

Lightbox images showing the development of a nematode worm (*Caenorhabditis elegans*), one of the complex cellular systems studied at the Crick Institute.

ARTS

The quest for order

Philip Ball tours a cross-disciplinary exhibition exploring patterns in bioscience.

In 2016, a steel-and-glass spaceship landed next to St Pancras railway station, London's gateway to Europe. From the start, the biomedical powerhouse that is the Francis Crick Institute set out to put its stamp on a district already home to University College London, the Wellcome Trust and *Nature*. But how to carve out a cultural niche in an area buzzing with scientific and artistic activity?

Deconstructing Patterns is part of that endeavour. This collaboration between the Crick's scientists, established artists and young people from a community arts programme has created works inspired by what's going on in the institute's labs. As curator Bryony Bengel-Abbott told me, the theme of patterns was chosen because a quest for order and regularity underlies the Crick's research into various extremely complex systems. These range from genome-sequence analysis to *Drosophila* neurology and the development of the nematode worm *Caenorhabditis elegans*.

It's not clear how much of that comes across in the exhibits. A discussion of, say, the role of transcription factors or forces

in myosin-actin networks in guiding development presents a communication challenge, no matter how beautifully illustrated with micrographs of stained cells. But the displays' pedagogical ambitions are also undermined for the right reason: artists have other agendas. However laudable the efforts to suggest that artists and scientists share a goal of making sense of life's complexity, this exhibition reveals that they ask different questions and find different answers.

This is most evident in the collaboration between the *C. elegans* team in the Polarity and Patterning Networks Laboratory, led by Nate Goehring, and young filmmakers from the 1A Arts project. This partnership began last year with a one-day workshop in which the scientists shared their work with a group of teenagers aged 14 to 17, some without a science background. "Our aim was to get them thinking about how animals develop, and expose them to some key concepts," says Goehring. "That is, symmetry and asymmetry, the importance of breaking symmetry to

Deconstructing Patterns

Francis Crick Institute, London.
Until 1 December.

generate different types of cell and specifying geometric axes, the need to assign different cell identities, and how simple spatial rules can give rise to complex form." The researchers devised exercises using building blocks connected in different ways to illustrate how morphology and symmetry can arise from local, algorithmic rules.

What the 1A Arts team came up with was quite different: a short, metaphorical narrative film about the transformative experience of an office worker caught in a repetitive regime. Despite the absence of explicit scientific content, Goehring was pleased with the result. "It was great to see them take advantage of their artistic freedom to come up with something entirely their own," he says, adding that the young people nevertheless "clearly internalized the core concepts — the importance of disrupting uniformity, defining identity, rules". In that regard, he says that he sees aspects of the principles of developmental morphology reflected in the film.

Deconstructing Patterns showcases two other collaborations. In the more evocative of these, Australian artist Helen Pynor — a

biology graduate whose work explores, often viscerally, themes relating to living matter such as human organs — filmed Crick researcher Iris Salecker describing the development of the *Drosophila* neural circuitry for vision. Only Salecker's hands and arms are visible, and there is no soundtrack to explain what we're seeing. This silent, manual choreography is mesmerizingly beautiful. It also captures the eloquence and sophistication of the unconscious gesture — and the limitations of language alone for expressing scientific ideas.

“The scientific story is about the movement of things in space, and hard to convey in words,” says Pynor. Salecker's use of body and gesture, Pynor adds, “fills in some of the gaps, even metaphorically, between verbal language and spatial meaning”. Viewers learn nothing about fruit-fly vision from this film, but they do learn a great deal about the roles of spatial conceptualization and the sense of dynamic process involved in thinking about this complicated system.

As Pynor notes, science does not take place in some abstracted universe where the observers have a disinterested distance from their subject. Instead, as she puts it, “the love of scientists for their subject, the presence of their own bodies in dialogue with the bodies they study, and ... their aesthetic sensitivity, are all layered into their research”. Salecker, meanwhile, says the film revealed that her team's research is “in essence a 3D dynamic structural problem, and that we are limited by our imagery and language. This insight will influence how we present data in the future.”

The exhibition also brought together award-winning poet Sarah Howe, sound artist Chu-Li Shewring and Greg Elgar, former head of the Crick's Advanced Sequencing team. The team's quest to “find meaning in noise” had an obvious appeal to Shewring. Her installation allows viewers to experience a sound composition within acoustic “hoods” that are suspended from the ceiling; included is a reading of Howe's poem ‘A New Music’, inspired by conversations with Elgar.

“Alphabet of us, cipher deciding the exact moment genes flip on and where”, Howe's poem begins. The words, fugitive in Shewring's soundscape, suggest that representations of the genome are moving beyond the static, deterministic metaphors of a ‘book of life’. Shewring was keen to keep interpretation open and uncertain, aptly reflecting the dance between prescriptiveness and contingency in the dynamic unfolding of genetic information. As a first step towards a more sophisticated public image of the genome, I'll settle for that. ■

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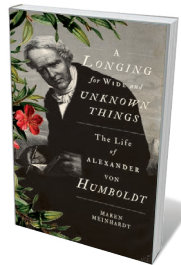
Books in brief



How to Fix the Future

Andrew Keen ATLANTIC (2018)

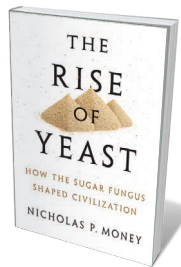
Silicon Valley insider Andrew Keen has long been calling out the “disturbingly centralized, unequal, and creepy” aspects of the digital revolution. In this acerbic, articulate global survey of human-centred solutions, he examines best practice in consumer choice, education, innovation, regulation and social responsibility. His journey takes in digital investor John Borthwick's call for antitrust regulation and “human-centric design”; lessons from China, Estonia and Singapore in how, or how not, to digitize; and distinct signs of cognitive clarity in no-tech schooling. An invigorating mix of principle and vision.



A Longing for Wide and Unknown Things

Maren Meinhardt HURST (2018)

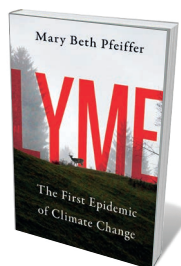
The heroic narrative is a poor fit for Alexander von Humboldt (1769–1859), argues Maren Meinhardt in her subtle biography. An editor at *The Times Literary Supplement*, Meinhardt paints the polymath as a creature of “contradictions and ambiguous achievements” firmly rooted in German Romanticism. Ever striving for the top, whether climbing Ecuador's Chimborazo mountain or writing *Cosmos* (1845), he often found his reach exceeding his grasp; even his personal life seems oddly indeterminate. An intriguing companion read to Andrea Wolf's *Invention of Nature* (Knopf, 2015; see *Nature* **525**, 31; 2015).



The Rise of Yeast

Nicholas P. Money OXFORD UNIVERSITY PRESS (2018)

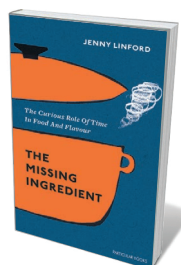
Yeasts are firmly embedded in the substrate of human culture. The sugar fungus *Saccharomyces cerevisiae* is, of course, central to the making of wine, beer, bread and biofuels; and other members of this unicellular eukaryotic clan are used as ‘lab rats’ in molecular genetics, or help produce drugs such as the antimalarial artemisinin. They're all over (and inside) us, too. Botanist Nicholas Money's effervescent tour is packed with delights, such as illustrations by Charles Tulasne, the “Audubon of fungi”, or the revelation that yeasts and humans share a common ancestor (and hundreds of genes).



Lyme: The First Epidemic of Climate Change

Mary Beth Pfeiffer ISLAND (2018)

“This is an illness that has been minimized, underestimated, and politicized.” Thus says investigative reporter Mary Beth Pfeiffer on Lyme, the tick-borne disease now on the march in North America, Europe and Asia. As Pfeiffer's hard-hitting study reminds us, non-specific symptoms and other complexities make tackling Lyme a formidable challenge (see also J. G. Logan *Nature* **552**, 174; 2017). She nimbly interweaves numerous strands of research — into the influence of climate change on the Lyme invasion, the disease, the pathogen, the vectors and the harrowing impacts borne by some sufferers.



The Missing Ingredient

Jenny Linford PARTICULAR (2018)

Time is the key ingredient in the culinary lab, argues Jenny Linford, cleverly reframing every step of the ‘food chain’ as poised on the clock's tick. From this perspective, we see classic veal stock as a 24-hour marathon, perfectly roasted coffee as a 4-minute drama and exquisitely fresh, consummately cooked sole as a mad sprint from boat to plate. Linford hardly draws breath as she zips from the time it takes for grated wasabi to develop its piquant kick (5 minutes) to the moment sauerkraut reaches peak fermentation. **Barbara Kiser**