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The unseen allies: Rethinking our relationship with the microbial world

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1. Introduction

The fight against microorganisms has been going on for many years in the form of a never-ending battle. Our story about these tiny creatures has always revolved around hostility, struggle, and elimination since the time when people first embraced the idea of the germ theory of disease. However, as science continues to shed light on the vast nature of the microbial world, this hostile approach can no longer be considered both relevant and correct. These are not our mortal foes; rather most of these are our allies. Our health and the well-being of these creatures go hand-in-hand.

The Guardians Within: Our Personal Ecosystem

We like to think of ourselves as entirely human, but biologically, we are walking ecosystems. The human body is home to trillions of microbes, collectively known as the microbiome, outnumbering our own human cells in vast quantities. Far from being passive hitchhikers, these microscopic residents are active participants in our health:

Digestion and Nutrition: Our gut bacteria break down complex carbohydrates that our own enzymes cannot digest, synthesizing essential vitamins like

microscopic

B12 and K in the process (Jiang et al. 2024).

Immune Training: The microbiome acts as a personal trainer for our immune system, teaching it to distinguish between friend and foe. A lack of microbial exposure or microbial imbalance early in life has been heavily linked to the modern rise of allergies and autoimmune disorders (Kim et al. 2025).

The Gut-Brain Axis: Emerging research shows that gut microbes produce neurotransmitters like serotonin, directly influencing our mood, mental health, and cognitive functions (Ataei et al. 2026). Overuse of antibiotics lead to the destruction of our internal ecosystems. Excessive use of chemicals in agro-ecosystem leads to destruction of friendly microbes, insects, worms, and small mammals, which directly or indirectly influence our surroundings and rainforests. A true shift in human health requires a shift in mindset from destruction to cultivation.

The architects of planet earth

Microorganisms are the invisible structures that support all life on Earth. Without them, the Earth's biogeochemical cycles would cease to function. Before any higher organisms appeared on the face of the earth, the early cyanobacteria started the 'Great Oxidation Event' by filling the atmosphere with oxygen, creating conditions for aerobic life. While rainforests are credited, marine phytoplankton, microscopic algae and cyanobacteria, are responsible for over half the oxygen on the planet (Naselli-Flores and Padisák, 2023). Microorganisms in soil are the best of all chemists. Atmospheric nitrogen is actually inaccessible to plants and is the job of soil bacteria like *Rhizobium* to "fix" and convert to an edible form, that nourishes plants and the food chain (Lindström and Mousavi, 2020). Nature's best recyclers are also these fungi and bacteria that decompose dead organic matter and return nutrients to soil. Without them the world would need to evolve to eat waste.

The industrial and environmental frontier

Facing unprecedented challenges for humanity, such as climate change, pollution, and resource scarcity, microbes are emerging as our most versatile technological allies. Bacteria with unique appetites are being used by scientists to clean up human messes in bioremediation. Microbes exist that can feast on toxic oil spills, and hospital waste water, break down industrial chemical waste and, incredibly, even consume plastics that would otherwise clog our oceans for centuries (Dong et al. 2026; Matilda and Samuel, 2024; Sharma et al. 2025).

The figure 1 shows the conversion of [Organic Waste] —> [Biogas / Clean Energy] by means of —> (Methanogenic Archaea)

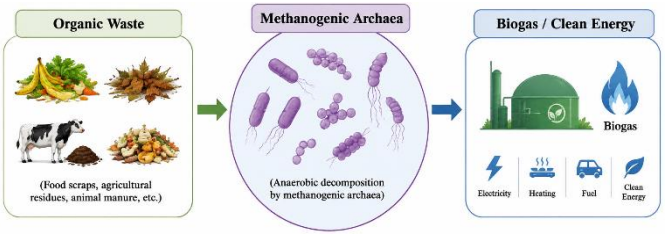

Figure 1. Organic waste translation into green fuel (biogas)

Through biogas production and microbial fuel cells the energy sector has a way towards sustainable and carbon neutral power. In medicine we have genetically engineered bacteria (like *E. coli*) to mass produce lifesaving human insulin (Riggs, 2021). Microscopic cells turned into highly efficient, microscopic factories. Even our food security is getting a microbial upgrade, as fermented foods and microbial proteins present sustainable alternatives to resource-heavy livestock farming (Kanimozhi et al. 2026).

A new philosophy of coexistence

The new century requires a revolution in perspective. The outdated idea that "the only good germ is a dead germ" is outdated and needs to go into retirement. While it is important to remain vigilant against deadly organisms, it is equally crucial to accept that most of them are harmless and help protect us. Spending money on microbial science can no longer be considered just interesting work but rather a matter of necessity. It does not matter whether you plan to create bacteria to save the planet from climate change or use probiotics to heal your chronic diseases. Our future is cooperation, not struggle. For many centuries humanity has been trying to dominate nature. Maybe it is high time to understand that our salvation lies in cooperating with the smallest representatives of it.

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