The Science of Antibiotic Resistance

What it is and why it matters

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Antimicrobial resistance: a silent pandemic

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Antibiotic resistance – the silent pandemic

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The Antimicrobial Resistance Pandemic: Breaking the Silence

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ANTIMICROBIAL RESISTANCE IS THE SILENT PANDEMIC WE CAN NO LONGER NEGLECT

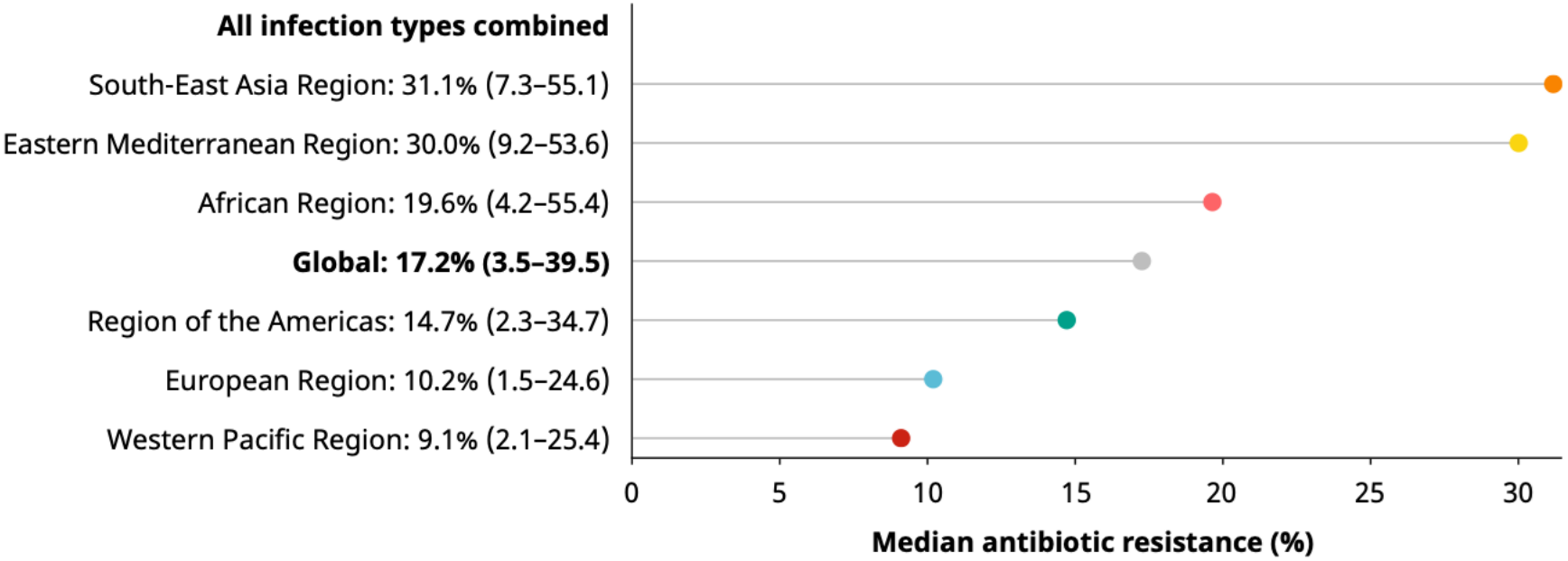
WHO warns of widespread resistance to common antibiotics worldwide

13 October 2025 | News release | Geneva |Reading time: 3 min (689 words)

One in six laboratory-confirmed bacterial infections causing common infections in people worldwide in 2023 were resistant to antibiotic treatments, according to a new World Health Organization (WHO) report launched today. Between 2018 and 2023, antibiotic resistance rose in over 40% of the pathogen-antibiotic combinations monitored, with an average annual increase of 5–15%.

https://www.who.int/news/item/13-10-2025-who-warns-of-widespread-resistance-to-common-antibiotics-worldwide

Figure 2. Median AMR in 93 infection type–bacterial pathogen–antibiotic combinations, by WHO region, 2023



WHO Global antibiotic resistance surveillance report 2025

https://www.who.int/publications/i/item/B09585

Globally in 2021:

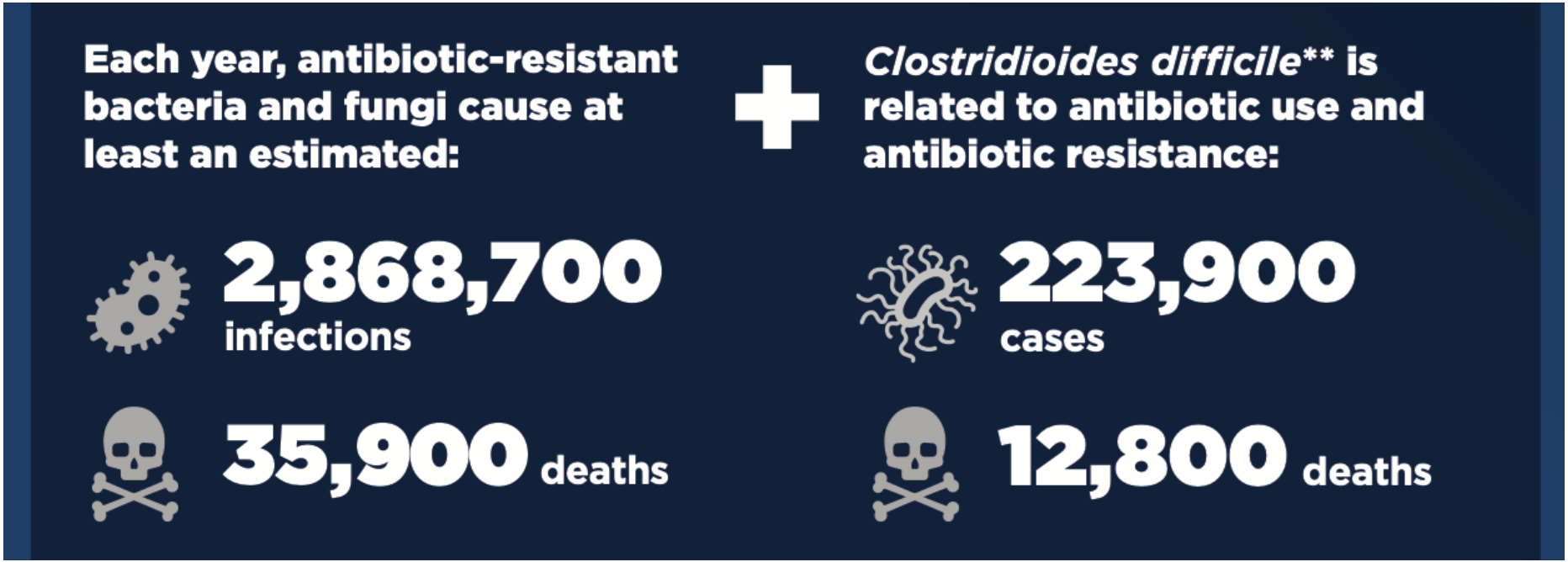
- An estimated 1.14 million deaths worldwide directly attributable to bacterial antimicrobial resistance
- An additional 3.6 million deaths associated with bacterial AMR

By 2050:

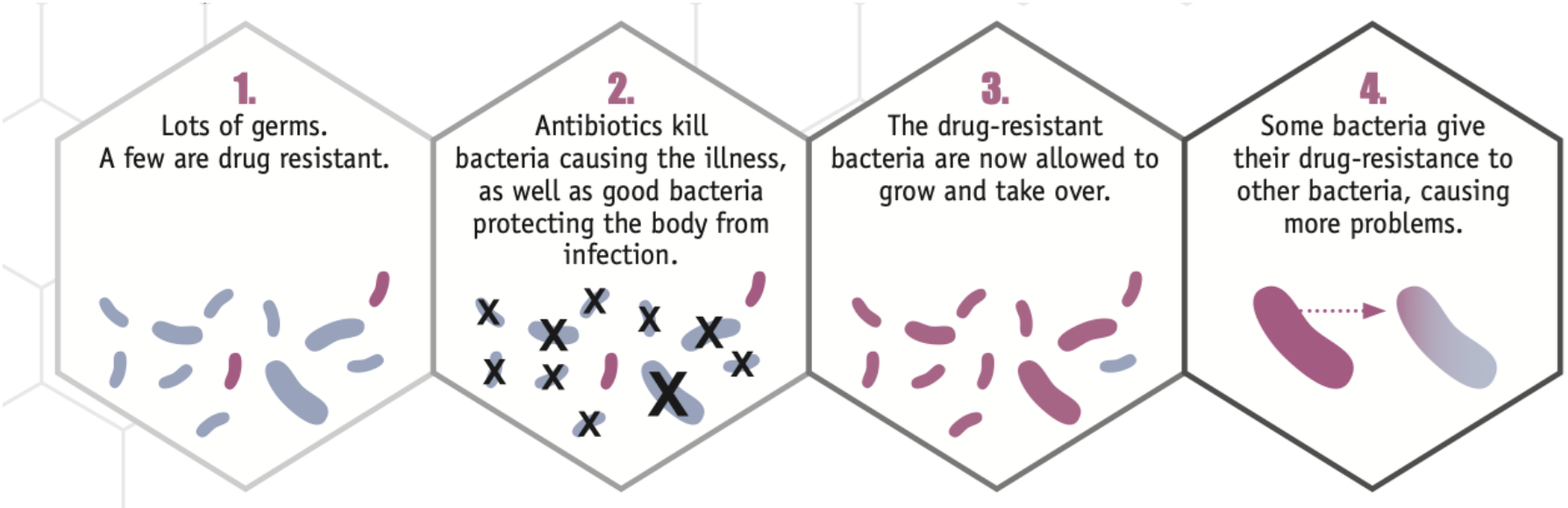
- An estimated 1.91 million deaths attributable to bacterial AMR
- An additional 6.31 million deaths associated with bacterial AMR

“Global burden of bacterial antimicrobial resistance 1990–2021: a systematic analysis with

In the United States:



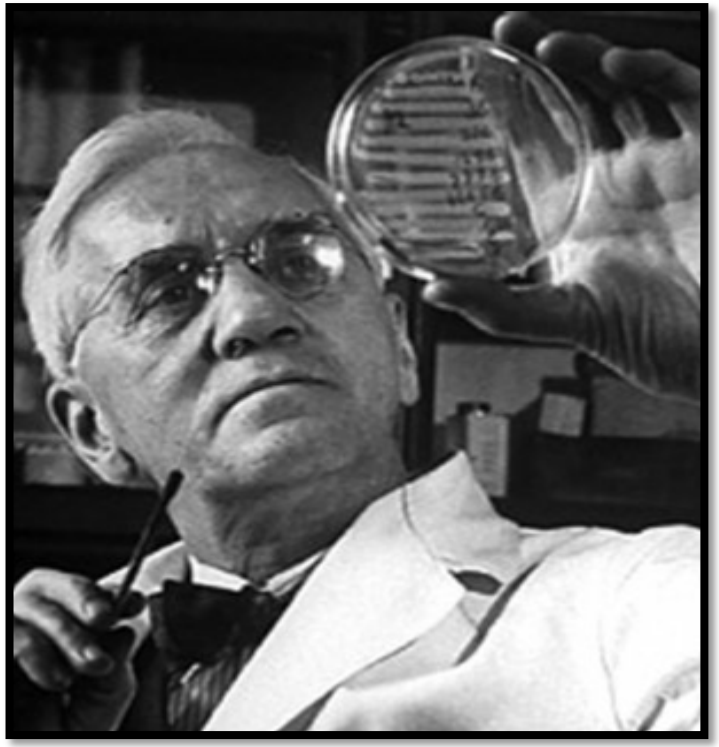
"Antibiotic Resistance Threats In The United States 2019," CDC, https://www.cdc.gov/antimicrobial-resistance/media/pdfs/2019-ar-threats-report-508.pdf



"Antibiotic Resistance Threats In The United States, 2013," CDC, https://www.cdc.gov/antimicrobial-resistance/media/pdfs/ar-threats-2013-508.pdf

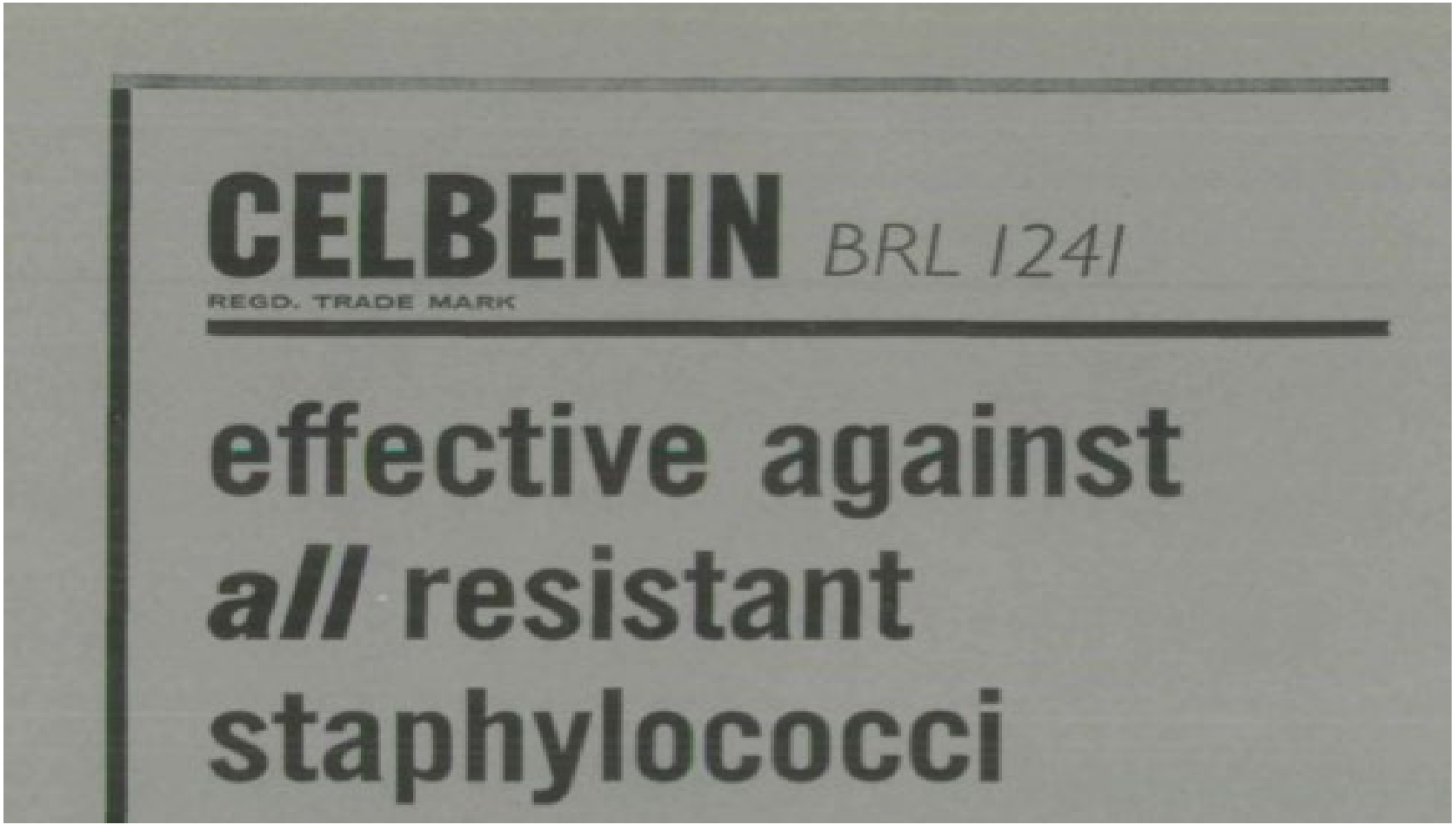
- Modern Mechanix magazine, 1930

National Library of Medicine



The time may come when penicillin can be bought by anyone in the shops.
Then there is the danger that the ignorant man may easily under-dose himself, and by exposing his microbes to non-lethal quantities of the drug, make them resistant.

Sir Alexander Fleming, Nobel Prize lecture, 1945



British Quarterly Journal of Medicine, 1960

Antimicrobial resistance is a ticking time bomb... We need to work with everyone to ensure the apocalyptic scenario of widespread antimicrobial resistance does not become a reality. This is a threat arguably as important as climate change for the world.

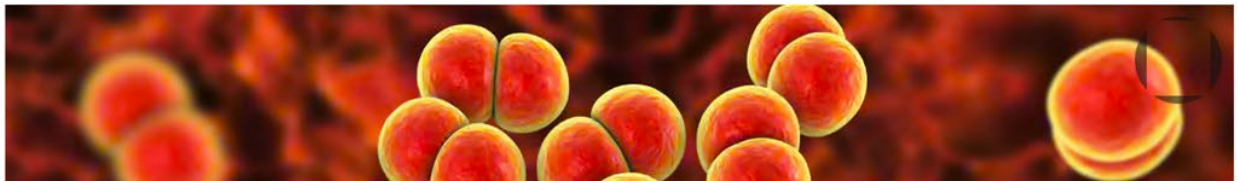
Dame Sally Davies, Chief Medical Officer of the UK,
"Annual Report of the Chief Medical Officer: infection and the rise of antimicrobial resistance,"
Lancet, Volume 381, Issue 9878, pp.1606-1609, May 2013

Gonorrhoea getting more drug-resistant and 'may become untreatable'

Rise in super-strength cases in England reaches highest level since records began, UKHSA says

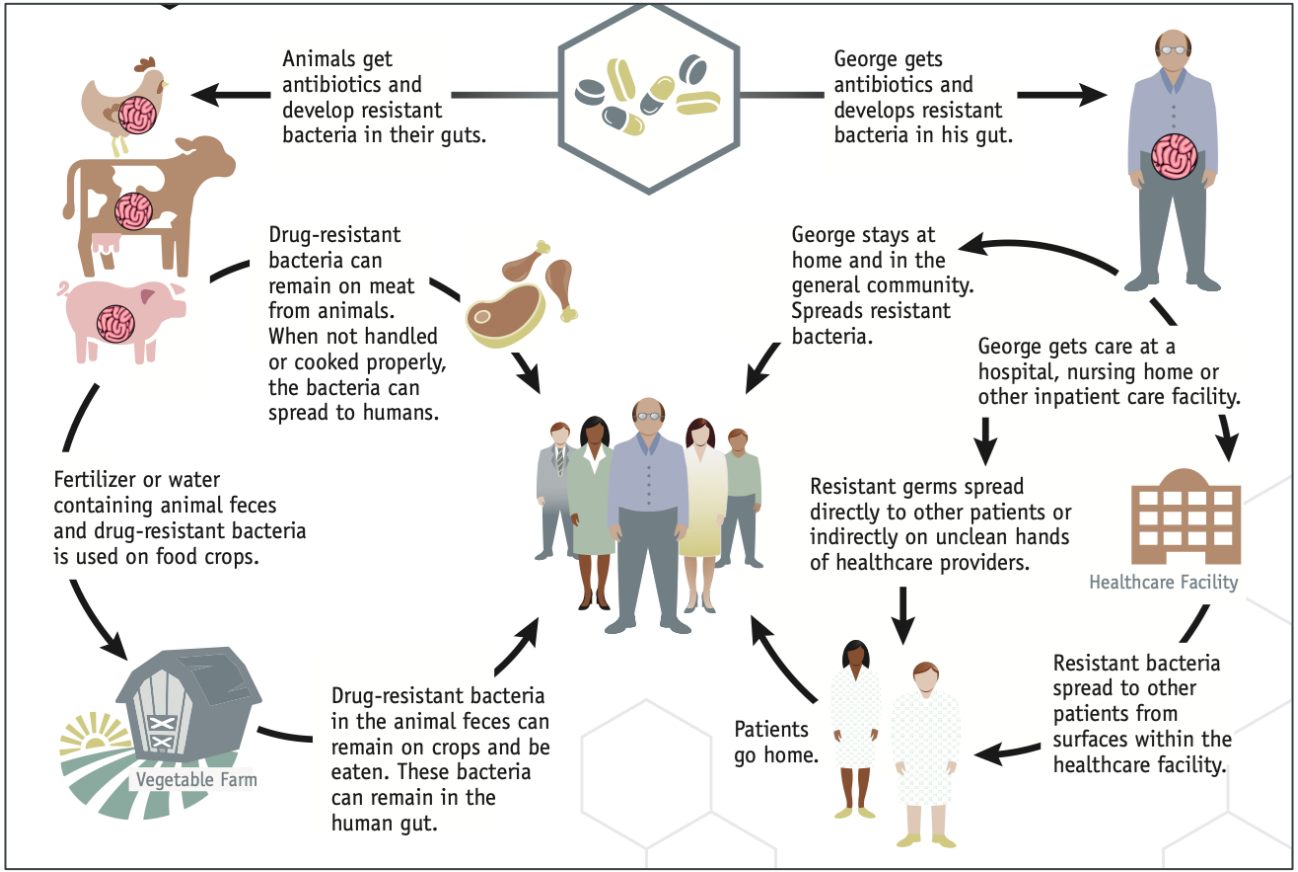
Andrew Gregory *Health editor*

Thu 15 Aug 2024 00.00 EDT

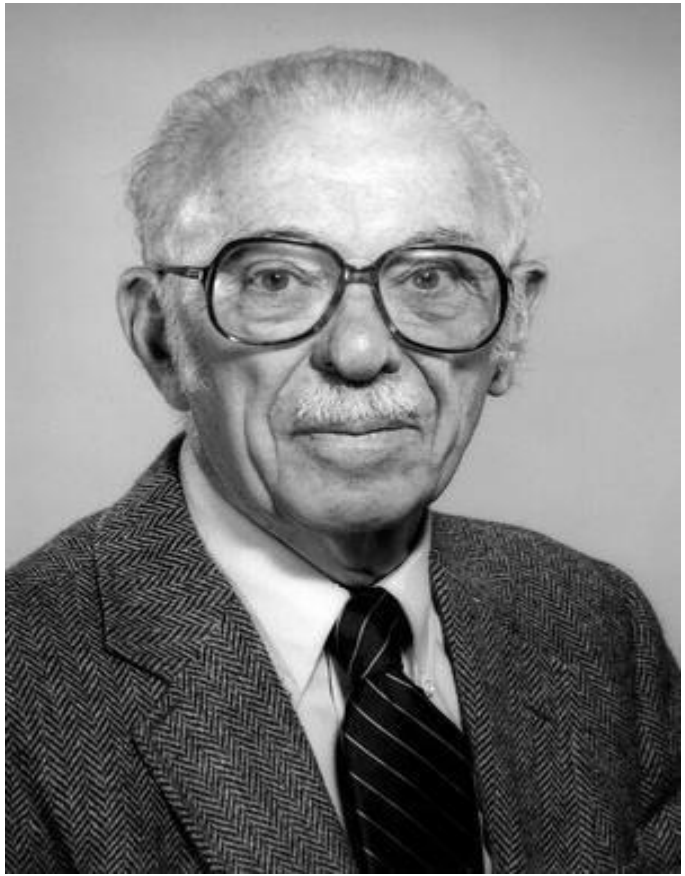


https://www.theguardian.com/society/article/2024/aug/15/gonorrhoea-getting-more-drug-resistant-and-may-become-untreatable

Healthcare, Agriculture, Environment



"Antibiotic Resistance Threats In The United States, 2013," CDC, https://www.cdc.gov/antimicrobial-resistance/media/pdfs/ar-threats-2013-508.pdf



The chicks receiving aureomycin fermentation grew more rapidly than control chicks receiving liver extract.
The fermentation residue supplied… an unidentified growth factor that made the chicks grow more rapidly than did a complete diet.

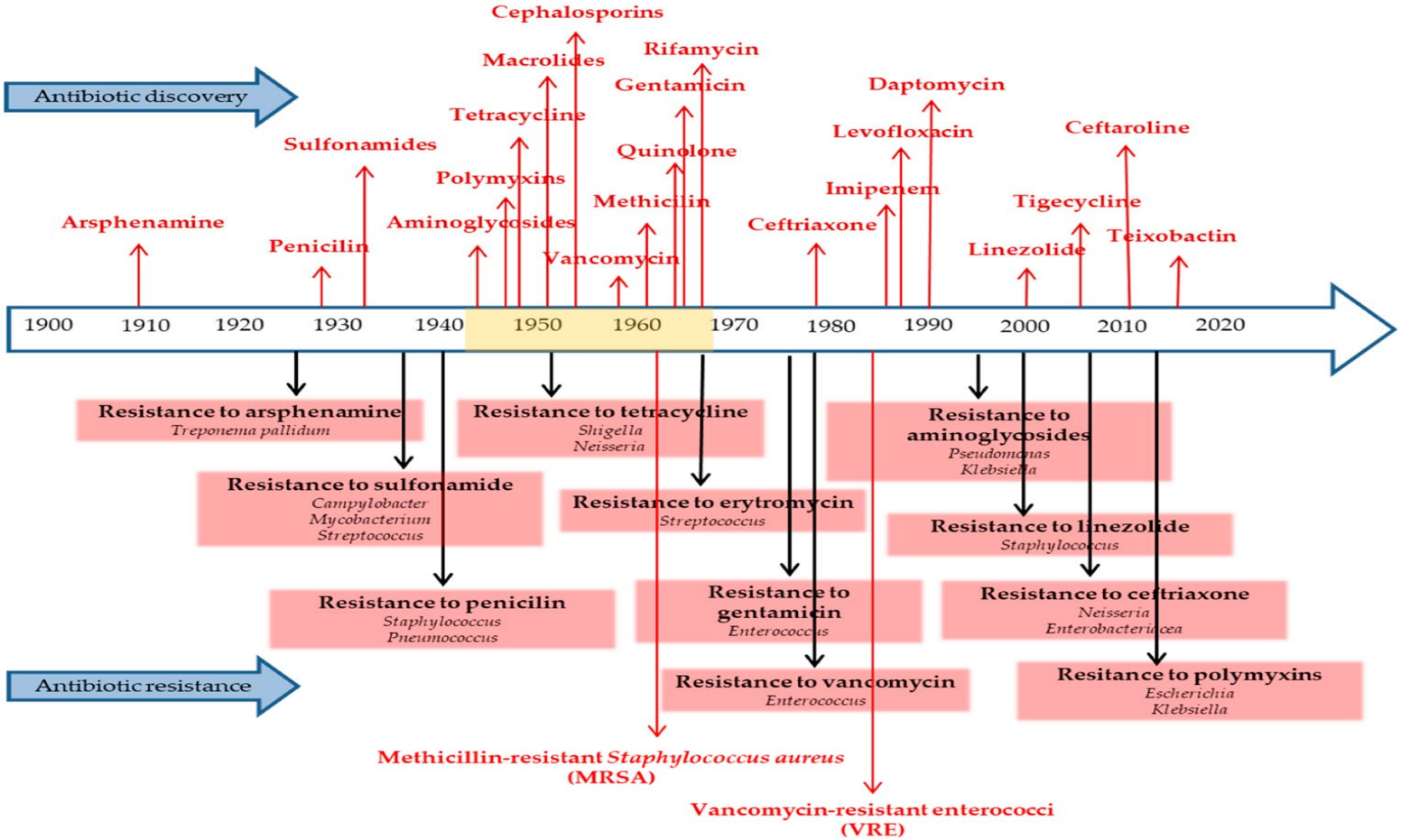
Thomas H. Jukes, "Some Historical Notes on Chlortetracycline," Reviews of Infectious Diseases, Vol. 7, No. 5, 1985 (describing "The Multiple Nature of the Animal Protein Factor," J. Biol. Chem. 1949, 180:647-654).

24,092,100 lbs

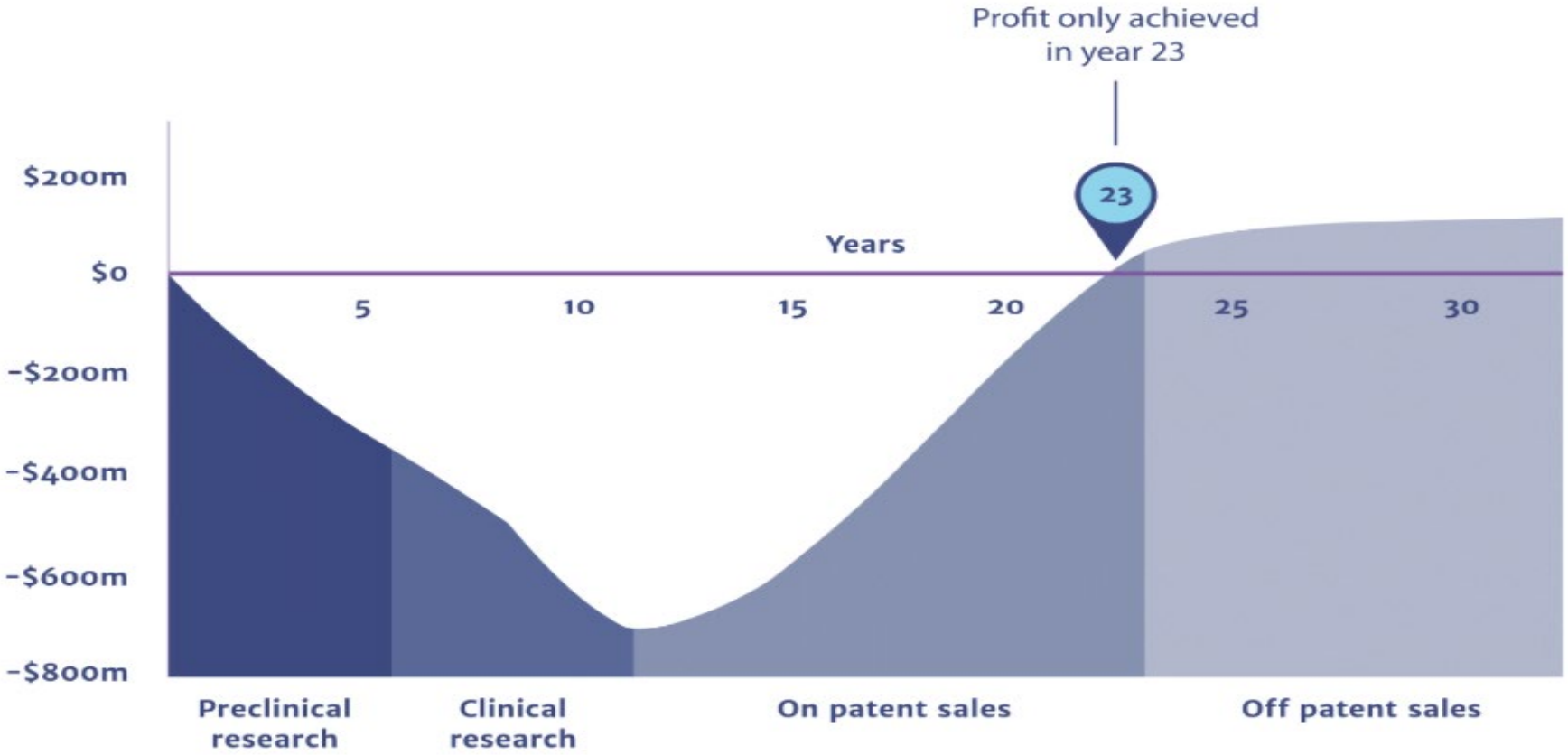
Agricultural antibiotic use

US (FDA ADUFA 2023)
Global (van Boeckel, PNAS 2015)

139,224,000 lbs



"Antimicrobial Resistance: The Impact from and on Society According to One Health Approach," Societies, 2024, 14(9), 187, September 2024



"Antimicrobial Resistance: Tackling a crisis for the health and wealth of nations," The Review on Antimicrobial Resistance, 2014

The pipeline faces a dual crisis: scarcity and lack of innovation. Among the 90 antibacterials in development, only 15 qualify as innovative. For 10 of these, available data are insufficient to confirm the absence of cross-resistance, meaning that resistance to one antibacterial could also reduce effectiveness against another treatment…

Only 5 of the antibacterials are effective against at least one of the WHO's "critical" bacteria.

"Analysis of antibacterial agents in clinical and preclinical development: overview and analysis 2025," WHO, https://www.who.int/publications/i/item/9789240113091