

# Championing fundamental cell biology



**Nature Cell Biology is proud to support fundamental cell biological studies. We look forward to continuing to publish impactful research that advances our understanding of cells in basic and applied contexts.**

As we approach [Cell Bio 2022](#), the joint meeting of the [American Society for Cell Biology \(ASCB\)](#) and the [European Molecular Biology Organization \(EMBO\)](#), we are excited for this occasion to meet in person again, to learn about the latest projects in cell biology labs worldwide, and invite researchers at all career levels to get in touch with the editors to discuss publishing in *Nature Cell Biology*. The ASCB|EMBO conference reflects the diversity of today's research to probe the biology of cells across a vast and intersecting range of contexts, and with this event, we take the opportunity to focus on the importance of fundamental, or basic, cell biology.

While the study of biology to advance medicine is a key guiding principle for cell and molecular biologists, fundamental cell biological studies – which seek purely to understand how life works – are essential. We often hear from our community that basic research is not prioritized sufficiently in our current research ecosystem. The simmering pressure on researchers to divert away from basic questions to secure public funding is not new<sup>1</sup>. Public funders must balance their investments responsibly, including by considering the likelihood of a prompt return and benefit to society. Yet the potential of a new approach, model or line of inquiry can be immeasurable. It is challenging to predict when a breakthrough will occur or when a basic project will lead to a major biomedical advance. Curiosity-driven research and serendipitous discoveries have helped lay the foundation for our understanding of cell biology, building knowledge that is central to systems-level biology and biomedicine<sup>2–6</sup>. As the NIH recognizes, “[Curiosity Creates Cures](#)”.

The importance of basic science was highlighted this year as the United Nations General Assembly called 2022 ‘[The International Year of Basic Sciences for Sustainable Development](#)’. Efforts tied to this Year of Basic Sciences aim to mobilize all stakeholders in our community to

promote curiosity-driven research and emphasize its essentiality for sustainable development worldwide. Basic science not only benefits society by accruing knowledge and driving biomedical innovation, but it also imparts citizens with the information and critical thinking skills that are needed to contribute to decisions that will affect their future individually and collectively.

Like many in our community, we are fascinated by research that aims to understand how cells work and are awestruck by how much of basic cell biology is yet unknown. Technological advances – from sequencing to imaging – are providing an increasingly high spatiotemporal resolution with which to examine cells in culture, in tissues and in living organisms. Collaborative efforts are reshaping how we approach fundamental questions and are opening up avenues of discovery. Moving forwards, it is imperative that diverse perspectives be brought to the bench and that full range of voices are heard and amplified across science and publishing at all levels<sup>7–9</sup>. We are poised to enter a fruitful era of basic cell biology, led not only by methods developments and cross-disciplinary projects, but strengthened by our shared commitment to the work that is required to achieve diversity and equity.

The value of curiosity-driven, fundamental cell biology is illustrated in this month's issue. In their [Comment](#), Jeanne C. Stachowiak and Tomas Kirchhausen discuss the rich history of reconstitution systems as a minimal approach to tease apart complex membrane processes such as vesicular fusion, and examine the evolution of these assays and the biological questions that drive the field. As the authors write, recent progress is taking us closer to dissecting how cell membranes are assembled, how they are regulated by organic compounds and how they mediate robust biological functions.

Several studies in this issue deepen our understanding of membrane and organelle biology. [Thorsten Hoppe and colleagues](#) present a forward genetic screen in *Caenorhabditis elegans* for factors that modulate the levels of an endoplasmic reticulum-associated degradation (ERAD) model substrate. They discover an Argonaute-dependent ER-associated RNA Silencing (ERAS) pathway that acts together with ERAD to preserve ER homeostasis and function. In another study, [Zev J. Gartner, Young-wook Jun and colleagues](#)

define an adherens junction-mediated plasma membrane micro-compartmentalization that orchestrates Notch activation. Adherens junctions promote lipid-dependent accumulation of  $\gamma$ -secretase and size-dependent protein segregation, excluding full-length Notch receptors. This spatial organization may generate adherens junction-associated plasma membrane hubs for proteolysis of other substrates, in a size-dependent manner.

A separate study published in *Nature* this year<sup>10</sup> delineated the core principles of the eukaryotic cell cycle. This astonishing progress exemplifies our incomplete understanding of central molecular and cell biological processes, and the need for more attention to them. We capture some of the recent ground-breaking cell cycle articles published across the Nature Portfolio in an online [Collection](#). Methodological breakthroughs, a growing set of model organisms and an increasingly quantitative lens are shining a light on cardinal facets of the cell cycle, such as replication stress dynamics, how cells cycle in vivo, and senescence. This month, [Maria Kasper, Valentina Greco and colleagues](#) report that in vivo epidermal differentiation is a multi-day process through which cells experience a continuum of transcriptional alterations to transit independently of cell cycle exit. Their findings are discussed in a [News & Views](#) by Albert Herms and Philip H. Jones.

We are committed to supporting basic research across the scope of cell biology and look forward to findings that cast classic fields into new light and others that will illuminate pathways that are unknown to date. We will continue to nurture our ties with cell biologists that are focused on fundamental research and to serve our broad and diverse community, and we hope you enjoy turning to our pages for insightful, rigorous cell and molecular biology studies.

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