



## Autism

## Gut feelings

## Experiments on intestinal bacteria may point the way to a treatment for autism

AUTISM AFFECTS people's social behaviour and communication, and may impair their ability to learn things. All this is well known. Less familiar to most, though, are the gastrointestinal problems associated with the condition. The intestines of children with autism often harbour bacteria different from those in the guts of the neurotypical. As a consequence, such people are more than three times as likely as others are to develop serious alimentary-canal disorders at some point in their lives.

Unfortunate though this is, the upset gut floras of autistic people are seen by some investigators as the key to the condition—and to treating it. Recent research has shown that altering animals' intestinal bacteria can have dramatic effects on their nervous systems. Ameliorating autism by tinkering with the ecology of the gut might thus be a fruitful line of inquiry.

A study just published in *Neuron* suggests that it is. In it, Mauro Costa-Mattioli of Baylor College of Medicine, in Texas, and his colleagues demonstrate that introduc-

ing a particular bacterium into the guts of mice that display autistic symptoms can abolish some of those symptoms. The bug in question is *Lactobacillus reuteri*. It is commonly found in healthy digestive systems and helps regulate acidity levels. And it is also easily obtainable for use as a probiotic from health-food shops.

**Mens sana in corpore sano**

Dr Costa-Mattioli and his team first reported *L. reuteri*'s effects on autism in 2016, after conducting experiments with obese female mice. These animals have a tendency to give birth to offspring with autistic traits familiar from people—unwillingness to socialise, repetitive behaviour and un-

willingness to communicate (in the case of mice, via ultrasonic squeaking). The researchers noted that the guts of both the obese mothers and their young were bereft of *L. reuteri*. They wondered what effect transplanting these bugs into the animals might have. They found, when they did so to the offspring, that the youngsters' autism-like traits vanished.

That led to the latest experiments, on mice that have autistic symptoms induced in four other, different ways. Some were genetically edited to be autistic. Some were exposed to valproic acid, a drug used to treat bipolar disorder and migraines that is known to induce autism in fetuses. Some had their guts cleared of all bacteria. And some belonged to a strain called BTBR, individuals of which display autism-like traits that have no known cause.

Martina Sgritta, one of Dr Costa-Mattioli's colleagues, analysed the bacteria in the guts of all of these animals. She found that, while the genetically engineered mice and the BTBR mice had, as expected, reduced levels of *L. reuteri*, and those with bacteria-free guts were (obviously) free of the bug altogether, the valproic-acid mice had normal amounts of the bacterium.

This last result was unexpected, but the team carried on regardless. They arranged for between seven and 15 mice of each of the four types to have, starting at the age of three weeks, their drinking water laced with *L. reuteri*. Equivalent numbers of each ▶▶

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▶ type continued to be given ordinary water as a control. During the course of the experiment the mice had their faeces collected regularly, so that their bacteria could be tracked. And, at the age of seven weeks, they were given two sorts of social tests.

The first test involved putting each experimental mouse into a perspex container from which it could go either into a chamber where there was an empty wire cup or into one where there was a similar cup containing an unfamiliar mouse. Subject mice were left in the container for ten minutes and were monitored to see how long they spent with the empty cup and with the other mouse.

The second test placed a mouse in an arena where another, unfamiliar mouse was already present. An observer, who did not know which mice were controls and which had been given *L. reuteri* in their water, then noted how often over the course of ten minutes the two mice touched, sniffed, groomed and crawled on one another.

In both tests, all the mice that had had their water laced with *L. reuteri*, regardless of how their autism had been induced, were more sociable than equivalents that had been drinking unlaced water. In the first, they spent twice as much time with the mouse under the wire cup. In the second, they engaged in many more social interactions with the unfamiliar mouse.

The team's initial hypothesis had been that the supplementary *L. reuteri* were somehow changing the gut flora of the mice exposed to them into something more normal. But they weren't. Indeed, *L. reuteri* proved able to abolish autistic behaviour even in those mice which had guts otherwise devoid of microbes—as well as in those with valproic-acid-induced autism, which already had normal levels of the bug. That suggests boosting levels of this bacterial species is shaping behaviour all by itself.

Their next hypothesis was that the bacterium was doing this by interacting somehow with oxytocin, a hormone that shapes behaviour and plays a part in the ways in which people and other mammals form social bonds. Dr Costa-Mattioli knew from work published in 2013 that spraying oxytocin into the noses of mice with autistic symptoms helps to ameliorate some of those symptoms. Dr Sgritta therefore ran the experiments again, but this time on autistic mice that had had the oxytocin receptors on the relevant neurons disabled by genetic engineering. In these new experiments, the presence of *L. reuteri* in drinking water had no effect.

Follow-up examinations of the mice in all these experiments looked at the strengths of connections between nerve cells within part of the brain called the ventral tegmental region. This region regulates, among other things, motivation and

reward-related social behaviour. Nerve signals are carried by the movement of ions (electrically charged atoms), so the team were able to measure connection-strength by monitoring the flow of ions at the junctions between nerve cells in this region. Strong connections, with lots of ion flow, indicated that social experiences were rewarding. These were normal in the mice exposed to *L. reuteri*, which makes sense since animals treated with the bacterium sought out more social experiences. Conversely, weak connections (those with little ion flow) indicated that social experiences were not triggering a reward. Such weak connections were found in animals that had not been exposed to the bacterium.

The researchers suspected that such effects were controlled by signals from the gut that are being transmitted by the vagus nerve, which connects gut and brain. To test this idea they cut that nerve in selected animals. In these animals, subsequent treatment with *L. reuteri* failed to abolish their autistic symptoms.

The crucial aspect of this work is *L. reuteri*'s wide availability—an availability approved by regulators such as America's Food and Drug Administration. This existing approval, which means *L. reuteri* poses no known health hazard, simplifies the process of organising clinical trials.

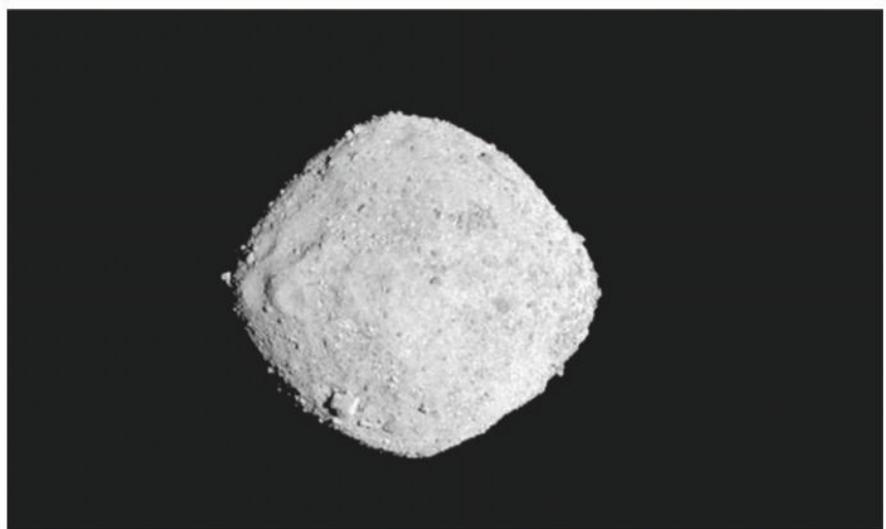
Clearly, autism in people is more complicated than a mere willingness to associate with others. And getting too excited

about a mouse trial is usually a mistake. But in Dr Costa-Mattioli's view his results, which have been replicated in part by Evan Elliot's laboratory in Bar-Ilan University, Israel, would justify embarking on at least preliminary trials intended to determine whether *L. reuteri* has positive effects on people with autism, and might thus be worth pursuing.

Others agree. Sarkis Mazmanian of the California Institute of Technology works in the same area. He says of these results: "I think the bar is now very low for getting this research moved on to human trials since most people already have these bacteria inside them and we know there are few, if any, safety or toxicity issues."

The general availability of *L. reuteri* does, however, bring with it another possibility—that people will conduct their own, "off label" trials, either on themselves or on their children. Dr Mazmanian is cautious about that idea. "I don't know if there is a barrier to people buying and using this stuff now. It may be strain-specific and the paper does not state which strain or strains were used," he says.

At the moment, Dr Costa-Mattioli is unwilling to divulge that information. He is expecting to publish another paper soon, though, with more details. In practice, it may be hard to discourage people from testing *L. reuteri*'s effects themselves. All the more reason to do properly conducted trials quickly. ■



### Hello to Benu

Another stamp has just been added to the album of objects in the solar system visited by space probes. Benu, pictured, is an asteroid that orbits the sun at approximately the same distance as Earth. This proximity, plus spectral analysis of its chemical composition (carbon-rich), radar analysis of its surface (smooth) and telescopic analysis of its spin rate (slow), made it the target of choice for a sample-return mission. That mission, OSIRIS-Rex, arrived on December 3rd. After an extensive inspection from an altitude of a few kilometres, OSIRIS-Rex will, in July 2020, swoop down and grab about 60 grams of material from the surface. It will leave Benu in March 2021 and deliver the sample to Earth, in a special landing capsule, in September 2023.

## Eradicating polio Stalled

### Vaccine-derived polio viruses are a growing worry

IN 1988 A world emboldened by the eradication of smallpox set its cross-hairs on polio. The aim was to enter the new millennium without this crippling virus. But the battle drags on. On November 30th an emergency committee on the global spread of polio, appointed by the World Health Organisation (WHO), delivered its latest verdict. Eliminating polio has become what Michel Zaffran, director of polio eradication at the WHO, calls a “dual emergency”.

The first is the stalled progress on wiping out wild polio viruses in their last two strongholds, Afghanistan and Pakistan. The world’s steady countdown to zero since 2012 has stopped, with cases this year already surpassing those in 2017 (see chart). As a consequence there are worries that polio may travel back to countries which have already eradicated it, like India.

The second emergency is the growing number of countries with cases of the disease that have been caused by a polio vaccine. These are still rare. But they are attracting more notice as those caused by the wild virus itself have dwindled. In 2017 cases caused by vaccine-derived viruses overtook, for the first time, those caused by the wild version.

Polio vaccines come in two forms. The injectable version, which rich countries use, contains dead viruses and creates antibodies in the blood. Someone vaccinated with it who ingests the wild virus (say, by drinking contaminated water) is protected from the disease. But, for several weeks afterwards, the wild virus in his gut can be passed on to people who are not immune.

The oral vaccine, by contrast, contains weakened live virus. Because the antibodies it creates take up residence in the gut, they battle there with any wild virus a vaccinated person ingests, making further transmission less likely. The oral vaccine is thus a better option where wild polio viruses roam and vaccination rates are low—which has been the case in poor countries.

The oral vaccine has another benefit. Someone vaccinated with it excretes the weakened form of the virus for a couple of weeks. Anyone who comes into contact with this excreted virus also gains immunity, and can pass it on further, to others who are not immune. In places with poor sanitation, this sort of passive vaccination is a boon—but only up to a point. As the weakened virus from the vaccine jumps from one unvaccinated person to another,

## The composition of the universe Still in the dark

### A persistent claim to have detected dark matter looks wrong

NEGATIVE RESULTS are rarely reported widely. But they can be important. And this week sees one such—the possible demolition of what had been thought to be a sign of dark matter.

Twenty years ago results from DAMA, a particle detector housed under a central-Italian mountain, suggested that this mysterious stuff, thought to make up 85% of all matter in the universe, had been detected. DAMA’s operators saw an oscillating signal, peaking in June and at its lowest ebb in December, which was consistent with the Milky Way being embedded in a halo of dark matter. Because Earth’s axis of rotation is tilted with respect to the disc of the Milky Way, the flow of dark matter through the planet should vary seasonally as it orbits the sun. Calculations suggest the dark-matter flux should reach a maximum in early summer and a minimum in winter, which is what DAMA found.

DAMA has continued to gather data—and more than two decades later and after numerous upgrades researchers there continue to see their cyclical sig-

nal. In the meantime, none of the other detectors set up to find dark matter has caught even a whiff of the stuff. But because these searches are conducted in ways different from DAMA, their results might somehow be explained away. So, in an effort to replicate precisely what DAMA does, yet more experiments have been set up, this time using the same detector material—crystals of sodium iodide, which should flash if dark-matter particles collide with them.

This week, one such experiment, COSINE-100, in the Yangyang Underground Laboratory, in South Korea, reports in *Nature* an analysis of data taken during its first two months of operation. Though not definitive (which would require a full year’s data) this analysis suggests that the average signal over the collection period, minus noise such as that caused by the radioactive decay of the surrounding rock, leaves little room for a dark-matter signal akin to that at DAMA. The search, therefore, continues—as does the mystery about dark matter’s true nature.

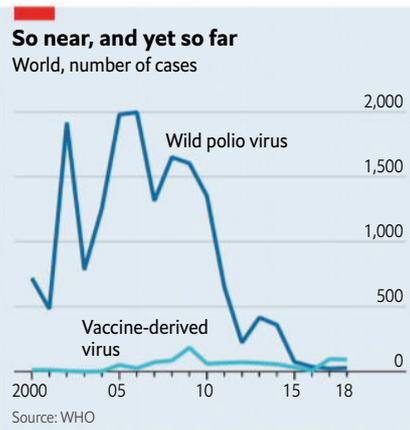
the chances increase that something will go wrong. Along the way, the virus mutates and, after a year or so, can turn into a paralytic form that resembles the wild virus.

Of the three strains in which poliovirus exists, type 2 is most adept at this trick. It causes more than 90% of paralytic polio cases from mutated oral-vaccine strains. So when, in 2015, the wild type 2 polio virus was declared eradicated, it made sense to stop vaccinating people against it. In 2016, in a co-ordinated switch that took place over the course of two weeks, 155 countries replaced their stocks of oral polio vaccine

containing all three strains with a version that does not include the type 2 strain. To protect people from any type 2 vaccine-derived virus still circulating, the injectable vaccine was added to routine immunisation schedules in these countries.

Yet last year type 2 viruses derived from the oral vaccine caused cases of polio in Syria and the Democratic Republic of Congo (DRC). This year cases emerged in Nigeria, Niger, Somalia and the DRC—a sign that gaps in vaccination coverage are widespread. Genomic analysis of the strains involved showed that they had crossed borders (rare for vaccine-derived strains) and that some had circulated undetected for as long as four years. Health officials worry that the outbreaks in Somalia, in particular, may spread to neighbouring countries.

That is a setback for Africa. The last person on the continent paralysed by the wild polio virus was a Nigerian child who contracted the disease in 2016, so Africa has probably already eradicated the wild virus. The outbreaks are also a sign that polio’s grand finale may be more drawn out than even pessimists expected. When wild polio virus disappears, the oral vaccine will be replaced with the injectable vaccine. How long such jabs will be needed to guard against remnants of vaccine-derived polio is anybody’s guess. ■





Belgium's Africa Museum

## The burden of history

TERVUREN

A revamped museum endeavours to tell the vexed story of colonialism

IT IS A magnificently bizarre hybrid. Still officially called the Royal Museum for Central Africa, but better known as the Africa Museum, it cannot help but ooze colonial triumphalism, despite recent protestations of egalitarian diversity. Housed in a majestic purpose-built palace 20 minutes' drive east of Brussels, it stands above a lake amid parkland. Immaculate gravel paths sweep around the site. However radically the interior may have been refashioned to reflect new attitudes to Africa, the grandeur of King Leopold II's design and the fervour of his desire to promote his imperial venture into the continent's heart still overwhelm the visitor. The monarch ruled Congo as a private estate nearly 80 times bigger than his European homeland from 1885 until a year before his death in 1909; his double-L motif is embossed on almost every wall and above many an alcove.

Short of knocking the entire edifice flat, the museum's current regime, run since 2001 by Guido Gryseels, a 66-year-old agricultural expert, has spent the past five years behind closed doors seeking to put a modern imprint on an irredeemably archaic structure. It reopens on December 9th. "We'll be criticised on both sides," predicts Mr Gryseels, who, like many modern museum bosses, is perforce a canny diplomat.

"For not going far enough and for being too politically correct."

The result is a brilliant, weird, tantalising hotch-potch of old and new. A glass oblong now encases a new entrance, restaurant, conference hall and auditorium a stone's throw from the main building, to which it is connected by an underground tunnel-cum-gallery painted in bright white that hosts a huge dug-out canoe carved out of a single tree. On the other side of the main palace, a separate pavilion, a century old, still houses a library holding the archive of Henry Morton Stanley, the Victorian explorer commissioned by Leopold to advance the king's imperial interests ahead of his European rivals.

Whether the colonial enterprise is now deemed a source of national shame or pride, the sheer wealth and variety of the treasures within are a marvel. "It's probably the largest museum of its kind in the world," says Mr Gryseels. "It has 125,000 ethnographic items, 10m zoological ones, 6m insects, 8,000 musical instruments, 200,000 rock samples, 3,000 historical maps, 4km of archives..."

Unsurprisingly, the most controversial issue is how to present history. Leopold's regime is now widely condemned as one of the cruelest in colonial Africa, with forced

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labour akin to slavery and horrifying punishments such as the amputation of hands. Mr Gryseels is unequivocal. "Colonialism as a system of governance is now considered immoral, authoritarian, racist, based on military occupation and exploitation," he says, while acknowledging beneficial "individual contributions in such things as medicine and education". The museum's new message is broadly damning.

But its original one cannot be physically expunged. Late-19th-century maps of the Congo are encrusted on the walls, along with an honorific granite mural naming 1,600 Belgians who died on service for the king during his quarter-century of predation. A central rotunda still contains four famously controversial statues depicting white men clad in gold-painted raiment in arrogantly paternalistic postures. Captions hail their mission to bring "high civilisation" to the benighted natives, who gaze up gratefully at their mentors. Just as controversially, a gallery devoted to natural resources asks, in Mr Gryseels's words, "why, if Africa is so rich, is it still so poor?"

### Leopold and his ghosts

Belgium took longer than other European powers fully to acknowledge the dark legacy of colonialism. A third of white Belgians are thought to have family or business links to Congo or the other two former Belgian dependencies, Rwanda and Burundi. A society of veterans still battles fiercely to defend the reputation of Leopold and the colonial achievement in general. In particular, it points out that since Congo became independent in 1960 it has suffered under almost unparalleled misrule and misery.

Activists in Belgium's lively Congolese ►►

community, however, largely blame the colonialists for leaving the locals ill-prepared to govern and, among other crimes, for conniving in the assassination of Congo's first prime minister, Patrice Lumumba. Representatives of the diaspora have advised the museum on the revamp. Contemporary as well as ancient ethnic Congolese art is handsomely displayed. Colonial interpretations and prejudices that previously underscored the items on show are rigorously explained in a light more sympathetic to the indigenous people.

Still, some diaspora voices say that they have been ignored. Some resent the notion that their ancestors are depicted in galleries that elsewhere exhibit stuffed animals—invoking (they say) the shocking memory of 1897, when 267 Congolese were brought over to be shown off in a human zoo, seven of them dying in the unfamiliar climate. "Africans are not study objects but people," Anne Wetsi Mpoma, an art historian in Brussels, has pointed out.

Such resentments have sharpened since last year when France's president, Emmanuel Macron, denounced the acquisition of African art now lodged in French and other European museums and declared that it should be given back. "The African heritage cannot be a prisoner of European museums," he said. A report he commissioned, written by a Senegalese economist, Felwine Sarr, and a French art historian, Bénédicte Savoy, issued its verdict on November 23rd. It concluded that a first tranche of 26 outstanding items should be given back immediately, another lot within five years, and the rest in due course, either on loan or permanently, once their provenance is properly established. Some 90,000 ethnographic and other African items, the report noted, adorn France's premier African collection, the Musée du Quai Branley in Paris. It implies that most such treasures were taken "by theft, looting, spoils [of war], trickery and sales under duress".

### Finders, keepers

African activists calling for mass restitution tend to affirm that virtually all art brought from Africa in the colonial era was acquired immorally. Some, such as the glorious Benin bronzes—seized on a British expedition to what is now Nigeria in 1897—were patently looted. Others were doubtless stolen or locals bamboozled or persuaded to sell under duress. But who can say definitively how each such transaction was conducted? Nor is it clear to whom the artefacts should be returned. Royal or chiefly families, tribal communities, churches, states that did not then exist in their modern form—each may have competing claims.

Hartwig Fischer, who runs the British Museum (where many of the bronzes are

**North of Dawn.** By Nuruddin Farah. *Riverhead Books*; 384 pages; \$27

OVER A DOZEN novels and almost five decades, the Somali writer Nuruddin Farah has chronicled the effects on ordinary lives of his country's upheavals. Some of his characters stay put amid the turmoil; others return from exile and try to fit in, remain afloat and make sense of the chaos around them. "Hiding in Plain Sight", published in 2014, took a different tack, focusing on a Somali woman who leaves Italy, her adopted home, to care for the children of her murdered half-brother in Kenya. Now, in "North of Dawn", Mr Farah charts the fortunes of a Somali family who leave Kenya for Europe.

In this absorbing story, the stakes are



Brave new worlds

held), says it and other European institutions have been discussing long-term loans to African museums. Yet in previous instances some proved ill-equipped to look after such valuables. In 1977 the Belgian government, seeking to improve relations with Congo's venal president, Mobutu Sese Seko, returned a trove of exquisite items. Almost all rapidly disappeared or were sold off on the international market. No matter, argue some in the Congolese diaspora. Their view is that what happens to re-

Somali fiction

## Home fires

raised. Mugdi and Gacalo feel their safe world implode when their Norwegian-raised son returns to Somalia, embraces jihadism and kills himself in a suicide attack. The couple argue about whether to offer sanctuary to his widow and two stepchildren. Gacalo wants to fulfil a promise of care she made before her son's death. Mugdi frets that his daughter-in-law may turn out to be "a troubled person, or, even worse, a terrorist".

In the end Mugdi relents, and Waliya, her daughter Saafi and son Naciim swap their zinc-sheet shack in a Kenyan refugee camp for an apartment in Oslo. After teething problems—"this fellow has a lot to unlearn," says Mugdi of his grandson—the children acclimatise, assimilate and grow to love their grandparents and to relish their newfound freedoms.

Their mother goes the opposite way. She rails against Western values and refuses to work, learn or integrate. Instead she fraternises with an outspoken imam and his radical deputy. Mugdi and Gacalo begin to worry about her connections, and, when she is questioned by an antiterrorist unit, her intentions.

Throughout the novel, from its shock opening to its bitter end, Mr Farah shines a searching light on family unity and national identity, examining what binds and what divides. There are glitches along the way. In places the prose is strident or ponderous. Some of the voices are undifferentiated; for the first half of the book Naciim sounds more like his grandfather than a 12-year-old boy.

But when Mr Farah's characters ring true, his novel soars. Along with family friction and cultural clashes he rigorously explores migration and extremism, and provides a wealth of insight into Somalia and "Somaliness". As one character explains: "you can't do well in a new country if you don't have a good measure of the one you left behind."

turned art is no concern of outsiders. It should go back to Africa forthwith.

For his part, Mr Gryseels is wary of Mr Macron's initiative. "It's a very complex issue," he says. The wrangle is likely to be as prolonged as the reckoning that Belgium, and the Africa Museum, are conducting with their pasts. "The museum's decolonisation will take time," says Ayoko Mensah, a Franco-Togolese member of a group that has advised on the renovation. "But it's well and truly on the march." ■

## Artificial intelligence in the ancient world

From Talos to  
"Terminator"

**Gods and Robots: Myths, Machines and Ancient Dreams of Technology.** By Adrienne Mayor. Princeton University Press; 288 pages; \$29.95 and £24

AS JASON AND the Argonauts sailed home with the Golden Fleece, they stopped to rest by the island of Crete and found themselves under attack by a giant robot. Designed by the god Hephaestus to protect the realm of King Minos, this bronze android, called Talos, was built to repel invaders by hurling rocks at any foreign ships that approached. The sorceress Medea saved the day, mesmerising the robot using her mind-control powers and then removing a bronze rivet from his ankle, causing the life fluid to drain away.

This ancient myth raises several surprisingly modern-sounding questions about Talos's nature. He is described as an automaton, a constructed being. Yet if Medea's mind-control powers affect him, surely that suggests that he has a mind, and is more than a mere machine? Talos is sometimes depicted as a tragic figure, condemned for blindly following his programming, like HAL, the murderous supercomputer in "2001: A Space Odyssey". His story can also be read as a cautionary tale about the dangers of giving machines the power to kill when they lack the capacity to make moral judgments.

On close inspection, ancient mythology turns out to be chock-full of robots, androids and mechanical creatures. As well as Talos, Hephaestus created a quiver of drone-like arrows that could never miss, a mechanical dog that always caught its prey, a pair of fire-breathing bronze bulls and a fleet of self-driving cauldrons that acted as butlers to the gods, serving them nectar and ambrosia. The "Odyssey" describes autonomous, crewless ships that work in any weather and can find their way to any port. Pygmalion fell in love with an artificial woman he had created. Mechanical beasts and realistic, moving statues were attributed to the mythical inventor Daedalus.

Adrienne Mayor entertainingly re-examines the various versions of these myths that survive in written and visual form and speculates about their origins. Talos may have been inspired by the large stone figures made by the Nuragic people of Sardinia, for example, who were famed metallurgists; Greek statues were painted to look more lifelike, so adding mechanisms to make them move was an obvious next step. Ms Mayor demonstrates how these myths

prefigure modern science-fiction stories such as "Metropolis", "Blade Runner" and "Terminator", and connects them to modern debates about machine intelligence, autonomous weapons, human augmentation and artificial life. Aristotle pondered the use of machines in place of slaves and the prospect of technological unemployment; Pygmalion built the first sexbot.

The focus is mainly on Greco-Roman sources, though Etruscan, Persian, Hindu and Buddhist stories also make appearances, including the rich medieval tradition of the "Alexander Romance". A Persian tale tells of a 1,000-strong troop of fire-breathing mechanical cavalry, supposedly built for Alexander the Great at the suggestion of his vizier Arastu (Aristotle) and sent

into battle against the war elephants of Porus of India. Lively digressions on Alexander's adventures in a diving bell, or on the development of Greco-Roman torture instruments, are entertaining, even if they deviate somewhat from the author's central theme.

Ms Mayor ends with a survey of actual (rather than mythical) ancient automata built by historical figures such as Heron of Alexandria and Philo of Byzantium, to illustrate how, then as now, speculative narratives and real technologies can co-evolve and inspire each other. The inescapable conclusion is that when it comes to modern debates about robots and machine intelligence, as with so many other things, the Greeks got there first. ■

## Roman history

## To bury, not to praise

## Lessons from the self-inflicted demise of a great republic

SHAKESPEARE MISSED a trick. His version of Julius Caesar's funeral does, admittedly, have its moments. But he might have done even better had he read his Appian. For while the Bard's version musters oratorical verve, the historian's offers a coup de théâtre, complete with the astute use of props, sightlines and stagecraft.

Before the funeral, well aware that Caesar's corpse would be obscured by the throng, a wax cast of the body was prepared, with each of the assassins' blows

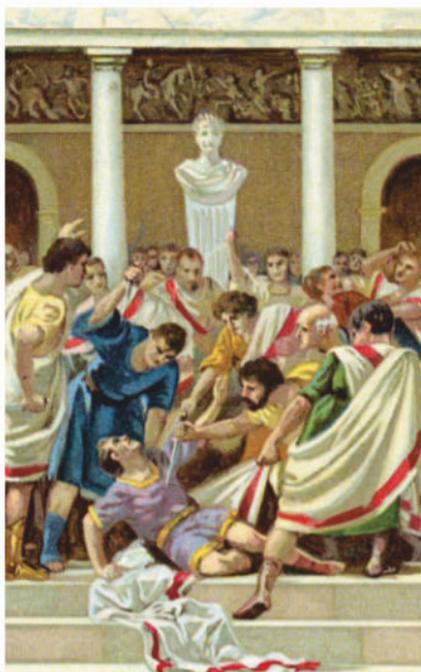
**Mortal Republic: How Rome Fell into Tyranny.** By Edward Watts. Basic Books; 352 pages; \$32. To be published in Britain in March; £25

marked on it clearly. This was then erected above Caesar's bier. As the Roman people filled the Forum, a mechanical device rotated the model slowly, revealing the 23 "gaping" wounds to everyone. The crowd, as they say, went wild.

Caesar's reign—and its bloody end and bloodier aftermath—would later come to be seen as a turning point in the history of Rome. And indeed it was, but as Edward Watts points out in "Mortal Republic", the Republic had been in its death throes for decades. The decline was caused less by gaping wounds than gaping inequality, and by leaders unable or unwilling to remedy it. If that syndrome sounds familiar, it is meant to. Mr Watts says inquiries about how antiquity can illuminate the "occasionally alarming political realities of our world" prompted his reflections.

This ominously titled book is his response, furnished with such nudgingly apposite chapters as "The Politics of Frustration" and "The Republic of the Mediocre". His gambit isn't new: the classical world is often used as a lens through which to examine modernity. Want to understand China? Read Thucydides. Need to know about Afghanistan? Best study Plutarch. This trick can easily go awry: the past was not just the present in togas, as some historians would do well to remember. But Mr Watts pulls it off deftly.

He begins by taking the reader on a brisk ▶▶



The road to ruin

► march through Roman history. The Republic's early citizens were legendarily hardy. In the late third century BC, faced with multiple threats, Rome entered a state Mr Watts describes as "an ancient version of total war". Two-thirds of the male citizen population between 17 and 30 years old were enrolled in the army, ready to die for Rome. And die they did, cut down in battle after battle like fields of wheat. During one engagement with Hannibal, tens of thousands were killed. The Roman response was to regroup—and win.

Such sturdiness didn't last. By the sec-

ond century BC, the formerly united Republic had been split into two factions—not by war but by wealth. On one side was a class of "superwealthy Romans", enriched by military conquest and growing financial sophistication. They dined off silver plate, ate imported fish, drank vintage wine and holidayed in extravagant Mediterranean villas. One of the most powerful was Crassus, a man who made his fortune in unscrupulous property deals, then used that money to buy political influence.

Yet while some Romans swilled from ornate goblets, the majority drank a more

bitter draught. They endured a life of back-breaking work and the knowledge that they would almost certainly end up poorer than their parents. Such a situation could hardly last—and didn't.

What remains one of the world's longest-lasting republics fell by the end of the first century BC, to be replaced by autocracy. Rome had defeated its enemies abroad but, argues Mr Watts, it was undone from within by greed and inequality—and by the sort of politicians "who breach a republic's political norms", plus "citizens who choose not to punish them". ■

## Johnson Signs of the times



*The lexicon of 2018 is depressing. But the buzz words won't last*

CAMBRIDGE DICTIONARY recently selected "nomophobia" as its word of the year, via a poll of readers. Those lucky enough not to have heard of this condition are nonetheless probably familiar with its symptoms: it refers to the fear of not having your mobile phone. The choice seems almost quaint; the concept is neither peculiar to 2018 (it is years older than that) nor especially hot. Your columnist had never heard of the term before the announcement.

But it says a lot that the selection is one of the least depressing made for 2018, another year in which the most notable new or newly zeitgeisty English words correspond to a wave of insults and anxieties in the Anglophone world. Collins, another dictionary publisher, chose "single-use" as its word of the year, referring to disposable plastics that make their ways into landfills and seas. Britain in particular is newly conscious of such noxious rubbish after the success of "Blue Planet II", a BBC documentary series about the oceans.

From there things get more poisonous still. Oxford Dictionaries chose "toxic" as its emblem for 2018. That word has come to be attached to many others: toxic masculinity, toxic homosociality (male bonding through awful behaviour), toxic debates over things like transgender rights. And Oxford's short-list of other contenders was nearly as bleak. It included "gaslighting" (trying to make someone doubt their own memory or even sanity) and "ince!" (self-described "involuntarily celibate" men, an increasing number of whom have taken to violence).

A kind of opposite of "toxic" has also had a big year: fragility, as in "white fragility". This refers to the inability (or alleged inability) of whites to handle

claims of racism perpetrated against non-whites, so that they panic when the subject is brought up, shutting down discussions about discrimination, privilege and worse. Coming out of the academic school of "critical race theory", white fragility has given birth to "male fragility", "cis fragility" (on the part of people who are not transgender), and so on.

Dictionary.com made an interesting choice with "misinformation" as its word of the year. Why not "disinformation"? One editor explained that disinformation refers to an intentional effort to spread lies; misinformation is the spreading of false information with or without that intent. In other words, Russian troll farms engage in disinformation; when unwitting Americans share those posts, that's misinformation—which, in the end, is the bigger problem. This, too, feels older than 2018, though. "Post-truth" was Oxford's pick in 2016.

Several other groups are yet to name their words of the year. What else might they consider? Brexit was a source of many new words or applications. The "backstop"

meant to prevent the reimposition of a hard border in Ireland is a new use for an old word. "Gammon" as a way of insulting older red-faced male Brexit supporters has the virtue of being creative, and the downside of being a sneer based on skin colour. "Cakeism" might be the most useful. After Boris Johnson, one of Brexit's figureheads, declared that he was "pro having [cake] and pro eating it", cakeism has neatly summed up Brexiters' refusal to face trade-offs.

American politics has seen words rapidly changing in their valency after being coined by adherents of one party and then being adopted and flipped by the other. In 2016 "fake news" meant news that was fake; Donald Trump seized on that and distorted it to mean true news he didn't like. Hillary Clinton ill-advisedly referred to "deplorables" among Mr Trump's supporters during their presidential contest; his fans eagerly adopted the name. American conservatives taunt left-wing youth as "snowflakes", a name they have in turn reappropriated with Twitter handles like "Iron Snowflake". Those who voted for Remain in Brexit have done the same with "Remoaner".

So if there is any good news in the cascade of abuse it is that, like so much slang in circulation today, any word popular enough to sum up the mood of a year will saturate social media so quickly that it will soon lose its bite. Or it might be ironically appropriated by the very people it was meant to insult—an old phenomenon, but now manifest at breakneck speed. Social-media tastemakers prize playfulness, ironic detachment—and novelty. In other words, if you are depressed by the vituperations of 2018, be consoled. Most will seem old in 2019, and be history by 2020.

