

Invited Lecture 5

MicroMundo: citizen science and service-learning against antimicrobial resistance

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Abstract

Background: As alerted by WHO and other global or local health agencies, antimicrobial resistance (AMR) poses a global threat to environmental, animal, and human health. Side to side with surveillance and action, research and education stand as basic pillars to collectively tackle the current AMR crisis. The discovery of new antimicrobial drugs or alternative strategies to fight infectious diseases is urgent. Within this frame, we describe here our experience with MicroMundo, a successful international strategy based on principles set up by Jo Handelsman's Tiny Earth initiative in the US, which we have implemented and expanded throughout the Iberian Peninsula (1, 2). **Objective:** Beyond the isolation of microbial strains showing antibiotic bioactivities, the key objectives of MicroMundo are (i) to create scientific culture in our society on AMR and One Health, and (ii) to inspire vocations in young students towards R&D in Biomedicine. **Methods:** MicroMundo is based on a crowdsourcing research strategy, adapted to Service-Learning pedagogic standards that combine active learning with community service (3). University students are trained to work in teams, then each team is assigned a Secondary or High School for the academic year. The MicroMundo team is thus in charge of leading younger students into the discovery of antibiotic-producing microorganisms from a soil sample of their choice, thus amplifying the range of search. In addition, MicroMundo teams have the mission of promoting AMR awareness activities directed to the community in which the school is located. **Results:** Along the last eight years, 32 MicroMundo hubs, operating across 31 different Portuguese and Spanish universities, have recruited thousands of teenagers in this quest. Yearly, an average of 500 university students in Spain and Portugal, lead about 3,500 younger students onto the analysis of over 1,500 soil samples, analyzing 30,000 isolates for antibiotic bioactivities. This effort has led to collections of hundreds of antibiotic-producing candidates. But, most importantly, the collective effort boosts wakefulness on One Health-oriented scientific careers in academics in various educational levels. **Conclusions:** MicroMundo is a successful strategy to bring onto society AMR awareness, and to inspire our future researchers into solutions to this current global health challenge.

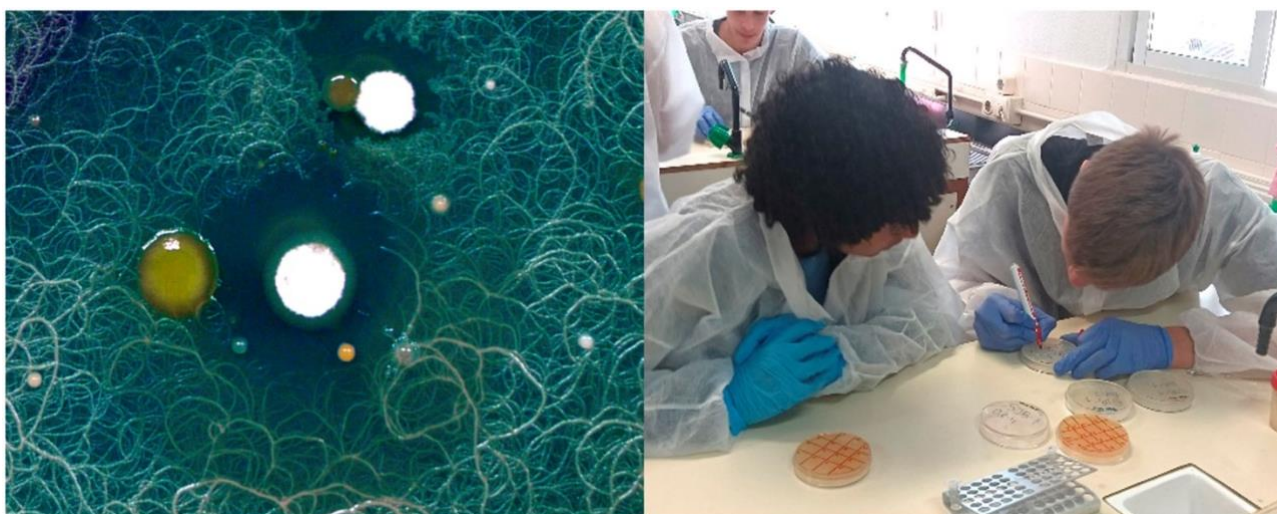


Figure 1. MicroMundo aims to detect antibiotic bioactivities from novel bacterial isolates by exploring soil biodiversity (left, colonies grown on TSA 10% agar; the white colony in the center inhibits the invading *Bacillus mycoides* in the background) by involving secondary and High School students (right).

Keywords: antimicrobial resistance; One Health; citizen science, service-learning; active learning

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