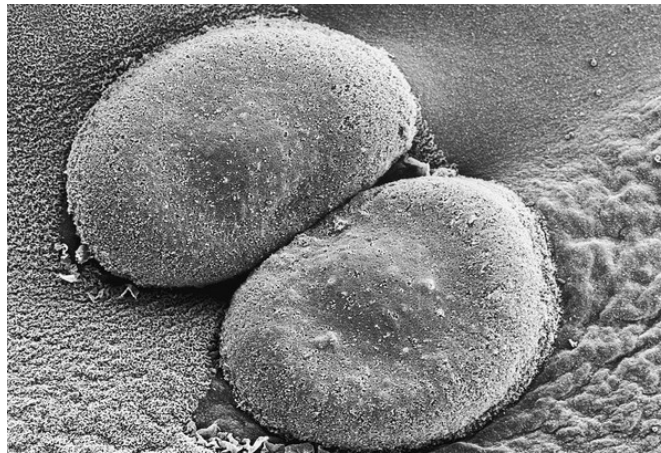


## MicrobiomeRogue: Strepto

(Lara Amorim)



Scanning electron micrograph of colonies of *Streptococcus pneumoniae*  
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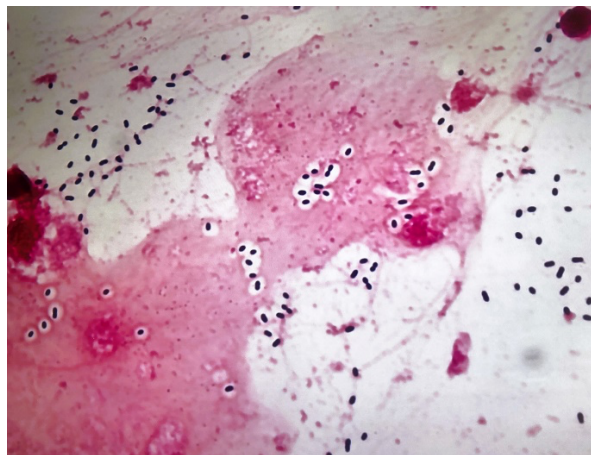
### Claim to Infamy: a fearsome pathogen in disguise

**Strepto (*Streptococcus pneumoniae*) – your nose’s risky roommate.**

Meet *Streptococcus pneumoniae* – or pneumococcus for short. Let’s call it Strepto!

This tiny bacterium lives in our noses and throats and usually doesn’t cause any trouble. In fact, many people carry it without even knowing. But under the right (or rather, wrong) circumstances, it can go from a quiet neighbour to a serious threat. This is called being a “carrier”. That’s why it’s sometimes called a “microbiome rogue.”

Strepto has a very distinctive shape. Under the microscope, it appears as pairs of round bacteria (called diplococci) with a smooth capsule around them – like tiny jellybeans stuck together, wearing spacesuits! This capsule is one of its most powerful tools. It helps Strepto escape body’s defences by making it hard for immune cell to grab onto it.



Microscopic image of *Streptococcus pneumoniae*. The bacterial capsule, a key virulence factor, is clearly visible as a halo surrounding the cells, which appear as dots. Credit: Scharvik. (2023)/ iStock.

## A learner-centric microbiology education framework

Even though it often lives peacefully in our respiratory system, Strepto cells can flip the script and cause serious illnesses like infections of the lung (pneumonia), brain and spinal cord (meningitis), blood (sepsis), and ear. It can also cause sinus infections. These illnesses can be especially dangerous for young children, elderly people, and those with weakened immune systems.

Strepto usually enters through the nose or throat and quietly settles in. But if your immune defences are down—like when you have the flu—it can sneak past local barriers and make its way to places it doesn't belong. It's a master at finding weak spots! Issues that weaken defences, like a cold, flu, poor nutrition, smoking, or long-term illness, can make it easier for Strepto to spread and cause problems.

Unlike some of our gut microbes that help with digestion or development of immunity, pneumococcus doesn't do us many direct favours. That said, having small amounts in the nose might help our immune system stay sharp by recognizing potential threats. But let's be honest—it's a risky tenant, and the bad often outweighs the good. If the balance of good bacteria in your nose and throat is thrown off, Strepto can seize the opportunity, multiply, and invade areas it shouldn't — like your lungs or bloodstream.

On top of that, Strepto has buddies. Some bacteria, like *Haemophilus influenzae* and *Moraxella catarrhalis*, can live alongside Strepto and help it stick around longer and form protective biofilms. These are slimy layers that bacteria build to protect themselves. Even viruses like the flu virus can lend a hand by weakening your defences, making it easier for Strepto to spread.

### *Strepto is a sneaky, wicked Rogue in our microbiomes*

#### Did you know...

- It wears a disguise: Strepto's capsule is made of sugars that help it hide from the immune system. Some parts of it even look like human cells, so your body sometimes doesn't realize it's an invader!
- It has over 100 different capsule "outfits": Scientists have identified more than 100 different types (called serotypes) of Strepto based on the capsule it wears. Some are more dangerous than others. This is why different vaccines are needed to cover the most harmful ones.
- It breaks through barriers: Strepto makes special enzymes that break down the mucus and tissues in your nose and lungs. This helps it move through the body and reach places like the brain, blood, or lungs.
- It's tiny but mighty: A single Strepto bacterium is about 1 micron in size (so small you'd need a microscope to see it), but it can still cause big problems in your body if it spreads.
- It travels quietly: Strepto doesn't swim like some bacteria that use tails or flagella. It spreads passively, often through sneezing, coughing, or us being in close contact with others.

### How can we protect ourselves?

One of the most powerful strategies we have against Strepto is vaccination. There are vaccines like PCV13 and PPSV23 that protect against the most dangerous types of pneumococci. These vaccines are especially important for babies, elderly people, and those with chronic conditions. Vaccination helps both individuals and communities by reducing the spread of the bacteria.

Antibiotics can treat infections caused by Strepto, but some types are becoming resistant. The most used antibiotics include penicillin and amoxicillin, which are usually effective when bacteria are not resistant. For more serious infections, especially meningitis or pneumonia, doctors may use ceftriaxone or cefotaxime. In cases of allergy or resistance, alternatives like azithromycin, or vancomycin may be used. However, antibiotic resistance is a growing problem, making prevention more important than ever. So, prevention is key – through vaccination, good hygiene, and keeping a healthy microbiome.

In a healthy microbiome, friendly bacteria help keep Strepto in check. Good guys like other *Streptococcus* species, *Corynebacterium*, and *Dolosigranulum* compete for space and resources, helping to prevent the rogue from taking over.

### Why It Matters

*Streptococcus pneumoniae* isn't just a medical curiosity, it's a major global health challenge. It causes over a million deaths each year, especially in places where vaccines and healthcare are limited. Its ability to quietly live in the body and then causes serious disease makes it both fascinating and dangerous.

Learning about its sneaky behaviour helps us understand how to stay ahead through science, public health, and the power of a healthy microbiome.