

ECOLOGY & DIVERSITY OF MICROORGANISMS

FECHA: enero 03 al 21, 2000
PROGRAMA RESPONSABLE: Postgrado en Oceanografía & Microbiología
IDIOMA: Inglés & Español

WELCOME

to the first Latin American postgraduate course on the "ECOLOGY AND DIVERSITY OF MICROORGANISMS". During the next three weeks we would like to make you aware of the impressive diversity in metabolic activities of microbes; convince you that microbes rule the world and illustrate this by showing how microbes interact to do their job optimally. Interaction will be the main theme of the course, interactions between microbes, but also between microbes and the environments which they inhabit and between microbes and their animal and plant hosts. Lively interactions between students and faculty are also important to make the course a success. Teachers and symposium speakers are here to pass on to you some of their excitement about microbiology, and they will attempt to teach you why they hunt for, tame and study microbes. They encourage you to fully exploit the opportunities which are offered by the course. The tight schedule over the next three weeks will give you ample opportunities to do it.

COURSE OBJECTIVES

The purpose of the course is to provide an overview of the many facets of the exciting field of microbial ecology and diversity by bringing together various aspects of environmental and, in a few cases, clinical and health oriented microbiology. Since a major goal of the course is to initiate contacts between scientific fields which are not usually combined it encourages a rapprochement between various areas of environmental microbiology.

COURSE DESCRIPTION

We will emphasize the marine environment, but not exclude other interesting microbial ecosystems available at various sites in the Concepción area. Some lectures will illustrate the importance of microbes as living environmental agents and as partners in microbe-animal interactions, others will emphasize the roles microbes play in global geochemical cycles. Understanding microbiology will open new insights into the history of life on earth and possibly suggest new approaches to discovering life on other planets. A better understanding of microbes promises to provide an array of new products and processes as well as a better awareness of the microbial biosphere, which is the earth's life support system.

COURSE STRUCTURE

The course comprises lectures in the morning, laboratory work in the afternoon and colloquia in the evening. Preparatory discussions and exercises on particular course subjects are offered during the course and research themes will be discussed during the minisymposia on saturday mornings.

The laboratory work is investigative, i.e. we would like to discover new microbes and understand their activities. It is designed to educate students about current techniques and to encourage independent research. The students will carry out investigations with faculty assistance or independently in groups.

The course requires complete student participation in all aspects of the program for the full duration of the course. Proficiency in the English language is essential. Course work begins early in the morning and may typically run late into the evening. There is little time for much else but course work.

CREDIT REQUIREMENTS

- (1) active participation in the course,
- (2) a written report describing the outcome of the group project(s) and
- (3) successful completion of a short oral exam at the end of the course.

LANGUAGE

English (Spanish on request)

LOCATIONS AND TIME

Classes:	Start at 09.00 in the lecture room of the Microbiology Department
Laboratory work:	Afternoons in the course lab and in the labs of the course staff at the Microbiology Department
Colloquia:	Lecture room of the Microbiology Department and computer laboratory of the Oceanography Department
Field trips:	Special schedule
Minisymposia:	Saturday, January 8 and January 15 in the lecture room of the Microbiology Department

COURSE STAFF

Coordinator: José Stuardo, Universidad de Concepción, Departamento de Oceanografía

Directors:

Maria Angelica Mondaca, Universidad de Concepción, Chile, Facultad de Ciencias Biologicas

Kurt Hanselmann, University of Zürich, Switzerland, Institute of Plant Biology/Microbiology

Course faculty and course research projects offered

The teaching staff is drawn from microbiologically oriented research institutions on campus and from abroad.

Kurt Hanselmann, University of Zürich - Phototrophic and anaerobic microbial food chains

Gerardo González, Universidad de Concepción - Antibiotic resistance genes in the environment

Miguel Martinez, Universidad de Concepción - Aerobic degradation of chlorinated xenobiotics

Maria Angelica Mondaca, Universidad de Concepción - Microbial sensitivity and adaptation to heavy metals

Carlos Smith, Universidad de Concepción - Immunobiological responses to stress in fish

Homero Urrutia, Universidad de Concepción - Anaerobic bacteria from methylamin-degrading biofilms

Invited course lecturers

Ricardo Barra, Universidad de Concepción - Environmental compartments

Apolinaria Garcia, Universidad de Concepción - Structure and function of cell wall lipopolysaccharides

Carlos González, Universidad de Concepción - Bacterial structures and virulence

Minisymposia: Speakers and their subjects

Ricardo Barra, In search for evidence of long range atmospheric transport of pollutants in Chile

Leonardo Castro, Introduction: Microbiology and Oceanography

Victor Gallardo, Relationship between ENSO and Thioploca

Gerardo González, Antibiotic resistance in nosocomial gram-negative bacteria

Kurt Hanselmann, Toxic cyanobacterial biofilms in oligotrophic environments and Iron and sulfur regulated phosphorus cycling at sediment water interfaces

Rolf Kummerlin, Pathogen detection made simple

Verónica Madrid, Parasites in freshwater used as sources of drinking water

Miguel Martinez, Chlorophenol degradation by bacteria isolated from Bio-Bio river

Maria Angelica Mondaca, Chromate reduction by *Serratia marcescens* isolated from tannery effluents

Angel Oñarte, Vaccines for the new millenium

Silvio Pantoja, Extracellular hydrolysis of peptides in seawater and sediments

Jaime Rodriguez, Lignin degradation by microorganisms

José Stuardo, Introduction: Postgraduate education in Oceanography

Alfredo Troncoso, Bacterial secondary production in the Humbolt current

Homero Urrutia, Methanogenic biofilms designed for sulfate-containing industrial effluents

WHAT THE COURSE ATTEMPTS TO OFFER

- An introduction to microbial diversity and ecology
- A discussion on some molecular techniques and on how they are related to cultivation-based approaches
- An examination of the strengths and limitations of approaches used to describe diversity, e.g.
 - Why molecular techniques do not replace cultivation but complement it
 - How cultivation attempts can be made successful
- Investigations of interesting microbial ecosystems on field trips
- An emphasis on the marine environment and other microbial ecosystems present in the area

WHAT THE COURSE SHOULD LEAD TO

- Make the student aware of the diversity in metabolic activities and of interactions between microbes and between microbes, animals and plants
- Give the student insights into the history of life on earth and on approaches to discovering life on other planets
- Make the student respect the microbial biosphere as the earth's life support system
- Make the student understand microbial diversity as a provider of an array of new products and processes
- Initiate new ways to discover infectious causes of diseases not previously recognized as microbial in origin
- Open up contacts between scientific fields which are not usually combined

WHAT WE INTEND TO TEACH

- How microbes behave in their natural environments
- The role of microbes in global geochemical cycles
- Some of the more unusual cultivation techniques as well as cultivation of interesting microorganisms
- Microbial diversity as a critical aspect of future environmental and medical research
- Microbial diversity as the basis for emergence of infectious diseases and increasing antibiotic resistance
- Experience in "frontier" research

WHAT THE COURSE DOES NOT DO

- Cover all microorganisms
- Cover all techniques currently being used in diversity studies; we will focus on cultivation
- Offer exercises with known outcomes; we intend to investigate and discover

HOW THE COURSE IS ORGANIZED

- Lectures (morning), Lab exercises (afternoon), Workshops (evening), Group reports (end of course)
- Field trips (whenever appropriate)
- Minisymposia (Saturday morning)
- Work in groups of 2 to 3 students on a specific project
- Student input is important

LAB BEHAVIOR

- We will be guests in laboratories of the Microbiology Department: Civility and consideration at all times
- Help in keeping clean glassware on shelves; consider the needs of others
- Treat microbiological waste appropriately; autoclave before disposal
- Think ahead, plan your experiment; if you aren't sure, ask
- Teachers are here to facilitate your work

COURSE DOGMA

- There are no uncultivable microorganism, only scientists who have not been persistent enough to try
- DNA sequence information works best as a hypothesis generator
- Your input is important
- Have reasonable expectations