

# Fight against Malaria

**Worldwide: 240 million cases; 640,000 deaths (95% in Africa)**

- Two strategies
  - 1. Traditional - quinine; later vaccines
  - 2. New approach: mab's (monoclonal antibodies)

# Fight against Malaria

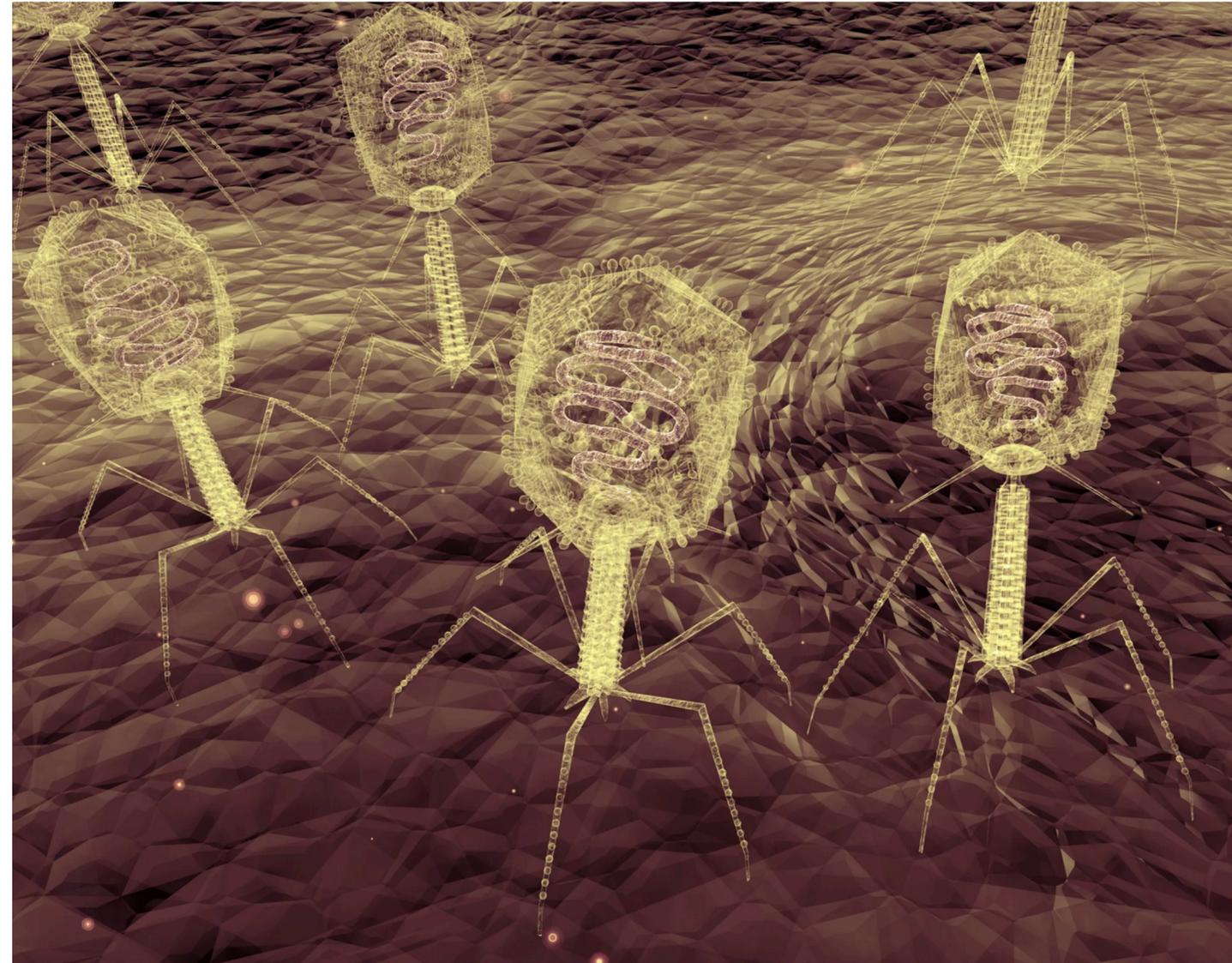
- 1. Vaccines (prompts the body to produce antibodies)
  - Usually only 30% effective in children
  - Less than 40% effective in adults

# Fight against Malaria

- 2. Monoclonal antibodies (delivering antibodies directly to the body)
  - mab explicitly optimized to target certain antigens
  - New trial (healthy adults in Mali) proved 82% effective (high dose) and 75% (low dose) over 6 months
  - Not (yet) long-lasting effect (past 6 months)
  - Next 3 steps: (1) Children; (2) pregnant women; (3) going from intravenous to subcutaneous admin



# Viruses, bacteria & CRISPR\*



**Bacteriophages**

**\*) clustered regularly interspaced palindromic repeats**

# Viruses, bacteria & CRISPR\*

1. Bacteriophages [phages] are viruses that attack and modify the DNA of bacteria or kill/“eat” them
2. In *nature*, bacteria use CRISPR as a defense mechanism against viruses that prey on them

# Viruses, bacteria & CRISPR\*

In *the lab*, researchers did the opposite:

They engineered the phages, so they could target certain bacteria and inject them with CRISPR viral DNA to make specific edits to *their* genome.

To test the concept, they made the coli bacteria fluorescent . . . and sure enough, the bacteria glowed, indicating that the method was working.

# Viruses, bacteria & CRISPR\*

## Practical applications

(1) changing the resistance to antibiotics

2) Could the phages catch the E. coli in large “natural environments” (soil) . . . Since they could, it might be possible to change the microbiome in humans

# TREES & HEALTH



It has long been known that access to nature has considerable impact on well-being and non-accidental mortality

Likewise, it is known to benefit patient with mental disorders

But how much?  
Could it be quantified?

<https://www.sciencealert.com/people-in-portland-planted-trees-decades-later-a-stunning-pattern-emerged>

# TREES & HEALTH

- 1) USDA/Forest in Portland, Oregon conducted a tree-planting campaign in a 30 year period between 1990 and 2019 with strict data collection *when and where* (140 census tracts @ 4,000 homes ) ~50,000 trees were planted
- 2) Using data from the Oregon Health Authorities, researchers combined *non-accidental mortality data* (related to respiratory and cardio-vascular diseases) with the tree data for each census tract

# TREES & HEALTH

## RESULTS:

- 1) lower mortality rates in neighborhoods with more trees planted,
- 2) this negative association is statistically significant for both cardiovascular and general non-accidental mortality, especially among males and anyone above the age of 65
- 3) the association also grows stronger as trees grow taller,
  - trees planted in the prior 1-5 years (longest) were linked with a 15% percent drop in mortality
  - trees planted in the prior 11 to 15 years (oldest) were linked with a 30% drop in mortalityin other words: older, larger trees were associated with greater reductions in mortality  
Morale: new trees are great, but keep the old ones

# TREES & HEALTH

## ECONOMY

The statistical value of an adult human life is ~\$11 million\*

That means that planting 1 tree in each of Portland's 140 census tracts would generate about \$14.2 million annually in lives saved.

Maintaining those 140 trees would cost somewhere between \$3,000 and \$13,000 per year, the study's authors estimate.

\*) estimated by US federal agencies



