve the quality of the RC’s research.

The RC has a clear focus. The focus should continue to be in the molecular and genetic mechanisms of development with perhaps increasing emphasis on translational research (stem cells, regeneration, diseases) and evolution.

The PIs could develop even more collaborations within the RC and exploit more the advantages of the high quality research and technological expertise available in Viikki Biocenter and Biomedicum Helsinki (eg. proteomics, genomics, 3-D electron microscopy, cell biology, Stem cell center). More collaborations with the best international laboratories could also be developed.

Special attention should be paid to recruiting only the best students and post-docs and sending the graduated PhDs for postdoctoral training to the best international laboratories.

The RC members should be more active to encourage UH administrators and their own institutes and faculties to strengthen and secure the continued success of developmental biology research at UH by directing resources and opening positions.
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2 PRACTICES AND QUALITY OF DOCTORAL TRAINING (MAX. 8800 CHARACTERS WITH SPACES)

- How is doctoral training organised in the RC? Description of the RC’s principles for recruitment and selection of doctoral candidates, supervision of doctoral candidates, collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes, good practises and quality assurance in doctoral training, and assuring good career perspectives for the doctoral candidates/fresh doctorates.

The 12 groups of the RC function at four different faculties and institutes at the Viikki Biosciences and Meilahti Biomedical Campuses forming an inter-campus and inter-faculty doctoral training program at the UH. The general aim is to provide the students a deep understanding of the basic cellular and molecular processes behind normal organ development and in linked human disorders. The RC offers a modern and creative scientific atmosphere for training in a highly interactive and multidisciplinary environment with the most up-to-date technologies for the analysis of genes and genetic networks related to organ development. Each PhD student gets a broad knowledge of the field as well as the possibility to work with several model organisms.

The training is organized so that it covers many aspects of developmental biology as well as molecular and cell biology, physiology, zoology, biomedicine, biochemistry, dentistry, stem cell biology and cancer, genetics and bioinformatics. In addition, the RC members have strong links to clinical medicine and several models of human congenital disorders and stem cell systems are used. These, together with ongoing clinical collaborations, provide the students a good view of the development of clinical applications. Additionally, the RC has close collaborations with an evolution and development (evo-devo) research program at UH providing training in ecology, comparative analyses of tooth development and linking the analysis of transgenic mice to different mammalian species. The multidisciplinary training offered by the RC is useful for students having a background in a variety of disciplines such as clinical or molecular medicine, dentistry, veterinary medicine, animal physiology, biochemistry, genetics, cell biology or bioinformatics.

The training in the RC has had a strong international character as indicated by the fact that 70 % of the PhD students during 2005-2010 were foreign. The activity of the RC in generating internationality is indicated especially by the EU funded Marie Curie Early Stage Training Program (project web-site: http://www.biocenter.helsinki.fi/devsignalnet/index.htm) awarded for the RC in 2005 in which seven foreign PhD students were trained in our program at the UH in 2006-2010. To our knowledge this was the first time UH was awarded this type of training and mobility funding. The well-structured training program provided by the RC received high world-wide attention since we received 250 international applications. Additional internationality has been brought in by the participation of the RC in a Finnish-German Developmental Biology Training Program (http://www.biocenter.helsinki.fi/viikkigs/FinGerDevNet/) through which students have had the opportunity to travel to Germany to participate in local courses and vice versa.

Recruitment and selection of doctoral candidates varies a little between the RC groups but in general most PhD students come after having finished their Master’s thesis in another lab in Finland or abroad. For these students selection criteria include the previous academic record, experience/knowledge in relevant areas and especially their own research interests and motivation for a scientific career. In addition, reference letters and interviews are used to monitor the quality of the students during the recruitment phase. For those students who have carried out their Master’s thesis work in the RC lab, performance and motivation becomes main selection criteria.
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

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The supervision of doctoral candidates and the quality assurance occurs at several levels. Students acquire research training through individually designed projects and theoretical and practical training in various courses. The aim is to provide the young researchers with good theoretical and technical skills and to encourage them to pursue a research career. Each PhD student joins a RC research group in either campus to carry out their research project under the guidance of one or two supervisors who interact with the student on daily basis and who are responsible for the planning and progress of the project together with the student. The progress of training is monitored regularly and the upcoming problems are addressed and resolved early. The RC groups have also weekly lab-meetings where results and possible problems are discussed together. This day-to-day mentoring by the PIs, postdoctoral research and technical staff is the most important source of knowledge and skills during this period. Importantly, all PhD students have an annual follow-up group meeting including two external senior members that provide additional help and guidance all through the thesis work. The scientific goals are discussed and the needs for special training are carefully mapped to provide optimal career development.

Running their own projects will help the students to develop scientific thinking and the technological skills to carry out experiments. Special techniques can also be learned by short visits to other teams in the RC which often use similar approaches. We encourage the students to present their work in international meetings minimum once a year to give them the opportunity to present their work, get feedback from the experts in the field, and to network.

The RC collaborates closely with Helsinki area graduate schools and faculties to organize training. Most of the RC PhD students belong to one of the graduate schools operating in the area and are encouraged to attend the lecture and practical courses provided by them. Especially, the graduate schools organize several complementary courses in areas such as biostatistics, scientific writing and presentation in English, digital image processing and graphics, intellectual property and technology transfer and ethics in biomedicine. This type of training is recommended to all PhD students in the RC and it is recognized useful for the future careers in academia or in the private sector. All students have also the possibility to get training in teaching through the many courses organized by the RC members either through the graduate schools or in collaboration with the Faculties of Biosciences, Veterinary Medicine and Medicine.

Since 1996, the RC has taken an active role in undergraduate, graduate and postdoctoral training in developmental biology by organizing lecture series, practical courses and international symposia. In fact, almost all courses in the field across the faculties or graduate schools at UH were initiated and are still provided by the RC members. In addition, the RC runs a weekly "Developmental biology seminar series" where researchers from both campuses meet. There each PhD student and post-doc presents a paper annually and get training in critical analysis of data and in presentation skills. The RC also arranges an internal annual two-day Spring Meeting, where the students and post-docs get the opportunity to present the progress of their projects and to discuss current matters. The meeting program is organized entirely by the students and post-docs themselves providing again a good training opportunity.

The RC has provided very good career perspectives for the PhD students by giving them an opportunity to work in an internationally recognized multidisciplinary environment and exposing the students to the most recent development in the field. By organizing high-standard international symposia and sending the students abroad to meetings. In addition, the large international collaborative network of the RC members has already provided good postdoctoral training opportunities for several former PhD students of the RC.
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

- RC’s strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.

The strength of the doctoral training comes from the high profile multidisciplinary research that provides the students with broad skills. In addition, the timeliness of the training is updated regularly so that recent approaches and topics are covered in the courses. Students will be trained to think originally and innovatively, and they are integrated in teaching and mentoring undergraduate students and to create contacts to industry and applied research. The RC aims to provide a good basis for the students to continue their careers and perform post-doctoral research and to compete as independent investigators at the international level in a responsible fashion.

The main challenge in doctoral training is the long time (typically no less than 5 years) required for most students to obtain the PhD degree. This is partly based on the high standards and requirements set by the faculties, research teams and students themselves. The supervisors and students assisted by the follow-up group could take this more into account and plan the project with a more strict time schedule.

- Description of how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).

The RC’s contribution to the society is based on its high quality science, which is presented to the society in many forms. The most visible contribution comes from the lecturing, teaching and expert opinions provided by the RC to various audiences and forums. Most PIs have given lectures during the biannual Science Days for the general public, and IT has lectured in Finnish Academy of Science and Letters, and in many Dental Societies and Dental Schools internationally. The PIs have written textbooks in Finnish used by students at Finnish universities as well as by high school teachers (Sariola et al. From cell to an organism: Developmental Biology, 2nd ed., Duodecim; Bios series for high school biology curriculum, WSOY) and contributed to other textbooks published by Duodecim and WSOY. SG has written and lectured extensively on evolution, history and ethics of science internationally, and is renowned for his textbook Developmental Biology (Sinauer, now in its 9th edition) that is used at Universities world-wide. In addition, HS has written several specialized articles in the biggest Finnish newspaper Helsingin Sanomat. The RC is also encouraging the graduate students to public writing (for example, Maria Jussila: Stem cell article in Helsingin Sanomat). Many PIs have participated in public discussions in Finland on current scientific and ethical issues such as animal cloning, embryo and stem cell research and use of experimental animals in TV, radio and newspapers.

The PIs are actively involved in various scientific organizations (IT: European Orthodontic Society, president, Women’s Science Foundation, HS: Federation of Learned Societies, Heureka Science Center, TH: ScanFly) and private companies (IT, MM: Scientific advisors for Edimer Pharmaceuticals, Cambridge, USA, KW: Scientific advisor for Novagenesis). In addition all RC members belong to the Finnish Developmental Biology Society and actively participate in organizing their annual meeting. Several PIs are or have been members of the Society board, and MM is the current Chair.

The RC members have organized several international meetings (COST B23 “Growth Factors in Craniofacial Development and Repair”, 2006, Helsinki; Sigrid Jusélius Symposium, "Cell communication in morphogenesis" 2007, Helsinki; Gordon Conference " Craniofacial Morphogenesis & Tissue Regeneration, 2008, Il Ciocco, Barga, Italy; ScanFly 2008, Jäneda, Estonia; Paediatric Pathology Society Meeting, Helsinki; Congress of the European Orthodontic Society, 2009, Helsinki; EU Fp6 Marie Curie PhD program meeting "DevSignalNet Final Symposium", 2010, Helsinki).
The PIs are active in the administration of animal experiments (HS: Head of the Meilahti experimental animal center; JP: Vice-member in Board on Research with Experimental Animals, University of Helsinki, and member, National Board on Experimental Animal Research).

Several RC members are in regular contact with clinicians keeping them well informed about the advances of our research and creating collaborations. This kind of interactions also profits the patients in long term. In addition, KW is a consultant in the stem cell studies in Viikki and Meilahti campuses, and HS is the pathology consultant for the histopathological evaluation of iPS teratomas.

### Ways to strengthen the societal impact of the RC’s research and doctoral training.

We will continue high quality basic research, but in some areas will expand closer to the patients, to medical diagnostics and possibly regenerative therapies in collaboration with clinicians in the Helsinki University Central Hospital. The potential clinical applications include advances in histopathological diagnostics, regenerative medicine in nephrology and dentistry and cancer therapy.

The RC members could be more active in giving public lectures, interacting with patient organisations and writing articles to non-scientific publications and newspapers. The RC will continue to encourage the students and post-docs to public writing and to presentation of their work in various forums. The RC also continues to offer the doctoral students and post-docs training in presenting their work and specific emphasis will be laid on the evaluation and feedback after the students’ presentations in order to develop their presentation skills.

### Description of the RC’s research collaborations and joint doctoral training activities and how the RC has promoted researcher mobility.

The RC has a deep foundation based on common scientific interests which can be seen both in unique intra-RC collaborations and common researcher training across the Viikki-Meilahti campus geographical gap. All the groups have had fruitful collaborations with other RC members, and also several other research organizations all over Finland. Furthermore, the RC has traditionally been active in international collaborations. This can be seen in the HelDevBio achievements, as in 2005-10 the research articles published by the RC PIs were co-authored by 63 different international researchers from: USA (17), Germany (9), Japan (6), Canada (6), UK (4), Sweden (4), Estonia (3), Spain (2), Switzerland (2), Italy (2), Denmark (2), France, Poland, China, Israel, Austria, and Norway. The RC has also gained international visibility by organizing two major international conferences in Helsinki: in 2007 the Sigrid Jusélius Symposium “Cell Communication in Morphogenesis”, and in 2010 the “EU Fp6 Marie Curie PhD program DevSignalNet Final Symposium.

Our RC has attracted a significant number of researchers outside Finland. It has two foreign PIs: SG is a FiDiPro from USA and OS a recruited group leader from Japan. The 37 foreign students and post-docs in 2005-2010 (65%) come from UK, Russia, Spain, Romania, Canada, France, Poland, Hungary, Japan, China, Estonia, Lithuania, Bosnia, Greece, Belgium, Sweden, Germany and the Netherlands. Part of this researcher mobility became possible through the EU Marie Curie training program for doctoral students (see part 2), as well as funding obtained from CIMO (Ministry of Education funded international mobility organization). In addition, 3 Marie Curie postdoctoral fellows joined the RC between 2005 and 2010. We promote mobility also by supporting students’ and post-docs’ visits to collaborating labs, and students...
near graduation are helped in getting good post-doc positions abroad. In 2005-10 the RC "exported" post-docs to top-class research groups in places like Harvard Medical School, King’s College London, CalTech, Columbia University, Freiburg University and UC Irvine.

HelDevBio has a long tradition of high quality researcher training. Every year, the RC organizes several basic and advanced developmental biology courses, lab technology courses, journal clubs, and teaches timely subjects to all interested students in both campuses. In addition, the RC has several examples of joint supervision for PhD students in other RCs. Some of these are cross-faculty and discipline supervisions and some are international supervisions between Finland and Sweden or Estonia.

Last but not least, we have established FinGerDevNet (http://www.biocenter.helsinki.fi/viikkigs/FinGerDevNet), an Academy of Finland and Deutche Forschungsgemeinschaft funded (2007-2009 and 2010-2012) Finnish-German doctoral training network in developmental biology. FinGerDevNet joins forces between Universities of Helsinki, Oulu, and Freiburg to create a structured international education and mobility network that expands the training offered in each site, and includes practical and lecture courses, joint international symposia, as well as student exchange between collaborating research groups.

- RC’s strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.

In general, the RC is very international, collaborative and supportive for research mobility at all levels. The interaction between different groups and countries is smooth and works well. However, we do see challenges and possible actions to promote these further.

The key to fruitful collaboration is high quality of research and this is based on continuous training in intellectual and methodological skills. In order to keep the training at a high level, we would benefit from a higher proportion of post-doctoral researchers compared to doctoral students. The RC should be continuously active in recruiting foreign PI’s and post-docs. We should diligently work to recruit also returning post-docs, who have got international training and are about to start their independent careers. The FiDiPro and other programs should be fully exploited to attract distinguished senior scientists for sabbatical or longer periods to Finland. The RC could also function more intensively to seek for partners to create larger consortia eligible to apply for EU or other international research funding.

### 5 OPERATIONAL CONDITIONS (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the operational conditions in the RC’s research environment (e.g. research infrastructure, balance between research and teaching duties).

The RC operates on Meilahti and Viikki campuses and the PIs are affiliated with the Institute of Biotechnology, Faculty of Medicine, Faculty of Veterinary Medicine and Faculty of Biological and Environmental sciences. However, all the research groups have a common background as members of the research program in developmental biology at the Institute of Biotechnology. This results in strong and sustained interactions between the RC members both in research and teaching.

**Communication**

The RC has weekly research seminars, where students, post-doctoral fellows and PIs actively participate. In addition, for more than 10 years the RC has organized two yearly scientific retreats at the outstations of the University of Helsinki: One for the developmental biologists working at the University of Helsinki (Tvärminne retreat) and members of the RC are active in the Finnish Society of Developmental Biology.
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which organizes an annual meeting for the entire Finnish developmental biology community (Hytiälä retreat). The members of the RC actively participate also in the organization of other research seminar activities on their campuses, especially through Biocentrum Helsinki and Viikki Research Groups in Biosciences organizations.

Research

The members of the RC have several ongoing scientific collaborations between each other. Furthermore, they use similar approaches, which allows sharing of resources (for example transgenic mouse and fly strains, probes etc.), basic equipment and know-how (fluorescence microscopes, tissue culture, electroporation and in situ hybridization equipment, etc.). The research environment on both campuses is outstanding with functional core-facilities for histology, light-microscopy, electron microscopy, fluorescence activated cell sorting as well as DNA sequencing and microarray techniques. Transgenic mouse services are vital for the RC and the members have made significant contributions to the development and organization of the mouse facilities at the University of Helsinki (HS - former head of the Mellahti animal facility, IT, HS - members of the board of the Laboratory Animal Center; JP - research director of the transgenic mouse unit 2008-2009, see also below). The RC is surrounded by other outstanding scientists on both campuses and the RC members have active collaborations for example in the areas of evolutionary, neuro, and cancer biology.

Teaching

RC members contribute to teaching both at undergraduate and graduate levels. For several years RC has been responsible for organization of teaching in developmental biology at the University of Helsinki. To illustrate this, the first textbook in developmental biology in Finnish language was published as a RC joint effort in 2003. The teaching in developmental biology includes basic lecture series, advanced lecture series and a practical lab course. In addition, the RC members participate in other graduate level teaching organized by the graduate schools. Six of the twelve RC members also teach biochemistry, genetics, biomedicine and pathology for undergraduate students at their faculties. Recent appointment of FIDIPro Scott Gilbert, the author of the most recognized textbooks in Developmental Biology, also has a major impact to the teaching given by the RC.

- RC’s strengths and challenges related to operational conditions, and the actions planned for their development.

A major improvement in the operational conditions will be building of a new mouse facility in 2012. This will more than double the current capacity, which has been one bottle neck of research in the past. There are also challenges related to the move to the new facility. These include the high cost of cleaning the mouse strains. It is also very important to maintain and further develop a well-functioning transgenic mouse unit at the new facility. RC members are involved in planning the new facility as well as operations of the Laboratory Animal Center at UH. An opportunity/challenge also is combination of developmental biology with the new techniques in DNA sequencing, bioinformatics and electron as well as light microscopy. These are areas of active research on the campuses. The RC would also benefit from joining of new members working with model organisms such as C.elegans, zebrafish and chicken.

One challenge is the rather heavy teaching load for some (3-4) of the PIs, who have positions as university lecturers.
6 LEADERSHIP AND MANAGEMENT IN THE RESEARCHER COMMUNITY (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the execution and processes of leadership in the RC, how the management-related responsibilities and roles are distributed in the RC and how the leadership- and management-related processes support high quality research, collaboration between principal investigators and other researchers in the RC, the RC’s research focus and strengthening of the RC’s know-how.

The RC is composed of independent PIs and their research groups. It has no formal administration and is not officially part of the structure of UH. Joining the RC is voluntary and the PIs participate because of common research interests. As described above, this RC has a long history and started as the new research program in developmental biology at the Institute of Biotechnology in 1996. Irma Thesleff was then recruited as the Director of the program, a position which she still holds. She coordinated the two CoEs in Developmental Biology by UH and Academy of Finland, respectively.

As some PIs moved to other university departments and new PIs joined BI, an unofficial Developmental Biology Network was formed. There is no nominated leader in this network, although IT has taken some responsibility in overseeing the activities. The network is administered by a secretary at BI. This network is open to all interested researchers at UH and although the members of the RC in this evaluation form the majority of the network it includes also many other scientists at the Meilahti and Viikki campuses. The devbiol-network serves as an important information channel and unites the scientists interested in developmental biology at UH. For instance, an e-mail is sent every week by the student speaking in the Thursday journal club, and by the students organizing the spring retreat at Tvärminne biology station of UH. In addition, the e-mail address is used for information on seminars, courses, doctoral and postdoctoral positions, international congresses etc.

The responsibilities for different activities have been distributed among the PIs. For example, JP and UP have been responsible for running the weekly journal club. MS took the initiative and was the responsible person applying and administering the Marie Curie Early Stage Training program. HS was the initiator and editor of the Finnish Developmental Biology textbook where all PIs wrote chapters. The various lecture series and courses for undergraduates are mainly taken care by the PIs in Meilahti and Viikki with positions in the Faculties of Medicine, Biological and Environmental Sciences and Veterinary Medicine, and the Bi group leaders have organized graduate school lecture and practical courses at Viikki Biocenter.

The light structure and bottom-up type functioning of the RC is probably the best way to support high quality research and training. It offers a platform for exchanging information, meeting and initiating and strengthening collaborations. In addition to PIs, the doctoral students and post-docs benefit of the possibilities of the devbiol-network offers for communication. In fact, the students published for several years regularly a newsletter "Development and Communication" which was very popular and there have been attempts recently to restart the publication as a joint effort with the participants of the Finnish German Developmental Biology Network in Freiburg and Oulu.

- RC’s strengths and challenges related to leadership and management, and the actions planned for developing the processes.

The strength of the RC is definitely its light umbrella structure and the voluntary basis of joining. The functionality of this is illustrated by all the successful joint activities both in research and training since over a decade as described above. We believe that the facts that this RC is solely based on common
scientific interests in a defined research field, and that the goal is on high quality of research make it a unique community at UH.

While the voluntary character is an asset, it is also a challenge for the maintenance of the RC. Also, the fact that the RC unites research and training at many departments on two UH campuses is a strength but maintaining the intercampus cooperation is a challenge.

Most communication between the research RC groups happens naturally and unofficially during the daily and weekly research interactions. However, in order to keep up and improve collaboration, we plan to start systematic gathering of useful common information to a wiki-based bulletin board and to organize bi-monthly lunch meetings for the PIs in order to discuss timely matte

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<th>Listing of the RCs external competitive funding, where:</th>
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<tr>
<td>- the funding decisions have been made during 1.1.2005-31.12.2010, and</td>
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<td>- the administrator of the funding is/has been the University of Helsinki</td>
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<td><strong>Academy of Finland (AF)</strong> - total amount of funding (in euros) AF has decided to allocate to the RC members during 1.1.2005-31.12.2010: <strong>6340000</strong></td>
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<td><strong>Finnish Funding Agency for Technology and Innovation (TEKES)</strong> - total amount of funding (in euros) TEKES has decided to allocate to the RC members during 1.1.2005-31.12.2010: <strong>0</strong></td>
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<td><strong>European Union (EU)</strong> - total amount of funding (in euros) EU has decided to allocate to the RC members during 1.1.2005-31.12.2010: <strong>2460000</strong></td>
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<td><strong>European Research Council (ERC)</strong> - total amount of funding (in euros) ERC has decided to allocate to the RC members during 1.1.2005-31.12.2010: <strong>0</strong></td>
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</tbody>
</table>
| **International and national foundations** - names of international and national foundations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
|   - names of the foundations: **Sigrid Juselius Foundation**
|   - **Cancer Society of Finland**
|   - total amount of funding (in euros) from the above-mentioned foundations: **2300000** |
| |
| **Other international funding** - names of other international funding organizations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
|   - names of the funding organizations: **Swiss National Science Foundation**
|   - **Nagasaki University**
|   - total amount of funding (in euros) from the above-mentioned funding organizations: **300000** |
| |
| **Other national funding** (incl. EVO funding and Ministry of Education and Culture funded doctoral programme positions) - names of other national funding organizations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros). |
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- names of the funding organizations: Ministry of Education (=graduate student salaries and CIMO)
- EVO
- total amount of funding (in euros) from the above-mentioned funding organizations: 1630000

**8 RC’s strategic action plan for 2011–2013 (max. 4400 characters with spaces)**

- Description of the RC’s future perspectives in respect to research and doctoral training.

The HelDevBio RC is perhaps the best example of an intercampus and interdisciplinary network at the UH. It was seeded, when the developmental biology research program at the Institute of Biotechnology was launched in 1996. Its original aim was to improve the quality of research and training and strengthen the international visibility of Finnish developmental biology. The research program has indeed been highly successful, and has been the core of the Centers of Excellence in Developmental Biology of UH and the Academy of Finland. The primary goal of the program has been reached, and developmental biology research in Finland is nowadays stronger than ever.

The future perspective in training is to continue maintaining a living community of developmental biologists at the UH and also nationwide, to further improve the scientific productivity and to guarantee high quality training for the next generation. We will continue with the good practices in international doctoral training. However, we do not intend to increase the number of PhD students, but rather aim to gain a higher post-doc to graduate student ratio. We believe that this will ensure an even more personalized and effective training for the students. The Finnish-German training network has received a second round of funding and will continue at least until 2012. Together with developmental biologists at Oulu University, we are currently scoring for possibilities to apply for the Erasmus Mundus Joint Doctoral Program (EMJD) with four European partner universities.

The RC is continuously interested in timely research questions in which new important information can be uncovered. Our main task is to understand the complex interplay of cells in the tissues that form the developing organism. The future perspectives in research continue to focus on basic research, the knowledge of which serves many disciplines from molecular biology to evolutionary biology and clinical sciences. Collaborations with e.g. Helsinki University Central Hospital and the Faculty of Veterinary Medicine should be tightened to transfer our experimental results to clinical diagnostics and possible therapies. The future areas of interest include at least the function of stem cells in the development and tissue turnover and the epigenetic mechanisms controlling development. These areas are greatly dependent and advanced by the development of biological imaging techniques and genomic engineering methods, which will be kept up-to-date. New technologies, such as 3D OPT scanning of embryos, time-lapse imaging of living tissues, and systems biological approaches, should be introduced. Examples of future scientific and technological openings are listed below.

Specific research topics include:
- development of “artificial” kidneys for nephron regeneration therapies
- re-specification of neural crest cells in the turtle
- genome wide-approaches in developmental gene regulation
- cellular mechanisms of budding morphogenesis
- building dental tissues from cell and progenitor cells
- origins and migration of specific neuronal subgroups, identification of transcription factor networks specifying neuronal subgroups
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- genetic fate mapping using transgenic mouse techniques (Cre, fluorescent reporters)
- expression profiling and bioinformatic methods to study transcription factor networks
- morphological diversity generated by evolutionarily conserved signaling pathways, molecular mechanisms of ligand transport systems
- cellular reprogramming and dedifferentiation involved in conversion of cell phenotypes in the inner ear. Link between regeneration and cell polarity.
- new genetic tools to modify stem cells
- Use of Drosophila in vivo rescue system to analyze the function of modified proteins

New methods being used and to be applied or developed:

- micro-CTs on developing embryos
- viral-mediated gene transfer
- mathematical modeling of scute growth
- whole embryo culture
- deep sequencing methods (massive parallel sequencing)
- tissue-culture techniques and live-imaging of tissues
- generation of novel transgenic mice for imaging
- quantitative analysis of ligand diffusion in Drosophila pupal wing
- tamoxifen-inducible Cre recombinase transgenic mice
- zinc finger nucleases, homologous recombination in human stem cells and cancer stem cells

9 SHORT DESCRIPTION OF HOW THE RC MEMBERS HAVE CONTRIBUTED TO THE COMPILATION OF THE STAGE 2 MATERIALS (MAX. 1100 CHARACTERS WITH SPACES).

For the stage 2 material compilation, the responsible person invited the RC PIs to a meeting in which the plan was discussed and tasks were divided. The ideas and strategies were thought, instructions how to collect the data were formulated and different persons volunteered to write draft versions of parts 1-9 of the report.

Each PI contributed by filling a form on her/his behalf, and the information was pooled by the volunteers. The draft versions were commented by neighbouring PIs and sent to the responsible person, who again combined the points 1-9 of the report. The draft version of the whole report was again circulated, commented and accepted by the whole RC. We started the work early and wanted to act rapidly in the beginning. This gave us 3 weeks to finalize and comment on the report, ensuring that everybody had time to contribute and influence the final text.
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1 Analysis of publications

- Associated person is one of Mikko Frilander, Mikko.Frilander@helsinki.fi, Irma Thesleff, Irma.Thesleff@helsinki.fi, Frederic Michon, frederic.michon@helsinki.fi, Ingrid Jeanne Juliette Finiaux, Yoshida Toshiyuki, Laura Kaarina Ahtiainen, laura.ahtiainen@helsinki.fi, Markus Suomalainen, markus.suomalainen@helsinki.fi, Keijo Hakkinen, keijo.hakkinen@helsinki.fi, Emma Juuri, emma.juuri@helsinki.fi, Katri Maria Nurkko, katri.nurkko@helsinki.fi, Marja Mikola, marja.mikola@helsinki.fi, Pirjo Lindfors, pirjo.lindfors@helsinki.fi, Maria Pummelius, maria.pummelius@helsinki.fi, Sylwia Leliwek, sylwia.ledwiek@helsinki.fi, Miia Voutilainen, miia.voutilainen@helsinki.fi, Veas Shirokova, veas.shirokova@helsinki.fi, Scott Gilbert, scott.gilbert@helsinki.fi, Riina Rovio, riina.rovio@helsinki.fi, Kimmo Jonatan Wartiovaara, kimmo.wartiovaara@helsinki.fi, Alexandre Angers-Loustau, alexandre.angers-loustau@helsinki.fi, Katja Merja Pirtti, marja.pirtti@helsinki.fi, Tuomas Salminen, tuomas.salminen@helsinki.fi, Janna Sainio, janna.sainio@helsinki.fi, Aki Aalto, aki.alto@helsinki.fi, Sylwia Leliwek, sylwia.ledwiek@helsinki.fi, Osamu Shimii, osamu.shimii@helsinki.fi, Jane Kinnunen, jane.kinnunen@helsinki.fi, Shinya Matsuda, shinya.matsuda@helsinki.fi, Zhao Zeng, zhao.zeng@helsinki.fi, Juha Partanen, juha.partanen@helsinki.fi, Dmitri Shilov, dmitri.shilov@helsinki.fi, Ralf Luft, ralf.luft@helsinki.fi, Kari Kala, kari.kala@helsinki.fi, Laura Susanna Lahti, laura.lahti@helsinki.fi, Paula Piritta Peltopuro, paula.peltopuro@helsinki.fi, Jonna Marianne Saarimaki-Virtanen, anna.maria.saarimaki-virtanen@helsinki.fi, Natalia Sinijuhani, natalia.sinijuhani@helsinki.fi, Tapio Heino, tapio.heino@helsinki.fi, Mari Palgi, mari.palgi@helsinki.fi, Ritva Lindenroth, ritva.lindenroth@helsinki.fi, Vasileios Stratoulakis, vasileios.stratoulakis@helsinki.fi, Guus van der Heiden, guus.vanderheiden@helsinki.fi, Remo Sansi, remo.sansi@helsinki.fi, Kari Sainio, kari.sainio@helsinki.fi, Tiina Immonen, tiina.immonen@helsinki.fi, Anna Poppevaara, anna.poppevaara@helsinki.fi, Nina Milla Saaristo, nina.saaristo@helsinki.fi, Mads Jakobsen, mads.jakobsen@helsinki.fi, Jaan Heiki Vällistõ Härøy, jaan.heiki.vallesto@helsinki.fi, Maarja Kristina Hietonen, marja.hietonen@helsinki.fi, marja.hietonen@helsinki.fi, Satu Helena Kusure, satu.kusure@helsinki.fi, Nina Peralta, nina.peralta@helsinki.fi, Ulla Helena Pirtola, ulla.pirtola@helsinki.fi, Anna Kirjasen, anna.kirjasen@helsinki.fi, Heidi Loponen, heidi.loponen@helsinki.fi, Johanna Mantela, johanna.mantela@helsinki.fi, Maarit Sulg, maarit.sulg@helsinki.fi

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<tr>
<td>A1 Refereed journal article</td>
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<td>19</td>
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<td>22</td>
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<td>142</td>
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<td>A2 Review in scientific journal</td>
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<td>4</td>
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<td>A3 Contribution to book/other compilations (refereed)</td>
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<td>A4 Article in conference publication (refereed)</td>
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<td>B1 Unrefereed journal article</td>
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<td>C1 Published scientific monograph</td>
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RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

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2 Listing of publications

A1 Refereed journal article

2005


Fiander, MJ, Meng, X 2005, ‘Proximity of the U12 snRNA with both the 5 splice site and the branch point during early stages of spliceosome assembly’, Molecular and Cellular Biology, vol 25, no. 12, pp. 4813-4825.


Rice, R, Thesleff, I, Rice, DPC 2005, ‘Regulation of Twist, Snail, and Id1 is conserved between the developing murine palate and tooth’, Developmental Dynamics, vol 234, no. 1, pp. 28-35.


2

Wang, X, Åberg, T, James, M, Levanon, D, Groner, Y, Thesleff, I 2005, 'Runx2 (Cbfa 1) inhibits Shh signalling in the lower but not upper molars of mouse embryos and prevents the budding of putative successional teeth', Journal of Dental Research, vol 84, no. 2, pp. 138-143.


Histochemistry and Cytochemistry


Lindfors, PH, Lindahl, M, Rossi, J, Saarma, M, Airaksinen, MS 2006, 'Ablation of perspephin receptor glial cell line-derived neurotrophic factor family receptor 4 impairs thyroid calcitonin production in young mice', Endocrinology, vol 147, no. 5, pp. 2237-2244.


 Runx2 (Cbfa 1) inhibits Shh signalling in the lower but not upper molars of mouse embryos and prevents the budding of putative successional teeth, Journal of Dental Research, vol 84, no. 2, pp. 138-143.

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Laine H, Doetzhofre A, Mantela J, Ylikoski J, Lahto M, Roussel MF, Segli N, Pirvola U 2007, p19(Ink4d) and p21(Cip1) collaborate to maintain the postmitotic state of auditory hair cells, their codeletion leading to DNA damage and p53-mediated apoptosis', Journal of Neuroscience, vol 27, no. 6, pp. 1434-1444.

Laine H, Doetzhofre A, Mantela J, Ylikoski J, Lahto M, Roussel MF, Segli N, Pirvola U 2007, p19(Ink4d) and p21(Cip1) collaborate to maintain the postmitotic state of auditory hair cells, their codeletion leading to DNA damage and p53-mediated apoptosis', Journal of Neuroscience, vol 27, no. 6, pp. 1434-1444.


2008


2009


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2010


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RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HelDevBio/Thesleff


A2 Review in scientific journal

2005


2006


2007


2008

Mikkola, ML 2008, 'TNF superfamily in skin appendage development', Cytokine & Growth Factor Reviews, vol 19, no. 3-4, pp. 219-230.
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RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HelDevBio/Thesleff


2009
Mikkola, ML 2009, ‘Controlling the number of tooth rows’, Science signalling, vol 2, no. 85, pp. pe53.

2010

A3 Contribution to book/other compilations (refereed)

2005

2006

2007

2008

2009
A4 Article in conference publication (refereed)

2006

2007
Thesleff, I, Järvinen, E, Suomalainen, M. 2007, 'Affecitng tooth morphology and renewal by fine-tuning the signals mediating cell and tissue interactions', in Tinkerings, pp. 142-157.

2009

2010

B1 Unrefereed journal article

2005

2006


2007

2008

2009

2010

C1 Published scientific monograph

2010
Gilbert, S 2010, Developmental Biology, Ninth edition, 9th edn, University of Sunderland Press, Massachusetts, USA.
H1 Patents

2006
Alitalo, K, Laakkonen, PM, Kubo, H, Sainio, K 2006, Tie Receptor And Tie Ligand Materials And Methods For Modulating Female Fertility. 2006002854.
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF OTHER SCIENTIFIC ACTIVITIES 2005-2010

HelDevBio/Thesleff

1 Analysis of activities 2005-2010

Associated person is one of Mikko Frilander, Mikko.Frilander@helsinki.fi, Irma Thesleff, Irma.Thesleff@helsinki.fi, Frederic Michon, frederic.michon@helsinki.fi, Ingrid Jeanne Juliette Finiaux, yoshida.shirokova@helsinki.fi, Laura Kaarina Ahtiainen, laura.ahtiainen@helsinki.fi, Marika Suomalainen, marika.suomalainen@helsinki.fi, Oto Hārā, oto.harai@helsinki.fi, Emma Juuri, emma.juuri@helsinki.fi, Katja Maria Närhi, katja.narhi@helsinki.fi, Maria Juurinen, maria.juurinen@helsinki.fi, Marja Närhi, marja.narhi@helsinki.fi, Marja Nikola, marja.nikola@helsinki.fi, Päivi Lindfors (o.a. Hillonen), paivi.lindfors@helsinki.fi, Marja Pummela, marja.pummela@helsinki.fi, Sylwia Lefebvre, sylwia.lefebvre@helsinki.fi, Marie Voutilainen, marie.voutilainen@helsinki.fi, Vera Shirokova, vera.shirokova@helsinki.fi, Scott Gilbert, rita.rice@helsinki.fi, Reina Ricu, reina.ricu@helsinki.fi, Kimmo Joalanen, joalanen@helsinki.fi, Kimmo Joalanen, kimmo.joalanen@helsinki.fi, Alexandre Angers-Loustau, alexandre.angers-loustau@helsinki.fi, Katja Merika Piltti, katja.piltti@helsinki.fi, Marijo Salminen, marijo.salminen@helsinki.fi, Veera Vihinen, veera.vihinen@helsinki.fi, Jaana Kunnupuu, jaana.kunnupuu@helsinki.fi, Shinya Matuda, shinya.matuda@helsinki.fi, Zhao Zeng, zhao.zeng@helsinki.fi, Juha Partanen, juha.partanen@helsinki.fi, Elna Scholz, elna.scholz@helsinki.fi, Kaia Kakkuri, kaia.kakkuri@helsinki.fi, Tomi Jukkola, laura.sarinen@helsinki.fi, Laura S.Lahtinen, laura.sarinen@helsinki.fi, Paula Pirttila Pelispuro, paula.pelispuro@helsinki.fi, Jonna Marianne Saarmarkki-Vire, jonna.saarmarkki-vire@helsinki.fi, Natalia Sinijuhna, natalia.sinijuhna@helsinki.fi, Tapio Herno, tapio.herno@helsinki.fi, Meri Paali, meri.paali@helsinki.fi, Ritva Lehtimäki, ritva.lehtimaki@helsinki.fi, jussi.ahtila@helsinki.fi, Stratoskou, vassiliki.stratoskou@helsinki.fi, Gustaf Marstrand, gustaf.marstrand@helsinki.fi, Gustaf Marstrand, gustaf.marstrand@helsinki.fi, Pernu Santala, pernu.santala@helsinki.fi, Kira Sainio, kira.sainio@helsinki.fi, Tiina Immonen, tiina.immonen@helsinki.fi, Anna Poposaava, anna.poposaava@helsinki.fi, Nina Miikaela Pettersson, nina.pettersson@helsinki.fi, Marie-Josèphe, marie-josephe@helsinki.fi, Ulla Helena Pirkola, ulla.pirkola@helsinki.fi, Anna Kirjapainen, anna.kirjapainen@helsinki.fi, Heidi Loponen, heidi.loponen@helsinki.fi, Johanna Mantola, johanna.mantola@helsinki.fi, Marlin Sulg, marlin.sulg@helsinki.fi

<table>
<thead>
<tr>
<th>Activity type</th>
<th>Count</th>
</tr>
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<tbody>
<tr>
<td>Supervisor or co-supervisor of doctoral thesis</td>
<td>24</td>
</tr>
<tr>
<td>Prizes and awards</td>
<td>21</td>
</tr>
<tr>
<td>Editor of research journal</td>
<td>7</td>
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<tr>
<td>Peer review of manuscripts</td>
<td>49</td>
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<td>Editor of special theme number</td>
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<td>Membership or other role in review committee</td>
<td>15</td>
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<tr>
<td>Membership or other role in research network</td>
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<tr>
<td>Membership or other role in national/international committee, council, board</td>
<td>24</td>
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<tr>
<td>Membership or other role in public Finnish or international organization</td>
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<tr>
<td>Membership or other role of body in private company/organisation</td>
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<tr>
<td>Participation in interview for written media</td>
<td>2</td>
</tr>
<tr>
<td>Participation in TV programme</td>
<td>1</td>
</tr>
</tbody>
</table>
2 Listing of activities 2005-2010

Supervisor or co-supervisor of doctoral thesis

Mikko Frilander, Mikko.Frilander@helsinki.fi
Supervisor of Doctoral thesis, Mikko Frilander, 2010

Irma Thesleff, Irma.Thesleff@helsinki.fi

Frederic Michon, frederic.michon@helsinki.fi
Co-supervisor of doctoral thesis, Frederic Michon, 01.09.2010 → ..., Finland

Marja Mikkola, Marja.Mikkola@helsinki.fi
Co-supervisor of Doctoral thesis, Marja Mikkola, 2006 → ...
Supervisor of Doctoral thesis, Marja Mikkola, 2006 → ...
Co-supervisor of Doctoral thesis, Marja Mikkola, 2008 → ...
Supervisor of Doctoral thesis, Marja Mikkola, 2008 → ...

Kirmo Jonatan Wartiovaara, kirmo.wartiovaara@helsinki.fi
Supervision of PhD thesis, Kirmo Jonatan Wartiovaara, 20.03.2009, Finland

Marjo Salminen, Marjo.Salminen@helsinki.fi
PhD thesis supervision, Marjo Salminen, 2002 → 2007, Estonia
PhD thesis supervision, Marjo Salminen, 2002 → 2011
PhD thesis supervision, Marjo Salminen, 2003 → 2011, Finland
PhD thesis supervision, Marjo Salminen, 2003 → 2011
PhD thesis supervision, Marjo Salminen, 2005 → 2011, Finland

Tapio Heino, Tapio.Heino@helsinki.fi
Supervision of Doctoral thesis, Tapio Heino, 2006, Finland
Supervision of Doctoral thesis, Tapio Heino, 2009, Finland

Kirsi Sainio, Kirsi.Sainio@helsinki.fi
Graduate student supervisor, Kirsi Sainio, 24.04.2009, Finland

Tiina Immonen, Tiina.Immonen@helsinki.fi

Prizes and awards

Mikko Frilander, Mikko.Frilander@helsinki.fi
A Distinction awarded for supervising M.Sc. thesis work, Faculty of biosciences, University of Helsinki, Mikko Frilander, 2006

Irma Thesleff, Irma.Thesleff@helsinki.fi
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

**RC-SPECIFIC TUHAT COMPILATIONS OF OTHER SCIENTIFIC ACTIVITIES 2005-2010**

**HelDevBio/Thesleff**

Finnish Society of Sciences and Letters (Suom. Tiedeseura), invited member, Irma Thesleff, 2005
Honorary Doctor, Katholieke Universiteit Leuven, Belgium, Irma Thesleff, 2005, Belgium
Honorary Professor in Craniofacial and Dental Genetics, University of Copenhagen, Irma Thesleff, 2005 → 2010, Denmark
Professor of the Year, Finnish Association of University Professors, Irma Thesleff, 2005
Sheldon Friel Memorial Lecturer, European Orthodontic Society, Irma Thesleff, 2005
Chair, Gordon Conference on "Craniofacial Morphogenesis & Tissue Regeneration, Irma Thesleff, 2008
Honorary Doctor, University of Debrecen, Hungary, Irma Thesleff, 2008, Hungary
Honorary Doctor, University of Oslo, Irma Thesleff, 2008
Isaac Schour Memorial Award, IADR, Irma Thesleff, 2008
President, European Orthodontic Society, Irma Thesleff, 2008 → 2009
President-Elect of European Orthodontic Society, Irma Thesleff, 2008
AAAS Fellow, Irma Thesleff, 2009
Apolonia Prize, Finnish Dental Society, Irma Thesleff, 2009
President of European Orthodontic Society, Irma Thesleff, 2009
Valkhof Chair (Visiting Professor), Radboud University Nijmegen, The Netherlands, Irma Thesleff, 2009
Honorary Doctor, Karolinska Institutet, Stockholm, Irma Thesleff, 2010
Paul Goldhaber Award, Harvard School of Dental Medicine, Irma Thesleff, 2010

**Marja Mikkola , Marja.Mikkola@helsinki.fi**
President of Finnish Society for Developmental Biology, Marja Mikkola, 2010 → ...

**Riitta Lindström , riitta.lindstrom@helsinki.fi**
Best master's thesis in Faculty of Biosciences 2006, Riitta Lindström, 2007 → ...

**Editor of research journal**

**Irma Thesleff , Irma.Thesleff@helsinki.fi**
Member of Editorial Board, Orthodontics & Craniofacial Research, Irma Thesleff, 2005 → 2010
Member of editorial board, BoneKey, Irma Thesleff, 2005 → 2010
Member of editorial board, Journal of Oral Biosciences, Irma Thesleff, 2005 → 2010
Member of editorial board, Organogenesis, Irma Thesleff, 2005 → 2010

**Marja Mikkola , Marja.Mikkola@helsinki.fi**
Member of the editorial board of Experimental Dermatology, Marja Mikkola, 2009 → ...

**Marjo Salminen , Marjo.Salminen@helsinki.fi**

**Tiina Immonen , Tiina.Immonen@helsinki.fi**
Duodecim, Tiina Immonen, 01.01.2005 → 31.12.2005, Finland

**Peer review of manuscripts**

**Mikko Frilander , Mikko.Frilander@helsinki.fi**

**Irma Thesleff , Irma.Thesleff@helsinki.fi**
Reviewer, BioEssays, Irma Thesleff, 2005 → 2010
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RC-SPECIFIC TUHAT COMPILATIONS OF OTHER SCIENTIFIC ACTIVITIES 2005-2010

**HelDevBio/Thesleff**

Reviewer, Cell, Irma Thesleff, 2005 → 2010
Reviewer, Current Biology, Irma Thesleff, 2005 → 2010
Reviewer, Development, Irma Thesleff, 2005 → 2010
Reviewer, Developmental Biology, Irma Thesleff, 2005 → 2010
Reviewer, Developmental Cell, Irma Thesleff, 2005 → 2010
Reviewer, Developmental Dynamics, Irma Thesleff, 2005 → 2010
Reviewer, Differentiation, Irma Thesleff, 2005 → 2010
Reviewer, Experimental Cell Research, Irma Thesleff, 2005 → 2010
Reviewer, Journal of Cell Biology, Irma Thesleff, 2005 → 2010
Reviewer, Journal of Dental Research, Irma Thesleff, 2005 → 2010
Reviewer, Mechanisms of Development, Irma Thesleff, 2005 → 2010
Reviewer, Nature, Irma Thesleff, 2005 → 2010
Reviewer, Nature Cell Biology, Irma Thesleff, 2005 → 2010
Reviewer, Nature Genetics, Irma Thesleff, 2005 → 2010
Reviewer, PLoS Biology, Irma Thesleff, 2005 → 2010
Reviewer, PLoS Genetics, Irma Thesleff, 2005 → 2010
Reviewer, Science, Irma Thesleff, 2005 → 2010

**Laura Kaarina Ahtiainen**, laura.ahtiainen@helsinki.fi

Reviewer for Stem Cells Journal, Laura Kaarina Ahtiainen, 2010 → ...

**Marja Mikkola**, Marja.Mikkola@helsinki.fi

Gene Expression Patterns, Marja Mikkola, 2005 → 2010
Referee, Development, Marja Mikkola, 2005 → 2010
Referee, Human Genetics, Marja Mikkola, 2005 → 2010
Referee, BMC Developmental Biology, Marja Mikkola, 2005 → 2010
Referee, Developmental Biology, Marja Mikkola, 2005 → 2010
Referee, Developmental Dynamics, Marja Mikkola, 2005 → 2010
Referee, FEBS Letters, Marja Mikkola, 2005 → 2010
Referee, Genes & Development, Marja Mikkola, 2005 → 2010
Referee, Journal of Investigative Dermatology, Marja Mikkola, 2005 → 2010
Referee, Mechanisms of Development, Marja Mikkola, 2005 → 2010
Referee, PNAS USA, Marja Mikkola, 2005 → 2010
Referee, PLoS Genetics, Marja Mikkola, 2005 → 2010

**Scott Gilbert**

Member of Editorial board, Evolution and Development, Scott Gilbert, 2005 → 2010
Member of Editorial board, Journal of Experimental Zoology., Scott Gilbert, 2005 → 2010
Pre-Publication book reviewer, Scott Gilbert, 2005 → 2010
Reviewer, Nature, Scott Gilbert, 2005 → 2010

**Kirmo Jonatan Wartiovaara**, kirmo.wartiovaara@helsinki.fi

Differentiation, Kirmo Jonatan Wartiovaara, 01.01.2006 → 31.12.2010
FEBS Letters, Kirmo Jonatan Wartiovaara, 01.01.2009 → 31.12.2010

**Marjo Salminen**, Marjo.Salminen@helsinki.fi
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
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RC-SPECIFIC TUHAT COMPILATIONS OF OTHER SCIENTIFIC ACTIVITIES 2005-2010

HelDevBio/Thesleff

Development, Marjo Salminen, 2007 → 2008, United Kingdom
Mechanisms of Development, Marjo Salminen, 2008 → 2009, Netherlands
Life Sciences, Marjo Salminen, 2010, United Kingdom

Osamu Shimmi, osamu.shimmi@helsinki.fi
Briefings in Functional Genomics and Proteomics, Osamu Shimmi, 2009 → ..., United Kingdom
Journal of Molecular Evolution, Osamu Shimmi, 2009 → ..., United States
FEBS Letters, Osamu Shimmi, 2010 → ..., Netherlands
Journal of Molecular Evolution, Osamu Shimmi, 2010 → ..., United States

Tiina Immonen, Tiina.Immonen@helsinki.fi
Duodecim, Tiina Immonen, 2005 → ..., Finland
Journal of Cell Science, Tiina Immonen, 2008 → 2009, United Kingdom
PlosONE, Tiina Immonen, 16.09.2010

Editor of special theme number
Scott Gilbert
Editor, Special Ecological Developmental Biology issue of Birth Defects Res. C, Scott Gilbert, 2005 → 2010

Membership or other role in review committee
Irma Thesleff, Irma.Thesleff@helsinki.fi
Member of Scientific Evaluation Committee, VIB Department DEB11, Irma Thesleff, 2005
Member of Scientific Evaluation Committee of Division of Cell and Developmental Biology, University of Dundee, Irma Thesleff, 2005
Member of Scientific Evaluation Committee of CoE in Molecular Destruction and Reconstruction of Tooth and Bone, Tokyo Medical and Dental University, Japan, Irma Thesleff, 2005
Member of EMBO Fellowship Committee, Irma Thesleff, 2006 → 2010
Member of European Research Council Peer review evaluation committee, Irma Thesleff, 2007
Member of Scientific Evaluation Committee of Translational Medical Theme Centers, Karolinska Institutet, Irma Thesleff, 2009

Marja Mikkola, Marja.Mikkola@helsinki.fi
Referee, ‘Viksu’ high school students’ science competition, Academy of Finland, Marja Mikkola, 2006

Scott Gilbert
Reviewer, National Science Foundation, Scott Gilbert, 2005 → 2010

Marjo Salminen, Marjo.Salminen@helsinki.fi
Evaluation of EC Marie Curie applications in Fp6, Marjo Salminen, 2003 → 2006, Belgium
Evaluation of EC Marie Curie applications in Fp7, Marjo Salminen, 2007 → ..., Belgium
Acting as a vice chair in EC Marie Curie applications Fp7, Marjo Salminen, 2008 → ..., Belgium
Evaluation of applications for Postdoctoral Researcher positions, Marjo Salminen, 2008 → 2010, Finland
Evaluation of EC call Cooperation Health-2009-2.1.2-1 in Fp7, Marjo Salminen, 2009, Belgium
Evaluation of the University of Helsinki three-year grants, Marjo Salminen, 2009, Finland

Hannu Sariola, Hannu.Sariola@helsinki.fi
Julkaisufoorumi, Hannu Sariola, 01.03.2010 → ...

Membership or other role in research network
Mikko Frilander, Mikko.Frilander@helsinki.fi
Member of NordForsk RNA biology network, Mikko Frilander, 2006 → 2010
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF OTHER SCIENTIFIC ACTIVITIES 2005-2010

HelDevBio/Thesleff

Member of steering board of NordForsk network RNA biology, Mikko Frilander, 2006 → 2010
Biocentrum Helsinki member, Mikko Frilander, 2007 → ...
Osamu Shimmi, osamu.shimmi@helsinki.fi
Member of the national infrastructure for research on non-mammalian model organism, Osamu Shimmi, 2010 → ..., Finland

Membership or other role in national/international committee, council, board

Mikko Frilander, Mikko.Frilander@helsinki.fi
Board member, Vikki Campus education development services (VOK) advisory board, Mikko Frilander, 2005
Vice-chair of the Genetics and genomics program, Vikki Research group organization, Mikko Frilander, 2009 → ...
Member of Selection committee for lecturer in human genetics, University of Helsinki, Mikko Frilander, 2010

Irma Thesleff, Irma.Thesleff@helsinki.fi
Board member of Vikki Graduate School in Biosciences, Irma Thesleff, 1999 → 2012
SAB Member of BioCity Turku, Irma Thesleff, 2004 → 2009
SAB member of Center of Excellence in Developmental Biology, Karolinska Institutet, Irma Thesleff, 2004 → 2007
Board member of European Orthodontic Society, Irma Thesleff, 2005 → 2009
Board member of Biocentrum Helsinki, Irma Thesleff, 2007 → 2010
Board member of Laboratory Animal Center, Univ. Helsinki, Irma Thesleff, 2007 → 2013
Board Member of Biocenter Finland, Irma Thesleff, 2008 → 2010
Deputy member of board, FIMM, Irma Thesleff, 2008 → 2010
Member of Scientific Advisory Board, Centre de Recherche de Cordeliers, Univ Paris Descartes, Irma Thesleff, 2008 → 2010
Member of Scientific Advisory Board, Systems-based Consortium for Organ Design and Engineering, Irma Thesleff, 2008 → 2012
Board member of Finnish Graduate School in Oral Sciences, Irma Thesleff, 2009 → 2012

Marja Mikkola, Marja.Mikkola@helsinki.fi
Board Member of Finnish Society for Developmental Biology, Marja Mikkola, 2006 → ...
Grant application reviewer for Telethon Foundation, Italy, Marja Mikkola, 2007 → 2009, Italy

Scott Gilbert
Chair, Professional Development and Education Committee, Society for Developmental Biology, Scott Gilbert, 2005 → 2010
Executive Council, European Evolutionary Developmental Biology Society, Scott Gilbert, 2005 → 2010
Program officer, Society for Integrative and Comparative Biology, Biology Division, Scott Gilbert, 2005 → 2010

Marjo Salminen, Marjo.Salminen@helsinki.fi
Brain Research Society of Finland, Marjo Salminen, 2002 → 2011, Finland
Finnish Developmental Biology Society, Marjo Salminen, 2002 → 2011, Finland

Tapio Heino, Tapio.Heino@helsinki.fi
Member of the board, Scantly, Tapio Heino, 01.01.2007 → 31.12.2010
Hannu Sariola, Hannu.Sariola@helsinki.fi
hallituksen jäsenyys, Hannu Sariola, 01.01.2006 → 12.12.2010
hallituksen jäsen, Hannu Sariola, 01.01.2007 → 12.12.2013

Membership or other role in public Finnish or international organization

Juha Partanen, Juha.V.Partanen@helsinki.fi
Helsingin yliopiston toisen normaalikoulun johtokunnan jäsen, Juha Partanen, 01.01.2005 → 31.12.2005, Finland
Opetusministeriön selvitysmies, Juha Partanen, 01.01.2005 → 31.12.2005, Finland
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Ylioppilastutkintolautakunnan apujäsen, Juha Partanen, 01.01.2005 → 31.12.2005, Finland
Ylioppilastutkintolautakunnan matematiikan apujäsen, Juha Partanen, 01.01.2006 → 31.12.2006
Ylioppilastutkintolautakunta, Juha Partanen, 01.01.2007 → 31.12.2007, Finland
Ylioppilastutkintolautakunta, Juha Partanen, 01.01.2008 → 31.12.2008, Finland

Membership or other role of body in private company/organisation
Irma Thesleff, Irma.Thesleff@helsinki.fi
COST action B23 (European Union), Irma Thesleff, 01.01.2005 → 31.12.2005
European Orthodontic Society, Irma Thesleff, 01.01.2007 → 31.12.2007

Marja Mikkola, Marja.Mikkola@helsinki.fi
Consultant for Edimer Pharmaceuticals, Marja Mikkola, 2010 → 2011

Marjo Salminen, Marjo.Salminen@helsinki.fi
The Society for Neuroscience, Marjo Salminen, 2003 → 2010, Finland

Participation in interview for written media
Osamu Shimmi, osamu.shimmi@helsinki.fi
Interview of Japanese researcher in Finland, Osamu Shimmi, 2006 → ..., Japan

Juha Partanen, Juha.V.Partanen@helsinki.fi
Opinushallituksen koulutustilaisuudet (5 kertaa), Juha Partanen, 01.01.1999 → 31.12.2011, Finland

Participation in TV programme
Kirmo Jonatan Wartiovaara, kirmo.wartiovaara@helsinki.fi
Research Group: Thesleff I

Basic statistics

- Number of publications (P) 141
- Number of citations (TCS) 1,364
- Number of citations per publication (MCS) 9.73
- Percentage of uncited publications 23%
- Field-normalized number of citations per publication (MNCS) 1.36
- Field-normalized average journal impact (MNJS) 1.27
- Field-normalized proportion highly cited publications (top 10%) 1.42
- Internal coverage .93

Trend analyses

Collaboration

Performance (MNCS) by collaboration type
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING
AT THE UNIVERSITY OF HELSINKI
by CWTS, Leiden University, the Netherlands

Research profile

Categories:
- Developmental Biology
- Cell Biology
- Biochemistry & Molecular Biology
- Neurosciences
- Genetics & Heredity
- Endocrinology & Metabolism
- Oncology
- Multidisciplinary Sciences
- Biology
- Anatomy & Morphology

The red line indicates the number of publications in each category.

Legend:
- High H-Index
- Avg H-Index
- Low H-Index