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In the news

THE THIN LINE BETWEEN PHYSICS AND BIOLOGY

Credit: Arianna Bottinelli/Springer Nature Limited

The 14th edition of the Physics of Living Matter symposium took place at the beginning of September in Cambridge, UK. The intense 2-day symposium gathered 130 participants and covered diverse topics and systems, from genome transcription mechanisms to the evolution of squid eyes and the swarming behaviour of the worm *Caenorhabditis elegans*.

Among the many systems of interest, a recurring theme was how to connect different levels of organization and spatial scales, and how these levels influence each other. For example, how is a mechanical signal exerted on the skin translated into an electric signal travelling in the nervous system? Similarly, interactions with the environment are studied across scales: it has been discovered that the rate of mutation and genetic diversity increases if bacterial colonies grow in 2D environments; at a much larger scale, some insects evolved to jump from smooth surfaces, others instead slip quite badly when placed on glass. Finally, a central issue is understanding the emergence of collective behaviour, whether it concerned mechanical interactions and collective sensing in cells, or survival strategies in yeast colonies.

Across the presentations it was clear that biological systems and data are a continuous source of new, fascinating questions, with physics providing a general quantitative framework to tackle them. Concepts such as phase diagrams, entropy, symmetry breaking and universality classes have been borrowed and adapted to gain insight into biological problems. An extreme and striking example is the conceptual analogy between the use of genetic mutations to test the stability of organisms' traits and perturbation theory in physics, which was one of the fils rouges connecting a number of presentations. The meeting was lightly sprinkled with jokes about how physics and biology couldn't be more different, and heavily loaded with practical examples of how strongly connected they are. In 1854, Maxwell solved the problem of light passing through a sphere of variable refractive index out of curiosity towards the structure of fish eyes. Today, the data–model–theory virtuous cycle simultaneously answers old questions and opens up new challenges in biophysics, further blurring the already thin line between physics and biology.

On a final, separate note, the community gathered in a touching tribute to Suzanne Eaton, professor of molecular biology at the Max Planck Institute of Molecular Cell Biology and Genetics in Dresden, who tragically disappeared this summer.

Arianna Bottinelli