

## ***Progress of Microbial Ecology in Chile***

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### **Scientific society**

There aren't any specific, or independent scientific societies dedicated to Microbial Ecology in Chile per se; nevertheless, the "Sociedad de Microbiología de Chile (SOMICH)" (The Microbiology Society of Chile) (<http://www.somich.cl/>), is the main society that has grouped the main researchers involved in Microbial Ecology. However, the "Sociedad de Ecología de Chile" (The Ecology Society of Chile) (<http://www.socecol.cl/>), the "Sociedad Chilena de Ciencias del Mar" (The Marine Science Society of Chile) (<http://www.schcm.cl/>), and the "Sociedad de Bioquímica y Biología Molecular de Chile" (<http://www.sbbmch.cl/>) (The Biochemistry and Molecular Biology Society of Chile) also include topics related to Microbiology and specifically related to microbial ecology research. These four societies have annual meetings, and SOMICH is in charge of the organization of what is called "Colloquiums of Microbiology", that is carried out in two cities, Santiago and Valparaiso. In those colloquiums, Microbial Ecology and Environmental Microbiology are topics regularly present.

### **Research activities**

Currently, various activities within the field of microbial ecology are under development in Chile. In the last 30 years, a growing number of researchers have been interested in developing topics related to Biotechnology and Microbiology from a microbial ecology viewpoint. This field has developed topics that range from: biodegradation and bioremediation of chloroaromatics; bioleaching of copper; soil microbiology; marine and freshwater Harmful Algal Blooms; marine microbiology, focusing on microbial diversity of environments impacted by high copper levels and oxygen minimum zones; ecology and diversity of the pathogen *Vibrio parahaemolyticus*; biofilms development; Tellurite resistance mechanisms, as well as other pollutants, amongst others.

Considering that our country is full of contrast in terms of extreme environments, from the driest dessert in the world in the north to the rain forest in the south, studies related to extreme microorganisms are currently under development. Extreme environments, such as hot-springs and Antarctica, are currently under research from a microbial ecology and environmental biotechnology standpoint.

Most of the collaboration in Microbial Ecology is not with other Latin-American countries; the interaction is mainly with: USA, Germany, France, Spain, Sweden, Belgium and Netherland.

### **Education**

In Chile there are 33 traditional, public and private universities and over 30 private non-traditional ones. The top two ranked are: Universidad de Chile and Pontificia Universidad Católica de Chile. Among these Universities, the main undergraduate programs associated to Microbiology are: Biology, Biochemistry, Marine Biology, and Molecular Biotechnology Engineering.

*Degree Program*

The Faculty of Science of the Universidad de Chile offers a PhD Program in Sciences, with a Microbiology specialty.

The Pontificia Universidad Católica de Chile offers a PhD Program in Biological Sciences, with a specialty in Molecular Genetics and Microbiology.

Both programs group the main part of Microbiologist in the country. Foreign students have the opportunity to apply to these programs with fellowships offered by the Universities and ones that are State-funded; also, the Universidad de Chile has been sponsored through fellowships and exchange scholarships for scientists by the DAAD of the German government.

### **Practical applications**

In Chile – one of the principal copper producers in the world -, the main practical application related to Microbial Ecology with high biotechnological perspectives is Copper bioleaching. Numerous topics in this area, such as genomic research and physiology, are under continuous development.

Other fields, such as bioremediation and water treatment, are also important and have many research groups in charge of developing these topics, as well as their applications for improving the environment.

Other outcomes associated with microbial ecology and microbial biotechnology, are related to molecular diagnostics for detection of microbial infections and vaccine development. Bioprospection and the search for novel microorganisms and products with relevance in pharmaceutical industry are still incipient. However, Chile has enormous potential in microbial biodiversity due to the extreme and diverse environments which hopefully will be studied deeply in the near future.

### **Future prospects and International relations**

Microbial ecology research, especially focused in environmental issues is, in my opinion, the main challenge for the future in Chile. The problems provoked by the pollution of drinking water and soil are itself multidisciplinary, where microbial ecology research is the key discipline to address such issues. Strengthening the ongoing collaborations with American and European groups will, of course, critical for advancing towards finding solutions and a better understanding of these concerning matters.

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