Summary of the international traineeship at the University of Barcelona

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Introduction

- The main purpose of the training was to gain knowledge about the methods used for determining the physical and chemical properties of active fractions of porcine antimicrobial peptides extract and bioactive substances derived from fungi, and to evaluate the interactions between both biopreparations and multidrug-resistant bacterial strains.
- The second aim was to expand the knowledge about the application of biopreparations as therapeutics, especially their antibacterial effect, knowledge about minimal biocidal concentrations, and the evaluation of the efficacy of antimicrobial peptides against bacterial biofilms, minimal biofilm eradication concentration, and biofilm prevention concentration.

Advantages of a traineeship

- During the internship, I was able to learn a variety of things, including:

- Experimental techniques used for the evaluation of properties of studied biopreparations from porcine neutrophils and fungi.
- Techniques necessary for the assessment of antibacterial effect, minimal biocidal concentrations, the efficacy of antimicrobial peptides against bacterial biofilms, minimal biofilm eradication concentration, and biofilm prevention concentration.
- Studying the antibacterial properties of different natural products from animal blood and fungi.
- Developing the necessary laboratory skills to work with fresh blood samples and using the appropriate tools for the correct performance of the methodologies.
- Performing all the methodologies for the evaluation of antimicrobial and antibiofilm properties of active fractions of extract of peptides from neutrophils and the extract from fungi using the appropriate laboratory material and in the correct way.
- Skills in working with different materials, bacteria, and sophisticated laboratory equipment.
- Eagerness to assist in all processes taking place in the working environment, both in and outside the laboratory.
- Building good relationships with members of the laboratory and the ability to work in a team.

Traineeship

The MIC (Minimum Inhibitory Concentration) in microbiology is a method used to determine the lowest concentration of an antimicrobial agent (such as an antibiotic) that can inhibit the visible growth of a microorganism. Here's a brief overview of the methodology for determining MIC:

- Preparation of Microbial Inoculum:

The first step involves preparing a standardized inoculum of the microorganism being tested. This usually involves growing the microorganism in a suitable growth medium until it reaches a specific turbidity or cell density.

- Preparation of Antimicrobial Dilutions:

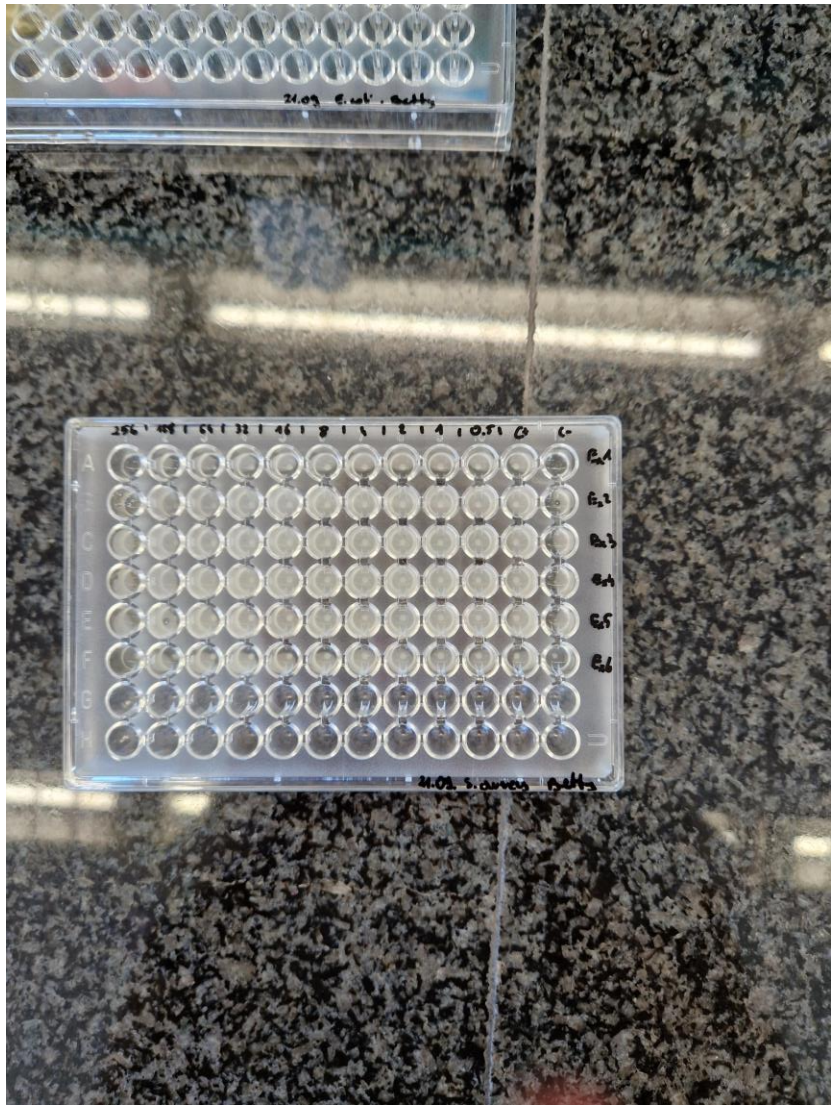
The antimicrobial agent is then diluted to create a series of concentrations, typically in two-fold dilutions, starting from a relatively high concentration. These dilutions are added to the wells of a microtiter plate or other suitable container.

- Inoculation and Incubation:

The standardized microbial inoculum is added to each well containing the antimicrobial dilutions. The microtiter plate is then incubated under appropriate conditions that support the growth of the microorganism.

- Reading and Interpretation:

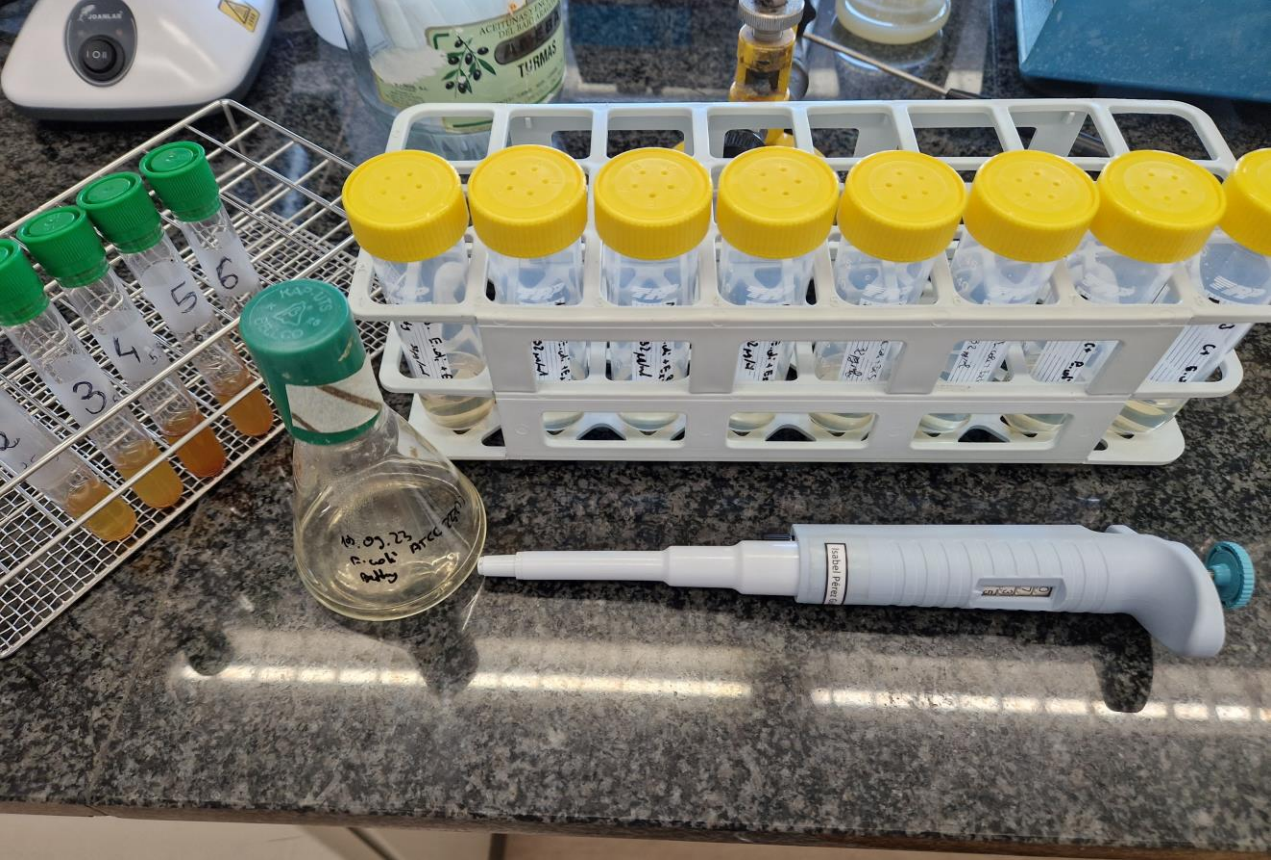
After the incubation period, the wells are examined for visible growth of the microorganism. The MIC is the lowest concentration of the antimicrobial agent at which there is no visible growth. This is typically determined by using a variety of methods, such as visual inspection, automated systems, or spectrophotometric measurements.



MIC

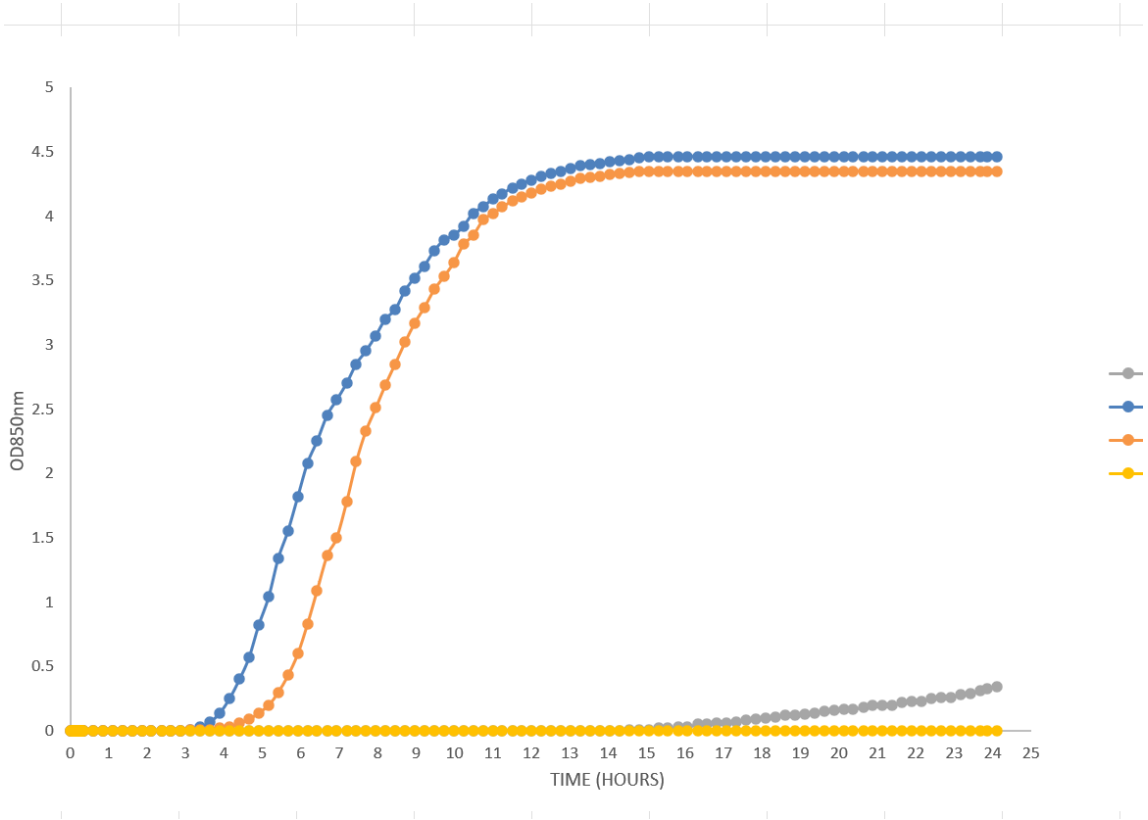
Bioreactors

- In microbiology, the cultivation of bacterial colonies for bioreactors involved several steps. First, a sterile growth medium was prepared, providing the necessary nutrients for bacterial growth. The medium was then inoculated with the bacterial culture, which was typically obtained from a well-established laboratory strain or an isolated environmental sample.
- The inoculated medium was incubated under controlled conditions, such as temperature, pH, and oxygen supply, to support the optimal growth of the bacterial culture. Over time, the bacteria proliferated and formed colonies within the bioreactor, utilizing the nutrients in the medium for their growth and metabolic activities.
- Regular monitoring of the bioreactor was carried out to assess the growth and health of the bacterial colonies. This often involved sampling the culture for analysis of bacterial density, viability, and metabolic byproducts.
- As the bacterial colonies reached the desired growth stage, they were harvested from the bioreactor for downstream applications, such as the production of biomolecules, enzymes, or pharmaceuticals. The harvested bacterial biomass could also be used for further studies or as inoculum for subsequent bioreactor cultures.



Preparation of samples for bioreactors

Bioreactor results



- Here we see the growth curves for E.coli together with the selected fungal extract

Summary

- Summing up, the internship at the University of Barcelona allowed me to acquire practical skills related to microbiological research and the assessment of the antibacterial properties of various substances. This experience significantly enhanced my competencies in the field of laboratory research and working with microorganisms, which will be of great importance for my future professional career.
- The acquired skills not only broadened my horizons in the field of microbiological research but also will enable me to optimize my laboratory work and expand the scope of studies outlined in my Individual Research Plan. This internship has been an extremely valuable experience that will contribute to my further professional development in the field of biomedical sciences.

Thank you for your attention