KNOW-HOW IN MOLECULAR MICROBIAL ECOLOGY

DATOS DE CONTACTO:

Research Results Transfer Office-OTRI
University of Alicante
Tel.: +34 96 590 99 59
Email: areaempresas@ua.es
http://innoua.ua.es

RESUMEN

The Molecular Microbial Ecology group is devoted to the study of diversity, ecological role and function of microbes –prokaryotes and their viruses and microbial eukaryotes as well- from different environments including hypersaline, marine and other aquatic environments and human or animal microenvironments.

VENTAJAS Y ASPECTOS INNOVADORES

MAIN ADVANTAGES OF THE TECHNOLOGY

Microorganisms play an essential role in the biosphere, since they participate in all biogeochemical cycles. They are present in all places where life can exist, in the most diverse environments, even in extreme conditions of temperature, pH or salinity.

By means of the application of molecular techniques, we can study microbiomes and pathobiomes. Said studies allow the identification of changes in bacterial and viral diversity, as well as in microorganism community structures, their interrelation and function. Such changes are useful indicators for assessing the impact that climate change, pollution and other anthropogenic activities have on microbial communities.

INNOVATIVE ASPECTS AND CURRENT STATE OF DEVELOPMENT

Metagenomics allows the identification of microorganisms that are present in samples directly collected from the environment, including unculturable microorganisms. The main advantage of metagenomics over culture-dependent techniques, is that the latter only allow the isolation of microorganisms that may represent barely a small fraction of bacterial and viral inhabitants in natural environments.

However, in microorganism communities made up of closely related strains, the proper identification of microorganisms by means of metagenomics analysis can become a trouble. Furthermore, this technology has limitations in the identification of viral populations. Said challenges can be overcome by means of single-cell genomics techniques, which our group has adapted to viral communities. In this novel technique, single cells or viruses are sorted by flow cytometry, enabling the analysis of their genome and/or proteome individually.

Moreover, the application of microfluidics in molecular techniques has allowed the volumes of samples required for molecular microbial ecology studies to be considerably reduced.

APLICACIONES DE LA OFERTA

Our developments have application, among others, in the following sectors:

Environmental sector: Changes in bacterial and viral diversity and in microorganism community structures are useful indicators for assessing the environmental impact of anthropogenic activities, such as fish farming, as well as of the effect of global warming in ecosystems.

Medicine and Health: Gut microbiota has proved to play a key role in the effectiveness of therapies against diseases such as cancer. Therefore, knowledge on human microbiome, e.g., associated to gut, skin or lungs, can be crucial in the development of new therapies. In addition, the development of antibiotic resistance genes by pathogenic microorganisms is a problem of increasing concern. Early identification of these genes and their possible spread, for example through sewage, is of great importance and one of the objectives of the European Union.

Drinking water supply and sewerage: The formation of biofilms in drinking water supply storage and piping systems is a drawback, both from the sanitary and the supply efficiency point of view. The evaluation of biofilm formation and the application of procedures to prevent their formation are of great importance, not only for the drinking water supply sector, but also for other industries that require this type of facilities, such as the

food industry. In this sector, in addition, the detection of active pathogens in food is also paramount.

Blue economy: Blue biotechnology is considered a suitable opportunity for the European Union's economic recovery. Knowledge of marine biodiversity and its functions can promote the development of new pharmaceuticals, enzymes and other products of high industrial interest that, in addition, are capable of withstanding extreme environmental conditions.

COLABORACIÓN BUSCADA

We are interested in establishing the following collaborations:

Establishment of R&D&I projects with research organisations (public or private), with the aim of opening new lines of research or implementing novel technological developments.

Conducting technical reports and scientific advice for companies.

Specific training in the area of characterization of microbial communities in extreme environments (marine, hypersaline).

Standardization, calibration, development of national and international technical standards, etc.

Technological support in those techniques that require high training or sophisticated equipment that are not available to the applicant company.

Exchange of personnel for defined periods of time (to learn a technique, etc.).

Rental of the laboratory's equipment to customers who wish to carry out their own tests.

More information: https://mme.scienseed.com/

This technology offer has been drafted in the framework of the project INNTA1/2020/25, financed by Agència Valenciana de la Innovació.