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EMBL/SAC/2025/8

EMBL Cell Biology and Biophysics Unit Review Summary and Response

The review of the Cell Biology and Biophysics (CBB) Unit took place in Heidelberg in a hybrid format on 5 - 7 May 2025. The review panel consisted of 18 international experts, including eight members of EMBL's Scientific Advisory Committee (SAC). The review was chaired by Ruth Lehmann, Whitehead Institute (US). Additionally, several external and internal observers were present: Chair of EMBL Council Peter Becker, Vice Chair of EMBL Council Amanda Collis, Peer Bork, EMBL Interim Director General, Ewan Birney, Interim Executive Director, Jan Korbel, Interim Head of EMBL Heidelberg, and Bianca Schmitt, Senior Strategy Officer.

Evaluation Summary

The Cell Biology and Biophysics (CBB) Unit is one of EMBL's oldest and largest research units. Since its establishment in 2010, it has developed into a highly interdisciplinary department with a strong international reputation for advancing mechanistic cell biology. Under the leadership of Jan Ellenberg, who has headed the Unit since its inception, CBB has fostered a highly collaborative environment, integrating discovery-driven research with pioneering technology development. This approach has positioned the Unit at the forefront of innovation in microscopy, AI-based image analysis, and quantitative cell biology. During the review period, CBB continued to attract excellent scientists, while also experiencing transitions among faculty.

The review came at a pivotal moment as the Unit prepared for a change in leadership. With Jan Ellenberg moving to SciLifeLab, interim leadership has been taken on by Anna Kreshuk and Alba Diz-Muñoz since December 2024. The panel praised their effective collaboration, clear vision, and commitment to mentoring, and recommended that their role as interim leaders be clearly acknowledged, with appropriate visibility and support, until a new Head of Unit is appointed. They also advised that the call for the new Head of Unit be launched without delay. The panel further stressed that a smooth leadership transition and carefully chosen recruitments will be essential to maintain momentum and ensure the Unit's continued impact in the years ahead. The panel also suggested that EMBL consider appointing a new director for the Imaging Centre, separate from the future Head of Unit, to ensure continued leadership and focus for this flagship facility. Additionally, the panel underlined the importance of strengthening the mentoring of faculty at all levels, especially of young group leaders in the CBB Unit.

The panel judged the Unit's research to be of very high quality and internationally recognised for combining discovery-driven research, particularly in chromosome organisation and nuclear architecture, and the development of new imaging technologies. The panel also noted the way

in which the Unit has been shaping new directions, such as linking cell behaviour with theoretical modelling. They further recognised the contributions of individual CBB groups to research and service aspects of the TREC (Traversing European Coastlines) expedition, exploring evolutionary and ecological aspects of cell biology, noting this as another new distinctive strength. The contributions of CBB groups to the success of the Imaging Centre was further seen as an example of the Unit's contribution to European life science research.

Among the highlights of this review period, the panel emphasised the significance of Gautam Dey's work on the evolution of mitosis in ichthyosporean protists. By combining live and ultrastructure imaging, comparative genomics, and chemogenetic perturbations, his group showed how closely related species adopt either open or closed mitosis depending on their life cycle. This framework for evolutionary cell biology in non-model systems has significant implications for understanding mitotic diversity across eukaryotes. Illustrating the Unit's excellence in imaging technology innovation, the panel praised the work of Robert Prevedel's group in developing a high-resolution line-scanning Brillouin microscope that allows rapid 3D imaging of mechanical properties in living tissues with minimal phototoxicity. This advance enables long-term, high-resolution imaging of sensitive systems such as mouse embryos and was recognised as one of the most significant scientific developments in 2022.

Looking ahead, the panel encouraged the Unit to strengthen quantitative multicellular biology, advance evolutionary cell biology, and expand research on microbial systems. Maintaining expertise in synthetic chemistry was also noted as an opportunity. The panel emphasised that these areas fit well in the wider EMBL context and the Unit would benefit from closer collaboration across the whole laboratory. They further highlighted the opportunity for the Unit to play a central role in EMBL's AI activities, from developing AI tools to generating data as ground truth.

Training and mentoring remain central to the Unit. The panel was impressed by the commitment of the graduate students, noting that microscopes were in such high demand they were routinely used at night and on weekends, with students raising concerns for insufficient availability. The panel suggested reconsidering the official PhD length of 3.5 years, as most students complete within four. Concerns were also raised about "bridging postdoc" positions, which may disadvantage candidates by already counting towards eligibility for postdoctoral fellowships. The panel noted that postdocs expressed appreciation especially for the format of their unit seminars but suggested other areas for improvement. Postdocs involved in programmes such as EIPOD and ARISE felt better connected than others, and the panel encouraged postdoc-led initiatives for community building, ideally with a small budget and some administrative support. They also noted a lack of mentoring and teaching opportunities. The panel suggested that PIs could involve postdocs more actively in such activities. The postdocs also raised the desire to receive more frequent updates on organisational matters, the difficulty of accessing information, and the

absence of a communal space, such as a kitchen, as a barrier to informal interactions and cohesion.

Overall, the panel commended the CBB Unit for a very successful review period. By pioneering technology development and advancing our understanding of cell biology through fundamental discoveries, the Unit has reinforced its position as a driver of progress and creativity in the field.

Response to the Panel's Recommendations

We would like to express our most sincere thanks to all members of the review panel, in particular to the Chair Ruth Lehmann, for dedicating their time, energy and expertise in reviewing the EMBL CBB Unit. We join the panel in congratulating everybody within the Unit for such a positive outcome. This review comes at a pivotal moment, as the CBB Unit is undergoing a leadership transition and the panel's constructive feedback will be invaluable in supporting the Unit's next phase. We would like to thank Jan Ellenberg for his supportive leadership in the past, and we are extremely grateful to Anna Kreshuk and Alba Diz-Muñoz for their dedication and effective leadership of the Unit during this period of change.

We are pleased that the review panel recognised the effective collaboration and interim leadership of Anna Kreshuk and Alba Diz-Muñoz. We agree that their leadership should be clearly recognised and supported until a new Head of Unit is hired. They have since been appointed as Joint Interim Heads, with the respective recognition and duties. Following the panel's advice, an open search for the new Head of Unit has been launched to avoid further delay and provide a clear future direction for the Unit as soon as possible. The panel highlighted the importance of the EMBL Imaging Centre and advised that EMBL consider establishing a new director for the facility, separate from the Unit Head, to ensure continued visibility and success. We thank the panel for this thoughtful recommendation and are currently preparing a search for this position, decoupled from the search for the CBB head of unit.

We are very pleased to hear of the Unit's strong international reputation and of the panel's judgement that its research is of very high quality, emphasising CBB's distinctive strength in combining discovery-driven cell biology with technology development. We also welcome the panel's recognition of the exciting new directions emerging in the Unit, such as collaborations linking cell behaviour with theory and studies exploring the ecological and evolutionary dimensions of cell biology, including work as part of the TREC expedition. We fully agree that there is considerable potential for synergy when CBB research is connected with expertise more widely across EMBL, and we appreciate the suggestions for areas of increased future focus such as quantitative multicellular biology, evolutionary cell biology, and microbial systems in multicellular contexts. Collaborations in these areas can be readily established or expanded within the framework of existing EMBL structures such as the Transversal Themes, with CBB

already playing key roles in Planetary Biology and Theory. Looking ahead, financial constraints will likely limit recruitment of junior groups in the near term, making it even more important to build on existing strengths, maintain cohesion, and continue fostering interdisciplinary excellence within EMBL.

The panel underscored the significance of CBB's role in EMBL's AI initiative, a perspective we wholeheartedly share and view as central to EMBL's future. Anna Kreshuk, as one of EMBL's leading experts in this field, has been contributing to the build-up of this new entity and will play a major role in developing future AI tools. In addition, technology development groups such as that of Robert Prevedel will advance other key aspects of EMBL's AI vision by embedding AI more deeply into the scientific process, while CBB research more broadly provides the data, perturbations, and models that form essential ground truth for training.

The panel underlined the importance of strengthening mentoring for faculty, in particular for young group leaders but also for those approaching their nine-year term at EMBL, to support their transition to new positions outside the organisation. We wholeheartedly agree, and see this as closely linked to the issue of leadership transitions and timely recruitment of the next Head of the CBB Unit. Additionally, EMBL strongly encourages external mentoring of faculty through a mentoring programme, which is usually actively endorsed and promoted by Heads of Units.

We are delighted to share the panel's observation and praise of the strong commitment and work ethic of graduate students in the CBB Unit. We will monitor the booking levels of EMBL microscopes to ensure sufficient availability so as not to hinder the students' progress. We would also like to thank the panel for its input on PhD duration at EMBL. We agree that this is an important topic, which is currently under review by the Graduate Committee, including the possibility of extending the official PhD length to 4 years and revisiting the bridging postdoc concept, particularly regarding its impact on career prospects.

We are pleased to hear the postdocs' positive feedback on the CBB Unit seminars. We fully agree with the panel that mentoring and teaching are important elements of postdoctoral training and career development. There are already some opportunities for postdocs to informally guide Master's or PhD students, and EMBL is open to exploring more structured mentoring opportunities with formal recognition. We also encourage postdocs to take full advantage of EMBL's extensive training portfolio, including EMBL predoc courses, summer schools, scientific courses and workshops, to gain valuable teaching experience,

We would like to thank the panel for raising perceived differences in support across various postdoc programmes. While externally funded postdoc programmes offer tailored events for their own cohorts (e.g. EIPOD or ARISE), we are happy to assure the panel that all postdocs at EMBL have access to support through the EMBL Postdoc Office, including welcome events, funds for postdoc socials, and the biennial retreat. We will ensure these opportunities are clearly communicated going forward. We are also supportive of postdocs exploring further mechanisms

for collaboration and exchange, such as through chat platforms, where they can make use of existing EMBL infrastructure.

We would like to conclude by expressing our gratitude to the panel once again for their thorough evaluation, insightful discussions, and constructive advice. Their recommendations will be invaluable for ensuring the future development and continuing success of the CBB Unit.

Prof. Dr. Peer Bork
Interim Director General

Prof. Ewan Birney, CBE, FMedSci, FRS
Interim Executive Director

16 September 2025