



Cliff Robertson as the title character in *Charly*, the 1968 film adaptation of *Flowers for Algernon*.

## IN RETROSPECT

# Flowers for Algernon

Ananyo Bhattacharya looks back at a science-fiction touchstone on the ethics of experimental biology.

By the time science-fiction writer Daniel Keyes died in 2014 at the age of 86, he had lived through vast upheavals in biomedical science, from the discovery of the DNA double helix to the sequencing of the human genome. But ethical oversight did not always keep pace. Keyes' novel *Flowers for Algernon*, 50 years old this year, highlights how often the need for oversight is ignored or flouted.

A case in point is a 1946–53 study conducted by Harvard University and the Massachusetts Institute of Technology, and sponsored in part by food conglomerate Quaker Oats. Dozens of boys with learning difficulties at the Walter E.

**Flowers for Algernon**  
DANIEL KEYES  
*Harcourt, Brace & World*; 1966.

Fernald State School in Waltham, Massachusetts, were fed cereals containing radioactive tracers to track how they absorbed iron and calcium. The boys were told only that they were joining a science club, and consent forms sent to their parents made no mention of radiation exposure. A US Department of Energy committee concluded in 1994 that it was “extremely unlikely” that the boys had been harmed by the radiation, but the disregard for their human rights is breathtaking. Other experiments, including some sanctioned by the US government,

were much more egregious. Hundreds of African-American men involved in the Tuskegee Syphilis Study in Alabama from 1932 to 1972 were never told that they had the disease; nor were they treated, despite the availability of penicillin from the 1940s.

The Tuskegee ‘experiment’ would never happen today, but the Massachusetts study’s more subtle transgressions — in failing to fully regard the participants as ends in themselves, rather than a means to achieve the researchers’ ends — remain relevant. It is this suppression of feeling for people and laboratory animals in the pursuit of scientific knowledge that Keyes captures in *Flowers for Algernon*.

Keyes’ novel, based on a short story that he published in 1959, follows 32-year-old Charlie Gordon, who agrees to have an experimental brain operation that may help him to overcome his severe learning difficulties and increase his intelligence (he has an IQ of 68). The only subject to have previously undergone the procedure successfully is a lab mouse named Algernon. After the operation, Charlie’s IQ rises rapidly; he soaks up new languages and knowledge of the arts and sciences. His journal entries, which make up the novel, chart his growing awareness of his own sexuality and emotions, particularly his feelings for his former teacher at the Beekman College Center for Retarded Adults.

More revealing of Keyes’ intent is the evolving relationship between Charlie and Algernon. At first resentful of Algernon’s superior intellect (the mouse easily beats him at navigating a maze), Charlie develops a strong bond with his fellow experimental subject. At the height of his genius, Charlie begins to investigate the experiment to advance the work. Soon realizing that it has flaws, he kidnaps Algernon to protect him. The regression that ends the book is so crushing that five publishers rejected the manuscript before it found a home. *Flowers for Algernon* became a best-seller (more than 5 million copies have been sold so far) and was adapted for the hit 1968 film *Charly*, starring Cliff Robertson. It still features in bioethics discussions.

Keyes had a degree in psychology and would later become a professor of creative writing at Ohio University in Athens. In between, he edited pulp magazine *Marvel Science Stories* and worked at Atlas Comics, the precursor to Marvel Comics. He also briefly taught English in New York City’s public-school system. The empathy that suffuses the novel stems from his experience of teaching children with learning difficulties. When one student returned to classes

after a long absence, Keyes noted that he had forgotten how to read. “He had lost it all,” Keyes said. “It was a heartbreaker.” His

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sympathy for Algernon seems to stem in part from dissecting a female mouse at university: Keyes was shaken when his incisions revealed “a cluster of tiny fetuses” in its uterus.

Despite his compassion for experimental subjects, human and animal, Keyes does not portray researchers as the evil geniuses of cultural cliché. Writing before modern ideas of informed consent were fully established in the late twentieth century, Keyes portrays the careerist psychologist Harold Nemur, who leads the trial, taking pains to get permission from Charlie's relatives to carry out the procedure. Neurosurgeon Jayson Strauss, who performs the operation, is concerned about Charlie's well-being throughout. What exercises Keyes is his scientists' failure to imagine Charlie as a whole human being before his intelligence-enhancing operation. Whereas

**“What exercises Keyes is his scientists' failure to imagine Charlie as a whole human being.”**

Charlie's appreciation of Algernon's ‘personhood’ only grows, Nemur is unable to view Charlie as anything other than a sort of benign Frankenstein's monster.

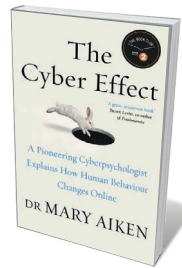
That hubris is sometimes evident today, when researchers fail to reflect fully on the consequences of their work (*S. Aftergood Nature* 536, 271–272; 2016). A crop of findings suggests that the well-being of laboratory rodents has not been sufficiently prioritized. For example, mice are housed at around 20 °C, cooler than their preferred temperature of 30 °C (see *Nature* <http://doi.org/bnh7>; 2013). Many lab animals are also overweight. As well as being bad for their welfare, there is evidence that such conditions may skew experimental results (*Nature* 464, 19; 2010).

This year, plans to make a synthetic human genome were criticized when discussions between more than 100 scientists took place behind closed doors and did not focus sufficiently on the proposal's ethical implications (*Nature* 534, 163; 2016). Another controversy centred on the widely used HeLa cell line, derived in 1951 from the cervical tumour that killed an African American woman, Henrietta Lacks. But she had never consented to such use. In 2013, the cell-line genome was published — without permission from Lacks's living relatives.

As the world enters the era of genome editing, it is tempting for scientists to monopolize the ethical debate once more. To avoid that temptation, researchers could do worse than turn to Keyes' astonishing *Flowers for Algernon*, a work that, tellingly, has never been out of print. ■

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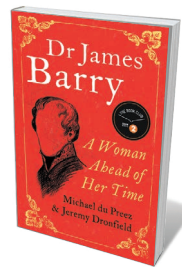
## Books in brief



### The Cyber Effect

Mary Aiken JOHN MURRAY (2016)

In this incisive tour of sociotechnology and its discontents, forensic cyberpsychologist Mary Aiken has much to say about children and the digital world. Parents addicted to mobile phones, for instance, fail to give babies the ‘face time’ they need to develop non-verbal communication skills; and the UK Association of Teachers and Lecturers has linked toddlers' tablet use with delays in speaking. With “compulsion loops” built into online games, and cybercommunities focused on extreme behaviours luring people in through online disinhibition, it's time for industrial accountability, she argues.



### Dr James Barry: A Woman Ahead of Her Time

Michael du Preez and Jeremy Dronfield ONEWORLD (2016)

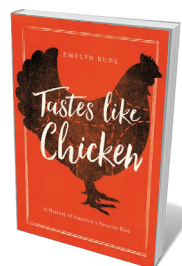
Over an illustrious career, Victorian surgeon James Barry became Britain's inspector-general of military hospitals, performed one of the first successful Caesarean sections in Africa and achieved the Crimean War's highest recovery rate. But under the overcoat, Barry was Margaret Ann Bulkeley, who with the complicity of her mother and radical friends defied the rules and studied medicine at the University of Edinburgh. Urologist Michael du Preez and writer Jeremy Dronfield have drawn on fresh archive material for this nuanced biography of a medic with a mind-blowing secret.



### Spare the Birds! George Bird Grinnell and the First Audubon Society

Carolyn Merchant YALE UNIVERSITY PRESS (2016)

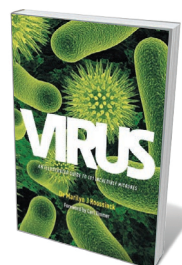
From a fashion for feathers to habitat loss, US bird-life in the late nineteenth century faced pressing threats, prompting naturalist George Bird Grinnell — who had ties to the family of ornithologist John James Audubon — to launch a society and magazine in the great man's name. Carolyn Merchant's lavishly illustrated environmental history analyses Grinnell's contribution, from biographical writings on Audubon to delightful field descriptions of birds he portrayed — noting, for instance, how cedar waxwings (*Bombycilla cedrorum*) aid in reforestation by excreting undigested cherry stones.



### Tastes Like Chicken: A History of America's Favorite Bird

Emelyn Rude PEGASUS (2016)

Andrew Lawler's 2014 *Why Did the Chicken Cross the World* (Atria; see *Nature* 515, 490–491; 2014) gave us a natural and cultural history of *Gallus gallus domesticus*, from its south Asian origins to global ubiquity. In a breezy narrative brimming with retro recipes, culinary historian Emelyn Rude focuses on the history of US chicken consumption, currently 8.6 billion birds a year. From New York immigrants' foul “ornithological parks” of the 1880s and 1890s to the rise in global demand — which can push production at the expense of animal welfare — Rude reveals chicken as a troublesome taste.



### Virus: An Illustrated Guide to 101 Incredible Microbes

Marilyn Roossinck IVY (2016)

Polio, Ebola, influenza — it's the viral villains that hit headlines, yet a number of viruses are benign. Environmental microbiologist Marilyn Roossinck sets the record straight with this stunning explication of 101 viruses that infect everything from humans to archaea. Along with basics on life cycles, transmission and more, Roossinck offers succinct descriptions, schematic drawings and a gallery of electron-microscopy images that have more than a passing resemblance to the paintings of Jackson Pollock and Wassily Kandinsky. **Barbara Kiser**