

EMBL Genome Biology Unit Review Summary and Response

The review of the Genome Biology (GB) Unit took place in Heidelberg in a hybrid format on 22 - 24 April 2024. The review panel consisted of 14 international experts, including six members of EMBL's Scientific Advisory Committee (SAC). The review was chaired by Adrian Bird, University of Edinburgh. Additionally, several external and internal observers were present: Chair of EMBL Council Peter Becker, Vice Chair of EMBL Council Amanda Collis, Edith Heard, EMBL Director General, Peer Bork, Director of EMBL Heidelberg, and Jessica Vamathevan, Head of EMBL Strategy.

Evaluation Summary

Since its inception in 2009, the Genome Biology (GB) Unit at EMBL Heidelberg has witnessed the fast-growing importance of genomics across various biological disciplines. The panel praised the consistently high quality of research attesting to the unit's high scientific standards, the quality of its recruitment, and its strategic foresight. Under the leadership of Eileen Furlong, the GB Unit has adapted and evolved to embrace the dynamic landscape of genomics, expanding its research themes to encompass systems approaches to microbial and eukaryotic biology while simultaneously pursuing classical molecular mechanistic studies. Given this diversity, the panel was happy to see that genomics has been a unifying thread, allowing GB to maintain cohesiveness and a shared identity.

The panel noted one of the defining characteristics of the GB Unit to be its commitment to fostering innovation and advancement in multi-omics techniques and methods of analysis, always remaining at the forefront of genome function research. The unit's efforts have not only contributed to addressing longstanding questions about living organisms but have also been pivotal in addressing newly arising challenges in the field. The panel praised the immense achievements and contributions of the GB Unit since the last review in 2020. Outputs from the groups have solidified the unit's position as a global leader in genomics research. Among the numerous scientific achievements of this review period, the panel highlighted work done by the Savitski and Typas groups using a newly developed method to study the extensive remodelling of the brain glycoproteome, which reveals how the gut microbiome may affect brain protein functions. The panel also highlighted work done by the Furlong group providing an unprecedented view of fruit-fly developmental gene regulation through time, at single-cell resolution; as well as recent important research done by the Korbelt group who discovered multiple recurrent inversions as a frequent source of genomic variation, causing structural diversity that contributes to human genetic disease.

The panel noted the pivotal roles of GB scientists across EMBL, holding leadership positions in four of the five transversal themes that comprise the EMBL Programme 'Molecules to Ecosystems'. Furthermore, individuals such as Mikhail Savitski and Jan Korbelt have taken on leadership roles in key areas, such as the Proteomics Core Facility and the Data Science Centre, respectively. Additionally, Wolfgang Huber was praised for his extensive personal involvement and contributions in the wide dissemination of new data analysis methods across the scientific community.

During the last review in 2020, the GB Unit had been seen as quite top-heavy. However, recent and upcoming departures are helping to address this imbalance while at the same time resulting in the loss of some of the unit's most successful scientists. The panel stressed that upcoming group leader openings should be filled as soon as possible, which should help further increase the number of junior group leaders and ensure the unit's continued scientific strength and effectiveness.

Previous reviews had also highlighted a potential tension between focused mechanistic questions and data-rich omics science within the Unit. However, the panel was impressed by how the GB Unit has successfully transcended this apparent dichotomy through its enthusiastic adoption of new approaches to address specific mechanistic questions. The panel was supportive of the unit's plan to continue with a broad portfolio including both technology development and mechanistic discovery science.

Regarding training, the panel noted that the PhD students were generally very happy with their PhD experience at EMBL, appreciating the varied support structures to achieve their goals, which was evidenced by the majority of PhD students having submitted a publication before leaving. The panel commended the GB Unit for motivating many of its PhD students towards academic careers, with a majority of graduates taking postdoctoral positions making the EMBL PhD programme one of the most successful in Europe. However, the strict four-year cut-off for PhDs poses challenges for project and publication timelines, for which the panel recommended finding ways to minimise, such as clear guidance and publication planning. Suggestions by the students, which were echoed by the panel, also included more structured planning and guidance from the Thesis Advisory Committee (TAC) as well as formal co-supervision by a second PI and/or a voluntary secondment in another EMBL lab. The postdoctoral fellows praised EMBL's facilities, services, and collaborative atmosphere. They suggested strengthening links between EMBL-EBI and Heidelberg units for better connectivity in computational efforts and appreciated EMBL's Transversal Themes and various social events for fostering inter-unit connections.

Lastly, the introduction of formalised mentoring for group leaders approaching their nine-year term at EMBL, in order to support their transition to new positions outside of EMBL was brought forward by the panel.

Overall, the panel congratulated the GB Unit on four very successful years, with both the quality and the impact of GB science having been consistently outstanding, driving technology development as well as discovery science to advance our understanding of genome biology and maintaining its position at the forefront of scientific innovation.

Response to the Panel's Recommendations

I would like to express my most sincere thanks to all members of the review panel, and in particular the Chair Adrian Bird for dedicating their time, energy and expertise in reviewing the EMBL GB Unit. I join the panel in congratulating everybody within the GB Unit for such a positive outcome. My most sincere thanks go to Eileen Furlong for the outstanding leadership and scientific vision that have been so instrumental in positioning and shaping the Unit.

The GB Unit has driven technology development and expanded the breadth of research themes covered, addressing long-standing as well as newly arising questions in the field. The research of every group in this unit can be considered a success story, positioning the GB Unit at the forefront of genomics research. The Unit's research focus also strongly aligns with EMBL's current scientific Programme 'Molecules to Ecosystems', with several GB group leaders in active leadership roles in all but one of the new Transversal Themes. The Unit's exceptionally promising and highly impactful research is exemplified by the research highlights noted by the panel but also by the younger group leaders within the unit and I am delighted to hear about the high international standing of the GB Unit and the panel's confidence in its future.

The panel was impressed by how GB has transcended the potential tension between focused mechanistic questions and data-rich omics science highlighted in previous reviews and I fully support the strategy endorsed by the panel of maintaining a diverse portfolio encompassing both technology advancement and mechanistic exploration. A major advantage of EMBL's nine-year turnover rule is indeed the continuous influx of young group leaders, refreshing EMBL's scientific portfolio and keeping the Units up to date with the latest thinking and technological developments. I agree with the panel that future group leader recruitments are crucial for the GB Unit to stay at the forefront of genome biology, especially given the fast moving pace of the field. I can assure the panel that it is expected that new junior group leaders will be hired over the next few years, with timing dependent on the financial context. In line with the panel's recommendation, these recruitments in addition to several senior group leaders departing the unit will also address the top-heavy composition of the GB Unit by increasing the proportion of junior group leaders.

I am very pleased to hear that the predoctoral and postdoctoral fellows are very satisfied overall. I would like to thank the panel for their discussions and suggestions for GB students that do not publish prior to the end of their PhD. The length of time that especially wet lab research projects

can take, the kind of ambitious research which EMBL aspires to, as well as the relatively short duration (3.5 years) for PhDs at EMBL, all contribute to this issue. We are addressing this in several ways for example through EMBL's commitment to applying the principles of Responsible Research Assessment across the organisation that do not focus on publishing in high impact factor journals and that value several kinds of research outputs, including preprints. There is also the option of a bridging postdoc in order for fellows to finish up projects and publish after graduation. Additionally, we are looking into ways to enrich the PhD program such as different types of mentors, co-supervision or secondment opportunities.

I thank the panel for their input on further mentorship for our group leaders, to build on the successful support already provided to incoming group leaders. EMBL prides itself in also accompanying its outgoing group leaders through their next steps, and we want to make sure that their transition at the end of their nine-year period happens successfully. I want to assure the panel that we have already been discussing this issue internally, as well as with SAC and, we are looking to implement additional checkpoints around the four- to five-year mark. As this marks the beginning of the second half of their nine-year trajectory at EMBL, it seems like the appropriate moment to give feedback as well as support and advice on the first steps towards the upcoming transition.

I would like to conclude by thanking the panel once again for their fruitful discussions, advice and expert contributions, which will be crucial to the future success of EMBL's GB Unit. I would also like to congratulate Eileen Furlong, for her outstanding leadership, and the entire Genome Biology Unit for their stellar research and contributions to EMBL. I look forward to seeing the evolution of this exceptional unit as well as the impact of its future contributions to science and to EMBL's programme.



Professor Edith Heard, FRS
Director General
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