Sociedad Argentina de Microbiología General

XIX CONGRESO DE LA SOCIEDAD ARGENTINA DE MICROBIOLOGÍA GENERAL

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Centro cultural y Pabellón Argentina de la Universidad Nacional de Córdoba, Córdoba, ARGENTINA.

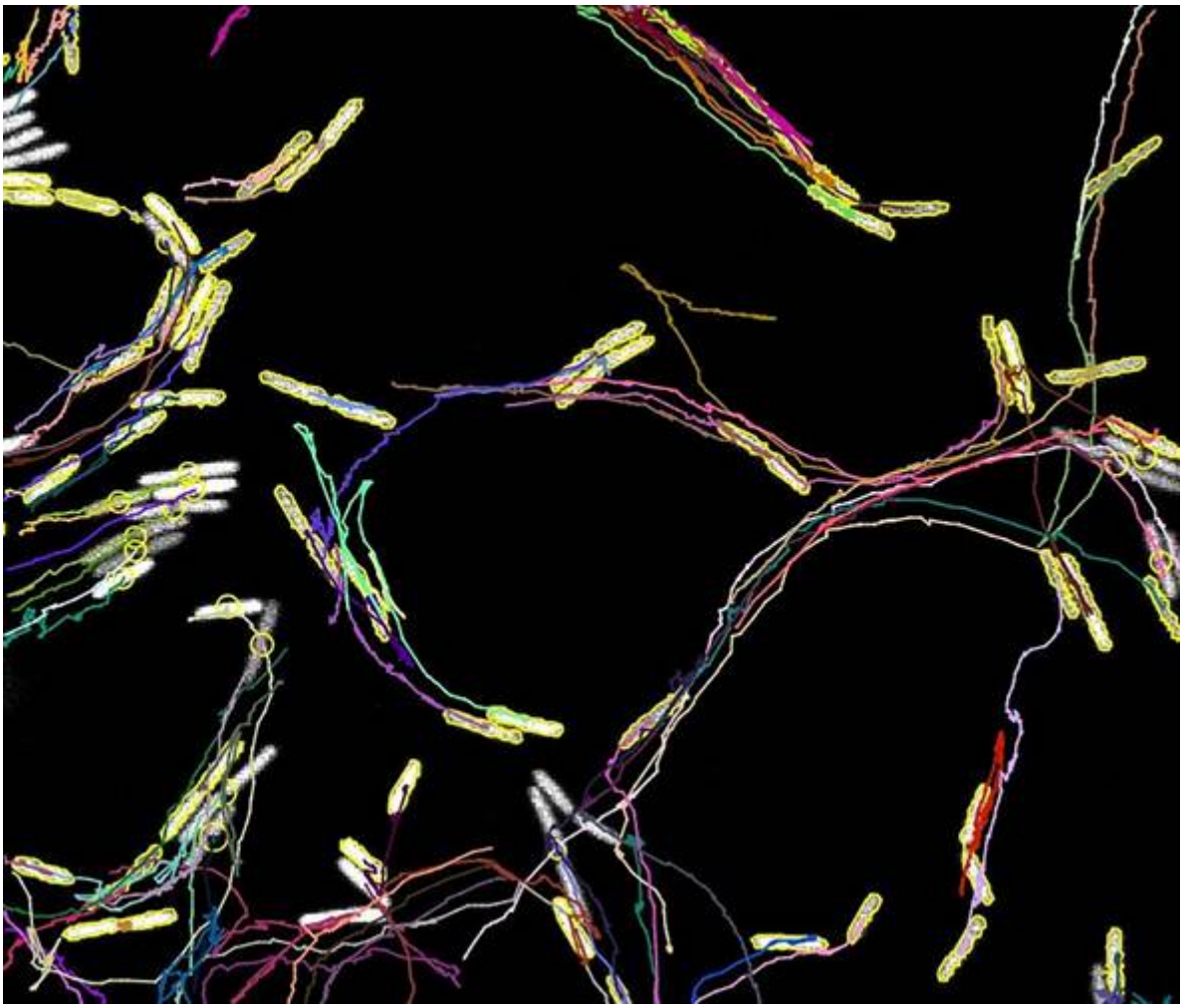

Foto: Se hace camino al andar. Celeste Dea. 1er puesto. Concurso fotográfico SAMIGE 20 años.

?-LACTAMASES: WHERE ARE YOU AND WHY?

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Since their discovery, antibiotics have marked a significant turning point in the history of medicine. Among them, ?-lactams have become particularly important due to their high efficiency and low toxicity, representing 75% of the global antibiotic market. However, the emergence of ?-lactamases—enzymes that hydrolyze these antibiotics—poses a major threat to our treatment options against infections. While we have extensive information on the substrate spectrum and kinetics of these enzymes in vitro, our understanding of many aspects of their in vivo behavior remains limited. For instance, we still lack knowledge about the conditions under which they are expressed, how they are processed, where they are localized and how they are degraded. New approaches are essential to deepen our understanding of ?-lactamases in their biological contexts. We used various bioinformatics tools to predict the translocation pathways of more than 9,000 enzymes by analyzing their signal peptides. Most Gram-negative ?-lactamases are predicted to be translocated to the periplasm via the Sec system. Some of these enzymes are cleaved by Signal Peptidase I, resulting in soluble periplasmic proteins. Instead, others possess a lipobox sequence and are recognized and cleaved by Signal Peptidase II, then lipidated and inserted into the membrane. Interestingly, most of the putative lipidated ?-lactamases originate from Acinetobacter spp. (a critical priority pathogen according to the World Health Organization). Cellular fractionation and immunoblotting confirmed the predicted localization of three of the most clinically relevant ?-lactamases in their respective host bacteria (OXA-23, -24 and -48) and explores the advantages of lipidation in *Acinetobacter baumannii* through growth curves, determination of Minimum Inhibitory Concentrations (MICs), and the study of outer membrane vesicle-mediated protection. We observed that lipidation does not affect the resistance phenotypes, but enhance the range of the ?-lactamase action.

Palabras clave: Keywords: ?-lactamases - antibiotic resistance - Acinetobacter spp.