PROJECT OFFER

# The use of Bacteriophages in modern Biotechnology

## Antibiotic resistance is growing worldwide, while consumers urgently demand antibiotic-free products… What if there would be a new tool to fight the danger of pathogens that is effective and environmentally friendly?

**BACKGROUND**
Bacteriophages are viruses that specifically infect and destroy bacteria, playing a crucial natural role in controlling bacterial populations. Bacteriophages are by far the most abundant and ubiquitous biological agent on earth! In contrast to antibiotics, they act very specific on the target, without adverse effects on other microorganisms, plants, animals or humans. Bacteriophages have shown to be able to replace antibiotics successfully in various cases from medicine to agriculture. Their potential is extremely powerful, but has not yet been fully tapped…

**TECHNOLOGY**
acib leverages its expertise in bacteriophages to offer valuable knowledge and solutions to the industry e.g. in the following areas:

**Medical applications:** Phages open new perspectives in medicine, especially in antibacterial therapy. Increasing resistance to conventional antibiotics poses a serious threat to public health. Phages offer the possibility of combating bacterial infections by specifically recognizing, attacking, and eliminating their hosts. In contrast to antibiotics, the surrounding microbiome remains unharmed.

**Agriculture and environmental protection:** Agriculture faces challenges such as plant diseases and the use of pesticides. Phages could serve as natural control agents against pathogenic bacteria in the soil flora or on plant surfaces. This could contribute to more sustainable agriculture and minimize the environmental impact of pesticides.

**Food industry:** Phages could play a revolutionary role in the food industry, particularly in terms of food safety. Their ability to eliminate specific pathogenic bacteria could help reduce foodborne infections and improve food shelf life. This approach could provide a sustainable alternative to chemical preservatives.

**Industrial process applications:** In industrial processes such as food production or wastewater treatment, phages could help to minimize bacterial contamination and increase the efficiency of production processes. This could not only bring economic benefits, but also contribute to a more sustainable and environmentally friendly industry.

**Bioremediation:** Phages could play a groundbreaking role in cleaning up environmental pollutants, whether in water or soil. Phages can be used to control harmful bacteria that could hinder the breakdown of pollutants. Through the targeted reduction of one or several undesirable bacterial populations, space is created for the beneficial bacterial population that is necessary for bioremediation. Another possibility is to specifically eliminate those bacteria that produce pollutants during degradation processes.

**Research and development:** Phages offer unique tools for genomic engineering and could serve as vectors for targeted gene transfer in research. This could accelerate the development of new therapies and biotechnological applications.

**OFFER**
acib offers comprehensive and tailored phage screening services in the areas listed above. This is done using two different strategies or combinations thereof. On the one hand, commercially available, potentially effective phages from strain collections based on database research can be used, and on the other hand, suitable phages from a wide variety of isolates (soil samples, water samples, surface samples e.g.) can be screened. Depending on the sample material, a direct or enriched isolation process is used.
Methods such as “Plaque assays” (Overlay assays) and “Spot-tests” are used for efficient isolation, identification of lytic phages, characterization of host specificity and quantification of the phages. To carry out phage screenings on a larger

scale or to determine the effectiveness of certain phages against their host(s), as well as to record phage dynamics (phage reproduction number, phage multiplication, phage concentration), so called "killing curves" will be carried out. In order to ensure a high sample throughput, these parameters are recorded using microtiter-plate or deep-well-plate assays. In addition, a qualitative microtiter-plate-based color assay will be used in future, which does not require measurement of the optical density, but still provides reliable information on the effectiveness of the phage-host relationship.
In the opposite case, the samples can also be screened for different bacteria, whereby these are determined at the taxonomic level of the “genus” or “species”, by using 16S rRNA sequencing. Subsequently, a screening procedure for suitable phages can be carried out against one or more of these "potential hosts", isolated and characterized before.
acib offers the technology to develop and optimize combined unique bacteriophage solutions exclusively for you. IP developed in such projects can be fully transferred to you as our investor/industrial partner.

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**DEVELOPMENT STATUS:**
TRL 2 (Concept developed)

**IPR:**
will be developed for you as our partner

**KEYWORDS:**
Phage nanoparticles
Bacteriophage therapy
Phage biocontrol
Bacterial contamination control

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