# Antimicrobial Resistance Gallery

## Potential application of predatory bacteria: *Bdellovibrio bacteriovorus*

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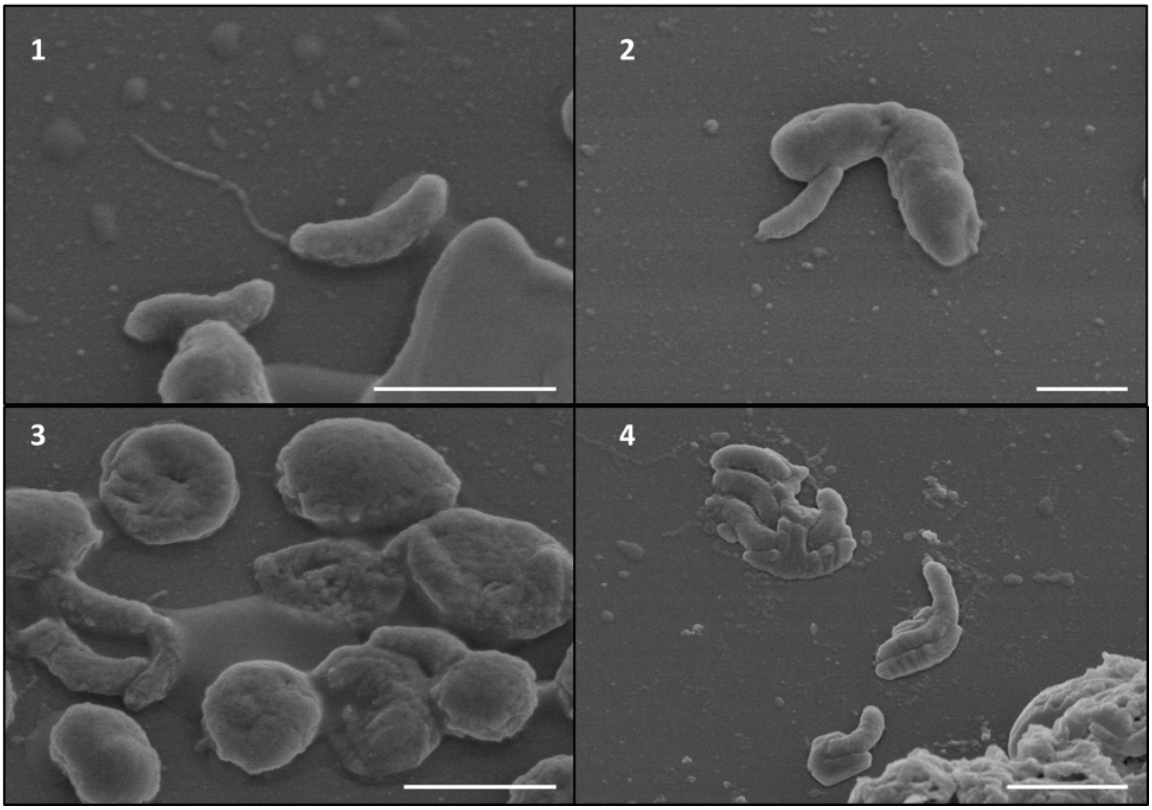


**Electron microphotographs of the life cycle of *Bdello* preying on a *Pseudomonas putida* cell.** 1) Bdello attack phase: cell searching for new prey cells. 2) Attachment of Bdello to the surface membrane of the prey cell. 3) Bdelloplast structure containing the Bdello cell growing inside the prey. 4) Lysis of the ghost prey cell and release of new Bdello cells. White lines represent a scale bar of 1 μm.

In nature, organisms interact with one another in various ways, some of which are beneficial for all involved, while others tilt the balance of benefit in favor of one at the expense of the other. This latter type, known as "antagonistic interactions", encompasses predation, grazing, and parasitism.

Predation, a common biological phenomenon, involves one organism (the predator) hunting and consuming another (the prey) as food to enable it to survive and reproduce. This process is fundamental in shaping the structure and function of ecosystems. Predators come in all sizes, from animals such as lions or killer whales, to microscopic creatures like protozoa, bacteria, and bacteriophages, all of which prey on other organisms.

Microbial predators have evolved fascinating strategies for hunting their bacterial prey. Bdello (*Bdellovibrio bacteriovorus*), for instance, employs an intraperiplasmic approach: it penetrates the outer surface of prey cells and grows and multiplies within the periplasm. The periplasm is the space between the outer cell layer and the inner cell membrane, and all sorts of highly integrated

activities take place there relating to the interactions of cells with their external environment. Bdello growing in the periplasm disrupts these activities, ultimately leading to the demise of the prey and release of the predator.

What is remarkable about Bdello is its specificity – it specifically targets bacteria (it loves to snack on fellow gram-negative bacteria!) – and has not been observed to interact with eukaryotic cells, making it harmless to non-bacterial organisms. This characteristic is incredibly significant because it forms the foundation of something called *selective toxicity*. What´s that? Well, it´s the ability to target and stop one type of organism without harming others. This concept is crucial in creating medicines and controlling pests. Think about it: when we take a medicine (antibiotic), we want it to tackle our specific health issue (kill pathogenic bacteria infecting us) without causing trouble elsewhere in our bodies (such as killing our own cells). Similarly, when we use insecticides, we aim to kill pests that eat our crops while making sure that helpful insects, such as bees, stay safe to pollinate the flowers.

Because of its fascinating lifecycle, Bdello has become a hot topic in the science world. These predators have earned the nickname "living antibiotics" because they're incredibly effective at wiping out harmful bacteria, even the antibiotic-resistant ones.

Their impact on the microbiota of humans and animals is still being studied. It's intriguing that Bdello appears to flourish in the guts of healthy individuals, suggesting it might help keep our gut healthy by balancing the intestinal ecosystem. This could be especially important for conditions like inflammatory bowel disease, celiac disease, and cystic fibrosis. Although there's still a lot we don't know about these predatory bacteria, they hold exciting potential for the future.

***Harnessing the predatory activity of Bdello to kill pathogenic bacteria, especially those resistant to our antibiotic medicines, is an exciting prospect for dealing with the antibiotic resistance crisis.***