The Problem With Antibiotics [C1]

La loro scoperta ha contribuito a una società più sana e longeva, ma ne abbiamo abusato pericolosamente. È possibile usarli in modo sostenibile prima che sia troppo tardi?

In 1954, just a few years after the widespread introduction of antibiotics, doctors **were already aware** of the problem of resistance. Natural selection meant that using these new medicines gave an advantage to the microbes that could survive the assault — and a treatment that worked today could become ineffective tomorrow. A British doctor put the challenge in military terms: “We may **run clean out** of effective ammunition. Then how the bacteria and **moulds** will **lord** it”. More than seventy years later, that concern looks **prescient**. The UN has called antibiotic resistance “one of the most urgent global health threats.” Researchers estimate that resistance already kills more than a million people a year, with that number **forecast** to grow. And new antibiotics are not being discovered fast enough; many that are essential today were discovered more than sixty years ago. The thing to remember is that antibiotics are quite **unlike** other medicines. Most drugs work by manipulating human biology: paracetamol relieves your headache by **dampening** the chemical signals of pain; caffeine blocks adenosine receptors and as a result prevents **drowsiness** **taking hold**. Antibiotics, meanwhile, target bacteria. And, because bacteria spread between people, the challenge of resistance is social: it’s as if every time you took a painkiller for your headache, you increased the chance that somebody else might have to **undergo an operation** without anaesthetic. That makes resistance more than simply a technological problem. But like that British doctor in 1954, we still often talk as if it is: we need to invent new weapons to better defend ourselves. What this **framing** **overlooks** is that the extraordinary power of antibiotics is not **due to** human **ingenuity**. In fact, the majority of them derive from substances originally made by bacteria and **fungi**, evolved millions of years ago in a process of microbial competition. This is where I can’t help thinking about another natural resource that helped create the modern world but has also been dangerously **overused**: fossil fuels. Just as Earth’s geological forces turned dead plants from the Carboniferous era into

layers of **coal** and oil that we could burn for energy, so evolution created molecules that scientists in the 20th century were able to recruit to keep us alive. Both have offered an illusory promise of cheap, miraculous and never-ending power over nature — a promise that is now coming to an end. If we thought of antibiotics as the fossil fuels of modern medicine, might that change how we use them? And could it help us think of ways to make the fight against life-threatening infections more sustainable? The antibiotic era is less than a century old. Alexander Fleming first noticed the activity of a strange mould against bacteria in 1928, but it wasn't until **the late 1930s** that the active ingredient — penicillin — was isolated. A daily dose was just 60mg, about the same as a **pinch** of salt. For several years it was so **scarce** it was worth more than gold. But after production was scaled up during the Second World War, it ended up costing less than the bottle it came in. This abundance did more than **tackle** infectious diseases. Just as the energy from fossil fuels transformed society, antibiotics allowed the entire edifice of modern medicine to be built. Consider surgery: cutting people open and breaking the protective barrier of the skin gives bacteria the chance to **swarm into** the body's internal **tissues**. Before antibiotics, even the simplest procedures frequently resulted in fatal **blood poisoning**. After them, so much more became possible: heart surgery, intestinal surgery, transplantation. Then there's cancer: chemotherapy suppresses the immune system, making bacterial infections one of the most widespread complications of treatment. The effects of antibiotics have **rippled out** even further: they made factory farming possible, both by reducing disease among animals kept in **close quarters**, and by increasing their weight through complex effects on metabolism. They're one of the reasons for the huge increase in meat consumption since the 1950s, with all its **concomitant** welfare and environmental effects. Despite the crisis of resistance, antibiotics remain cheap compared with other medicines. Partly — as with fossil fuels — this is because the negative consequences of their use (so-called externalities) are not **priced in**. And like **coal**, oil and gas, antibiotics lead to pollution. One recent study estimated that 31 per cent of the forty most used antibiotics worldwide enter rivers. Once they're out there, they increase levels of resistance in environmental bacteria. One study of **soil** from the Netherlands showed that the incidence of some antibiotic-resistant

genes had increased by more than fifteen times since the 1970s. Another source of pollution is manufacturing, particularly in countries such as India. In Hyderabad, where factories produce huge amounts of antibiotics for the global market, scientists have found that the **wastewater** contains levels of some antibiotics that are a million times higher than elsewhere. Like the climate crisis, antibiotic resistance has **laid global inequalities bare**. Some **high-income** countries have taken steps to decrease antibiotic use, but only after benefiting from their abundance in the past. That makes it hard for them to **take a moral stand** against their use in other places, a dilemma that mirrors the situation faced by post-industrial nations **urging** developing nations to **forgo** the economic benefits of cheap energy. This may be where the similarities end. While we look forward to the day when fossil fuels are **phased out** completely, that's clearly not the case with antibiotics. After all, most deaths from bacterial disease worldwide are **due to** **lack** of access to antibiotics, not resistance. What we are going to need to do is make our approach to development and use much more sustainable. Currently, many pharmaceutical companies have abandoned the search for new antibiotics: it's hard to imagine a more perfect anti-capitalist commodity than a product whose value **depletes** every time you use it. That means we need alternative models. One proposal is for governments to fund an international institute that develops publicly owned antibiotics, rather than relying on the private sector; another is to incentivise development with generously funded prizes for antibiotic discovery. And to address the issue of overuse, economists have suggested that health authorities could run subscription models that remove the incentive to sell lots of antibiotics. In one **pilot scheme** in England, two companies are being paid a set amount per year by the **NHS**, **regardless** of how much of their product is actually used. Finally, we have to remember that antibiotics **aren't the only game in town**. Supporting other, renewable approaches means we get to use the ones we do have for longer. Vaccines are vital to disease prevention — with every meningitis, diphtheria or **whooping cough** vaccine meaning a potential course of antibiotics **forgo**ne. And the 20th century's largest reductions in infectious disease occurred not because of antibiotics, but thanks to better **sanitation** and public health. Just as we no longer burn **coal** without a thought for the consequences, the era

of **carefree** antibiotic use is now firmly in the past. In both cases, the idea that there wouldn't be a **reckoning** was always an illusion. But as with our slow waking up to the reality of the climate crisis, coming to appreciate the limits of our love affair with antibiotics may ultimately be no bad thing.

Published in The Guardian on 17 August 2025. Reprinted with permission.

Glossary

- **depletes** = esaurire
- **carefree** = spensierato
- **were already aware** = essere consapevoli
- **moulds** = muffe
- **framing** = approccio
- **tackle** = contrastare
- **phased out** = eliminare gradualmente
- **pilot scheme** = programma pilota
- **regardless** = indipendentemente
- **prescient** = profetico
- **ingenuity** = ingegno, intelligenza
- **the late 1930s** = alla fine degli anni ‘30
- **concomitant** = associati
- **high-income** = ad alto reddito
- **urging** = esortare
- **aren’t the only game in town** = non è l’unica opzione disponibile
- **reckoning** = resa dei conti
- **lord** = dominare, prevalere
- **tissues** = tessuti
- **sanitation** = igiene, sanificazione
- **unlike** = diversi da
- **laid global inequalities bare** = svelare, mettere a nudo
- **taking hold** = prendere il sopravvento
- **due to** = dovuto a
- **overused** = abusare
- **lack** = mancanza
- **undergo an operation** = sottoporsi a un’operazione
- **fungi** = funghi
- **coal** = carbone
- **swarm into** = invadere
- **priced in** = includere nel prezzo
- **take a moral stand** = assumere una posizione morale
- **NHS** = Servizio Sanitario Nazionale (National Health Service)

- **whooping cough** = pertosse
- **dampening** = attenuare, smorzare
- **drowsiness** = sonnolenza
- **overlooks** = trascurare, ignorare
- **pinch** = pizzico
- **scarce** = scarsa
- **rippled out** = propagarsi
- **soil** = suolo
- **forgo** = rinunciare
- **run clean out** = esaurire completamente
- **forecast** = prevedere
- **blood poisoning** = sepsi
- **close quarters** = spazi ristretti
- **wastewater** = acque reflue