EMBL Developmental Biology Unit Review Summary and Response

The review of the Developmental Biology (DB) Unit took place in Heidelberg in a hybrid format on 24 - 26 April 2023. The review panel consisted of 13 international experts, including six members of EMBL's Scientific Advisory Committee (SAC). The review was chaired by Ruth Lehmann, Whitehead Institute, MIT, Cambridge, US. Additionally, several external and internal observers were present: Chair of EMBL council Peter Becker, UK Delegate and Vice Chair of EMBL Council Amanda Collis, Edith Heard, EMBL Director General, and Peer Bork, Director of EMBL Heidelberg.

Evaluation Summary

Since the last review in 2019, the DB Unit has undergone significant changes, the main one being the change in leadership from Anne Ephrussi to Alexander Aulehla after 14 years. The panel praised the immense achievements and contributions to EMBL of Anne Ephrussi as a group leader, Head of the DB Unit, as well as in her role as the Director of the EMBL International Centre for Advanced Training (EICAT). Ephrussi's leadership as well as the exemplary, interdisciplinary nature of her research, established the DB Unit as a prominent department in modern developmental biology at the international level.

After a competitive international search, Alexander Aulehla was appointed as the new Head of Unit (HoU) in 2021. Under his leadership, the DB Unit embraced EMBL's new programme "Molecules to Ecosystems" and now plays a central role in its implementation. The DB unit may well be the flagship for the Planetary Biology initiative. The panel was impressed with the unit's new research vision involving a broader interpretation of developmental biology. Themes such as 'developmental plasticity', 'time, timing and transitions', and 'metabolism in time and space' are now being explored, in part, by employing organisms beyond traditional models. The panel noted the strong sense of community among the DB groups and the beneficial cross-disciplinary interactions within the unit. The panel highlighted work done in an impressive pan-EMBL collaboration that resulted in a unique open-source tool to explore links between cell morphology and gene expression by integrating imaging and genomics data (Vergara et al., 2021).

The panel commended Alexander Aulehla for his dedication to the success of the unit and his compelling and thoughtful vision for its future. The panel particularly praised his focus on providing an optimal research environment, mentorship, and ensuring the well-being and success of trainees within the unit. They emphasised that maintaining focus on these leadership aspects will ensure a united, productive and successful unit in the future. With the departure of two group leaders and the recruitment of five new group leaders since 2019, the unit has reached critical mass and presents itself balanced in seniority and gender.

The panel also applauded the unit's success in driving the development of cutting-edge technologies in collaboration with other EMBL groups, especially for the area of imaging. As an example, the panel highlighted work discovering the role of hydraulic pressure in morphogenesis of sponges (Stockermans et al., 2022). The panel felt that there was a high potential for future technology development given the unit's recent expansion of model organisms and the associated technical challenges to establish these in the lab.

Given its recent growth and forward-looking vision, the panel was confident that the DB Unit will become a leading centre for integrative developmental biology by developing mechanistic paradigms in diverse organisms and ecosystems. Though the research within the unit is diverse, there are common threads, such as the concept of developmental plasticity.

The panel noted that the key to success in considering development 'in a broad context' will be to do so in a way that is specific and hypothesis-oriented. They emphasised that although groups can be either data or hypothesis driven in their research approach, ultimately it will be critical to have a means to test causality.

The panel further commented on the number of predocs in the DB unit graduating without having published a paper, though most complete a publication within a year of graduation. This delay may jeopardise their ability to be competitive for postdoc positions. Although there was no simple solution, the panel made several suggestions that included changing the rules on the duration of PhDs, ensuring that scope of projects is realistic and aligned with the duration of PhDs at EMBL, as well as encouraging the publication of intermediate milestones of larger projects, possibly as preprints.

Given the multifaceted research within the DB Unit, the review panel highlighted the importance of ensuring the groups share a common language and scientific criteria for excellence. The panel noted that the goal for gaining mechanistic understanding is the glue that binds all the investigators. The reviewers emphasised the value of interdisciplinary interactions, and advised to leverage expertise within the DB Unit, across EMBL, and outside of EMBL to ensure appropriate depth of knowledge and domain specific feedback.

Regarding training, both pre- and post-doctoral fellows were uniformly appreciative of the intentional efforts to create a supportive atmosphere and culture within the DB Unit.

The PhD students raised some concern regarding the diversity of research within the unit though it was also mentioned that at present this is not a problem and rather stimulates beneficial cross-disciplinary discussions and interactions. Furthermore, the students did echo the panel's concern about ensuring publications at the time of graduation. Solutions mentioned in this setting included uniform access to PhD extensions and communicating EMBL's adherence to DORA. The students also raised a perceived lack of support in the handling of past claims regarding bullying and harassment. The panel noted that structures have been put in place by

DB Unit and EMBL leadership to deal with this issue while balancing the request for transparency with the necessity for privacy.

Minor issues raised by the postdocs were the wish for recognition of supervisory activities as well as strict time limits of postdoc contracts hindering finishing of projects.

In conclusion, the panel commended the DB Unit for their remarkable performance over the last four years as well as for its bold and forward-looking vision that considers development in a broad context. The unit's strong sense of community and cross-disciplinary interactions further the success of individual groups. Alexander Aulehla's leadership of and investment into the unit are exceptional. The panel was confident that the unit is on track to become a leading centre for integrative developmental biology by establishing mechanistic paradigms in a variety of organisms and ecosystems.

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 Ruth Lehmann for dedicating their time, energy and expertise in reviewing the EMBL DB Unit. This is a very exciting but also challenging time for the unit as it has gone through significant changes with regards to the science of the unit as a whole, a new HoU, and a new EMBL Programme, making it a very timely moment to have this review now. I believe the input received from the panel will have a long-lasting impact on the evolution of the Unit and ensure its continued success especially given the new and broader directions of research.

I would like to congratulate everyone from the DB Unit for such a positive review. My most sincere thanks go to Anne Ephrussi and Alexander Aulehla for the outstanding leadership and clear scientific vision that have been so instrumental in positioning and shaping this Unit. I would like to join the panel in praising the remarkable contributions of Anne Ephrussi to EMBL over the past 30 years, as an exceptional scientist and Head of Unit as well as the Director of EICAT. I also echo the praise of the panel for the energetic and forward-looking leadership that Alexander Aulehla is bringing to the DB Unit ensuring a vibrant and cohesive environment enabling a diversity of research topics and organisms in the area of developmental biology. The unit performs exceptionally promising and highly impactful research, exemplified by the research highlights noted by the panel but also by the younger group leaders within the unit. I am delighted to hear about the high international standing of the DB Unit and the panel's confidence in its future to become one of the leading institutes for integrative developmental biology.

I am pleased to hear that the panel recognises the value of the unit's new research program, broad interpretation of developmental biology, and expanded use of organisms. I agree with the panel that the interdisciplinarity coupled with the strong sense of community within the DB Unit

is extremely beneficial for the success of the unit. I share the panel's optimism that given this recent expansion of organisms there is a high potential for similar technology development in the future, which will go on to serve the scientific communities beyond developmental biology.

Many members of the DB Unit have been highly motivated and engaged in the development and implementation of EMBL's current Programme 'Molecules to Ecosystems'. This is clear from the unit's strong links with the Planetary Biology and Theory@EMBL Transversal Theme. The unit already benefited greatly from this engagement, for example by being able to attract young talented group leaders such as Flora Vincent and Jordi van Gestel through the newly established joint Unit-Transversal Theme recruitment process.

I agree with the panel that regardless of the research approach taken, showing causality beyond correlations has to be the ultimate goal. This might be harder for some groups where organisms are not yet established to be cultured in the lab. I strongly believe that once again the highly collaborative nature of the unit, fostering discussions among the group leaders, interactions with other units, as well as outside expertise should facilitate overall success.

I would also like to thank the panel for their discussions and suggestions about the lack of publications prior to the end of their PhD, for many DB students. The length of time that research projects can take in this area of biology, as well as the relatively short duration (3.5 years) of PhDs at EMBL, both contribute to this issue. We are actively addressing this issue both at the unit as well as the organisational level, for example by promoting the practice of publishing a smaller paper earlier on in a PhD, prior to publication of the major paper of a student's project that can take much longer. EMBL is also committed to applying the principles of DORA that do not focus on publishing in high impact factor journals and that value several kinds of outputs, including preprints. Finally, there is also the option of a bridging postdoc in order for fellows to finish up a project and publish after graduation.

On the topic of diversity in DB Unit research areas and organisms, I would like to highlight that the DB Unit has always been quite diverse in terms of the organisms being studied, and the approaches taken. I agree with the panel that the overarching scientific focus and connectivity between groups requires a common language and constant knowledge exchange. I fully support the panel's notion on the importance of leveraging expertise outside the DB unit, in order to ensure the success of the diverse individual research programs. The DB unit has already put some structures in place including a new DB lecture series. Furthermore, the Transversal Themes enable connectivity and exchange across all of EMBL's six sites with their external expert panels bringing in potentially missing expertise.

I am pleased that the predoctoral and postdoctoral fellows are very satisfied overall. I thank the panel for bringing the students' concerns about a perceived lack of support in the handling of past claims regarding bullying and harassment. As noted by the panel, we have to strike the difficult balance of being transparent in the handling of these cases while also protecting the

privacy of those involved. However, I would like to assure the panel that we take bullying extremely seriously at EMBL and we have several routes for staff to reach out and highlight such issues or concerns. It is also very important to me as EMBL DG and to Alexander Aulehla as HoU, that the DB Unit students feel safe to speak up and given the concerns they raised, more avenues to enable communication and build trust are clearly needed. Alexander Aulehla had already set up a variety of new and creative approaches to ensure a trusting work environment within the DB unit where students can speak up and a healthy research culture is actively promoted.

Finally, on the topics raised by the postdocs the DB unit has recently put a seminar series in place taught by the unit postdocs in order to allow them to gain experience and be acknowledged for a formal training activity. The time limits on postdoc contracts is a structural facet of EMBL that cannot be changed easily.

I would like to conclude by once again congratulating Alexander Aulehla for his leadership and scientific vision, and everyone in the DB unit for a very successful review. EMBL is extremely proud of what they have achieved over this review period and I am looking forward to supporting the DB Unit in years to come and seeing the impact of its future contributions to science and to EMBL's programme. My immense thanks to Ruth Lehman and everyone on the review panel for their fruitful discussions, advice and expert contributions, which will be crucial to the future success of EMBL's DB Unit.

Professor Edith Heard, FRS
Director General
22 June 2023