

# Books & arts



*In Silico* focuses on Henry Markram's attempts to model rodent and human brains.

## In Silico

Director: Noah Hutton  
Sandbox Films (2020)

Kasparov in 1997 – simulate an entire rodent brain within a decade. He planned to build it from information about the brain's tens of millions of individual neurons.

Entranced, Hutton sought permission to film with the project annually over those ten years. He had no idea that he would end up tracking one of the twenty-first century's most explosive scientific ventures. Nor that the ten-year horizon would never get closer.

## Rise and fall

In 2010, the first year of filming, Hutton captures Markram's boastful mood: "I believe we will understand the brain before we even finish building it." In 2011, Blue Brain ran a simulation that for the first time generated something the team hadn't programmed – a wave that seemed to mimic the spontaneous, synchronized electrical activity in real brains. "This is it," gasps Markram.

But that year, Hutton also started to encounter critics in the neuroscience community. They claimed that the simulation project was premature because too little was known about the different types of neuron in the brain and how they were wired. Anyone can repair a broken watch by putting its known components in the right places, neuroscientist Zachary Mainen at the Champalimaud Centre for the Unknown in Lisbon, Portugal, tells the camera. Try this with the incompletely understood components of the brain, he says, "and you'll end up with a bunch of parts that doesn't tell the time".

As for that real-looking wave? Sebastian Seung, now at Princeton University in New Jersey, says: "How would you know if that activity pattern was right or wrong?"

When Hutton visited the next year, Markram ticked him off for contacting critics without informing him. The commission was deciding which two projects would become its billion-euro Future and Emerging Technologies Flagships and Markram didn't want any controversy to upset his chances.

The film suggests (as other commentators have) that Markram saw the flagship programme as a means to expand Blue Brain. But to win the money, it had to be more than that. He had to team up with top scientists in other European Union countries to present an interdisciplinary collaboration. He persuaded some initially sceptical cognitive neuroscientists to join. Their job, it was understood, would

## Implosion of a billion-euro brain model: the movie

Annual footage offers tantalizing glimpses inside a troubled European flagship project. **By Alison Abbott**

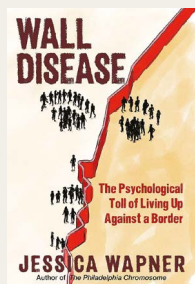
In October 2013, I attended the launch of the Human Brain Project in Lausanne, Switzerland, as correspondent for *Nature*. I hoped to leave with a better understanding of the exact mission of the baffling billion-euro enterprise, but I was frustrated. Things became clear the following year, when the project fell spectacularly, and very publicly, apart.

Noah Hutton's documentary *In Silico* captures a sense of what it was like behind the scenes of the project, which was supported with great fanfare by the European Commission. It had been hyped as a quantum leap in understanding how the human brain works. Instead, it left a trail of angry neuroscientists

across Europe. Yet aspects of what went so expensively wrong still remain elusive.

*In Silico* is more about the back story of the Human Brain Project (HBP). Hutton was 22 years old when he watched a 2009 talk by Henry Markram, the controversial figure who later became the first director of the HBP. Markram was speaking about the Blue Brain Project, a major initiative he had launched a few years before at one of Europe's top universities, the Swiss Federal Institute of Technology in Lausanne, with generous funding from the Swiss government. He claimed that he would – with the help of a supercomputer related to the one that beat world chess champion Garry

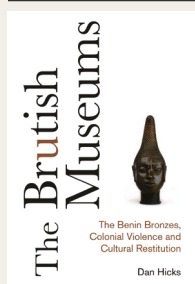
## Books in brief



### Wall Disease

Jessica Wapner *The Experiment* (2020)

Since the Berlin Wall fell in 1989, border walls have multiplied, notes science journalist Jessica Wapner in her compelling, dispiriting, global survey. In the decade after the September 2001 terrorist attacks, 47 appeared worldwide; Wapner investigates their geography and psychological effects. “Wall disease” — a translation of *Mauerkrankheit*, coined in 1973 by a former Berlin psychiatrist who had abandoned East Germany for the West — consists of fear, isolation, a sense of immobility, financial insecurity and suspicion of “the other” on the far side.



### The Brutish Museums

Dan Hicks *Pluto* (2020)

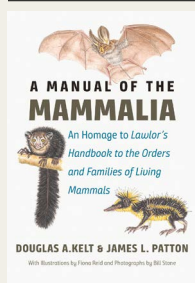
This timely book echoes the British Museum’s decision this year to redisplay a bust of its founder with labels about his links to the slave trade. Dan Hicks is a curator at the Pitt Rivers Museum in Oxford, UK, which, like the British Museum, holds many prized objects murderously looted by colonial forces in 1897 from Benin, in what is now Nigeria. Rejecting the view of Oxford colleague John Boardman that “the rape proved to be a rescue”, Hicks vehemently advocates that “brutish” museums urgently begin restitution of stolen objects.



### What Is a Complex System?

James Ladyman & Karoline Wiesner *Yale Univ. Press* (2020)

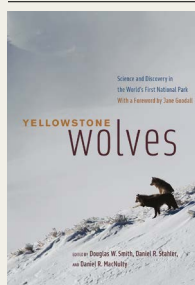
The Santa Fe Institute in New Mexico inaugurated the study of complex systems, but its founding workshops in 1984 did not define the topic. Even today there is no agreement on a definition, nor whether one is possible, remark philosopher of science James Ladyman and mathematician Karoline Wiesner. After a clear analysis of systems ranging from radiation to human brains, they conclude: there is no “single natural phenomenon of complexity”, but ‘complexity science’ does exist, rather than being “merely branches of different sciences”.



### A Manual of the Mammalia

Douglas A. Kelt & James L. Patton *Univ. Chicago Press* (2020)

The subtitle of this comprehensive, lavishly illustrated reference book terms it “an homage” to Timothy Lawlor’s acclaimed *Handbook to the Orders and Families of Living Mammals*, which was published in 1979, revised, but out of date following Lawlor’s death in 2011. As wildlife ecologist Douglas Kelt and mammal curator James Patton note, Lawlor’s final edition featured about 4,170 species of mammal; today’s figure is 6,495. “Do not be overwhelmed”, they advise students, “simply revel in the diversity that is the Mammalia.” **Andrew Robinson**



### Yellowstone Wolves

Eds Douglas W. Smith *et al.* *Univ. Chicago Press* (2020)

Twenty-five years ago, the authors reintroduced wolves to Yellowstone National Park in Wyoming — the first deliberate return of an apex carnivore to a big ecosystem. Here, they relate what they’ve learnt of the animals’ predation, mating, play, genetics, disease and more, and their impact on other species and the landscape. Also detailed are the fraught history, politics and implications of rewilding. Glorious pictures bear witness to fragile gains. US President Donald Trump’s silver-anniversary gift? Rolling back protections on the wolves. **Sara Abdulla**

be to ensure that brain simulations would be linked to behavioural outcomes, so they would always know whether any simulated activity was ‘right or wrong’. The film only scratches the surface of this thorny issue, although it is central to the scientific controversy.

What comes across more strongly is how Markram’s frequent overblown claims for the simulation projects — that they would obviate the need for animal experiments, for example — irritated many in the community. “Henry has two personalities,” says Christof Koch,

**“A fascinating window into the trouble grandiose projects and grandiose personalities can generate.”**

president of the Allen Institute for Brain Science in Seattle, Washington. “One is a fantastic, sober scientist ... the other is a PR-minded messiah.”

Markram’s answers to these charges on camera are often evasive; his critics, he says, simply don’t accept an unconventional way of doing science.

### Internal tensions

Early optimism is quickly strained, as project members are sidelined. Hutton returns to find that just nine months after the launch, Mainen and some colleagues had written a public letter calling on the commission to rethink the project, claiming that autocratic management was distorting its mission. The letter attracted around 800 signatories from neuroscientists globally. (Two years later, they set out an alternative approach in this journal: Z. F. Mainen *et al.* *Nature* **539**, 159–161; 2016).

By 2016, Markram had been removed from the leadership (see *Nature* <https://doi.org/fkqx>; 2015). The final two years of filming follow him back on Blue Brain. The simulation progresses, the 3D visualizations get more impressive, research papers emerge — but the project’s pep seems to drain away. Markram’s insistence that a complete brain simulation is still just ten years away sounds hollow. Meanwhile, the HBP continues with a more distributed, democratic structure.

*In Silico* is a fascinating window into the trouble grandiose research projects and grandiose personalities can generate, even if it fails to get to the heart of what specifically went wrong with the HBP. Hutton hints that the disputes were driven by money. I disagree; my sense is that it came down to leadership style and irresolvable differences in scientific opinion. There is a bolder, even more interesting, story waiting to be told.

**Alison Abbott** writes from Munich, Germany. e-mail: [alison.abbott.consultant@springernature.com](mailto:alison.abbott.consultant@springernature.com)