



EMBL Developmental Biology Unit Review 14-16 May 2019

The EMBL Developmental Biology Unit was reviewed on 14 to 16 May 2019 by a panel of 14 international experts, including six members of the Scientific Advisory Committee (SAC). The review was chaired by Stefano Piccolo, University of Padua, Padua, Italy. The Chair of SAC Paul Nurse, attended the review as an observer.

Evaluation Summary

The EMBL Developmental Biology unit is one of the world's leading departments for the study of developmental processes. The unit is characterised by consistent and outstanding scientific productivity. This ensures visibility and impact on the international stage and attracts brilliant students and postdocs. As Head of Unit for the past 12 years, Anne Ephrussi's contribution can be defined as remarkable. In addition to pursuing her own innovative work on RNA transport in germ cells, Anne Ephrussi deserves considerable credit for generating a productive, highly collegial and positive atmosphere that permeates the whole unit. She has successfully managed the high turnover in the unit by hiring new group leaders and mentoring them. Her key work directing the EMBL International Centre for Advanced Training (EICAT), is recognised by the panel and Anne is commended for her effective mentoring of young faculty staff and trainees.

The Developmental Biology Unit brings to EMBL an essential organismal, "system-level" and quantitative perspective to biological processes. As such, the unit is complementary and synergistic with other cell biology and technology-driven efforts of EMBL. The unit studies the basic principles underlying the development of complex organisms, adopting a rich variety of model systems and methodological approaches, while managing to remain coherent in its scope. Researchers of the unit aim to understand the emergent properties of living systems, the mechanisms of tissue patterning and differentiation and their evolution. This includes investigations on how cell fate is determined through cell-cell and cell-environment relationships in time and space, such as symmetry breaking events, cell shape changes, collective cell behaviours and tissue self-organisation. The Developmental Biology unit adopts a variety of data-driven and hypothesis-driven approaches toward these objectives. This is partly done through an extensive network of collaborations with other groups throughout the EMBL community, epitomising the highly collaborative atmosphere of EMBL.

There were many excellent research highlights discussed by the panel including work by Detlev Arendt's group which builds a framework with which to infer evolutionary connections between different cell types. This offers entirely new perspectives to animal evolution with the "cell tree of life", an initiative involving 20 labs which Arendt leads. Alexander Aulehla's work on collective cell behaviour during segmentation was also praised. He has developed highly innovative approaches, involving in vitro cell systems and microfluidic devices to control oscillatory dynamics experimentally. With these tools, he was able to reveal that the relative timing of signalling oscillations carries key information for mesoderm patterning. The panel recognised that embracing new applications of physical principles is advancing our understanding of development in new and unexpected directions. Also along these lines, Takashi Hiiragi's group has applied EMBL-customised light sheet microscopy and high-resolution mechanical measurements to monitor mouse peri-implantation development. Using fly embryos, Stefano De Renzi's group has implemented optogenetic methods that allow protein activity to be controlled with high spatio-temporal precision in order to analyse and provoke cellular localisation during gastrulation processes. Finally, Francois Spitz's group provided novel insights into the role of cohesins for chromatin structure by showing that depletion of cohesin, a ring-shaped protein complex, dramatically alters three-dimensional genome structure.

The panel noted that PhD students often graduate before publishing a first author paper and recommended that group leaders try to combine more ambitious projects with smaller scale, more concrete and feasible research goals. The turnover and hiring of group leaders was discussed by the panel. It was recognised that the high turnover of group leaders means that productive areas of



research can be lost, but that this also ensures the hiring of new talents as well as fresh scientific perspectives, biological models and experimental approaches. The review panel also insisted on the importance of actively striving to establish and maintain a good gender balance at all levels, but particularly when hiring group leaders. Additionally, it was recommended that policies aimed to accompany and prepare group leaders for transition out of EMBL before their nine-year term be implemented, for example by encouraging young recruits to apply for prestigious grants even before their first renewal.

The review panel endorsed the proposal by the Head of Unit to support the unit's needs for in-house computational and theoretical experts to enable predictive modelling. Overall, the review panel was positively impressed with the unit's interdisciplinarity, as well as its intellectually diverse, positive and collegial climate.

Response to the Panel's Recommendations

I would like to thank the panel for their extremely positive evaluation of the Developmental Biology Unit. I join the panel in congratulating Anne Ephrussi, as an excellent Head of Unit who has enabled a collaborative and positive research atmosphere. As highlighted by the panel, and reflected in the research highlights, the unit is intellectually diverse, stands out due to the variety of model systems studied and offers many fresh scientific perspectives. For this and the consistently high standard of research performed within the unit, Anne Ephrussi and the entire Developmental Biology Unit should be commended.

In response to the panel's recommendations, I agree that this unit has a need for computational and theoretical experts to enable predictive modelling approaches. Theoretical biology would be highly complementary to much of the ongoing research within the Unit, but also in other units. Indeed this is an area that I would like to consider across EMBL in the context of the upcoming EMBL Programme.

The panel noted that some PhD students graduate without a first author paper. Nevertheless many of them go on to publish their paper shortly after their PhD. I would also like to note that the scientific complexity of developmental biology research is likely to be a contributing factor. However, the panel's recommendation to combine both ambitious and smaller scale research goals is noted.

I firmly agree with the panel's recommendation to improve the gender balance of the unit, particularly at the group leader level. The gender balance will be somewhat helped by the latest group leader recruitment who will arrive later in 2019. However, I will continue to ask recruitment panels to keep this issue at the forefront of their mind. Future recruitment will involve gender-balanced panels.

The upcoming recruitments will also be an opportunity to further diversify the unit in terms of biological models and experimental approaches. This refresh of scientific perspectives is one of the benefits of EMBL's nine-year turnover rule.

To ensure that both the incoming and outgoing processes for group leaders remain as smooth as possible, I agree with the recommendation by the panel that young group leaders should be encouraged to apply for prestigious grants. I am discussing additional mechanisms which could be put in place, to help better prepare young group leaders for their departure from EMBL by providing targeted career advice at strategic time points during their nine-year term. It should be noted that these issues do not exclusively affect the Developmental Biology Unit and should be addressed more broadly across EMBL to improve career development.



Once again, I would like to congratulate Anne Ephrussi and the entire Developmental Biology Unit for a highly successful review. One in which the unit's collaborative and innovative philosophy shone through and provides an example for many of EMBL's values.

A handwritten signature in blue ink that reads "E Heard".

Professor Edith Heard, FRS
Director General

11 June 2019