United Nations Educational, Scientific and Cultural Organization
Organisation des Nations Unies pour l=Education, la Science et la Culture

I C R O INTERNATIONAL CELL RESEARCH ORGANIZATION
ORGANISATION INTERNATIONALE DE RECHERCHE SUR LA CELLULE

INTERNATIONAL PRACTICAL AND THEORETICAL COURSE ON
GENOMICS, PROTEOMICS AND BIOINFORMATICS

Santiago, Chile
October 11-23, 2005

Organized by the Instituto de Ciencias Biomédicas, Facultad de Medicina, Universidad de Chile.

Sponsors: International Union of Biochemistry and Molecular Biology, the PanAmerican Association of Biochemistry and Molecular Biology, the Chilean Society of Biochemistry and Molecular Biology, the MECESUP Project of the Doctoral Program in Biomedical Sciences, the FONDAP Center for Molecular Studies of the Cell, the Latin American Network of Biological Sciences (RELAB), the International Cell Research Organization (ICRO), European Molecular Biology Organization (EMBO).

Course Organizer: Dr. Jorge E. Allende

Organizing Committee: Dra. Pilar Carvallo, Pontificia Universidad Católica de Chile
Dra. Rosa Deves, Facultad de Medicina, Universidad de Chile
Dra. Cecilia Hidalgo, Facultad de Medicina, Univ. de Chile
Dr. Enrique Jaimovich, Facultad de Medicina, Univ. de Chile
Dra. Eugenia Jedlicki, Facultad de Medicina, Univ. de Chile
Dr. Raul Aguirre, Facultad de Medicina, Universidad de Chile
Dr. Omar Orellana, Facultad de Medicina, Univ. de Chile
Dr. Andrew Quest, Facultad de Medicina, Universidad de Chile
Dr. Angel Spotorno, Facultad de Medicina, Univ. de Chile
Dr. Hector Toledo, Facultad de Medicina, Universidad de Chile
Dr. Roberto Vidal, Facultad de Medicina, Universidad de Chile

Objectives:
1) to provide hands-on training for young Latin American biologists on some of the recently developed techniques for the study of functional and comparative genomics
2) To acquaint the course participants with recent developments, experimental models and techniques being employed in genomics and bioinformatics

PRACTICAL COURSE
The practical part of the course will require 80 hours of work at the bench or the computer by the

students. They will work on 4 different topics:
1) The use of microarrays as a tool to analyze genome scope responses.
Students will learn how to extract RNA, hybridize and interpret the results obtained in a microarray reader. There will also be experiments with DNA-DNA hybridizations to detect mutations
Invited Instructor : Dr. David Monroe (NIH, Bethesda, USA)
Local Staff: Raúl Aguirre (U. de Chile), Pilar Carvallo (PUC), Ulises Urzúa (U. de Chile)
Raquel Quatrini (Instituto Milenio de Biología Fundamental y Aplicada)
2) Comparative genomics through computer analysis of gene sequences.
Students will use known sequences of mitochondrial DNAs and of other genes of marsupial animals and software MEGA and PAUP to construct a phylogenetic tree of these animals.
They will also look at human diversity through analysis of mitochondrial DNA and compare genomes of bacteria.
Invited Instructors: Douglas Wallace (USA), Ramón Rosello Mora (CSIC, Spain)
Local Staff: Angel Spotorno (U. de Chile), Roberto Vidal (U. de Chile)
3) Techniques of automatic and hand-curated annotation of microbial genomes. Techniques of automatic and hand-curated reconstruction of metabolic pathways.
Students will experiment with automatic identification of ORF, putative gene functions, ribosome binding sites, rho independent stops, promoters, transcription factor binding sites, structural RNA genes, regulatory RNA genes, origin of replication, repeats, chromosome organization, GC skew, lateral gene transfer.

Metabolic Reconstruction
Automatic and hand curated metabolic reconstruction techniques, identifying missing gene assignments, identifying missing metabolic components, gene clustering, gene neighbors, Rosetta Stone sequences, phylogenetic footprinting. Regulatory pathway reconstruction. Synteny, multi-genome comparisons.
The above will be accompanied by hands-on exercises in the internet. A knowledge of the family of Blast programs is required (BlastP, BlastN, BlastX, TblastN, psi-Blast and phi-Blast)
Invited Instructors: Michael Galperin (NCBI - USA), Georges Cohen (Institut Pasteur, France)
Local Staff: David Holmes (Universidad Andrés Bello e Instituto Milenio de Biología Fundamental y Aplicada), Eugenia Jedlicki, Omar Orellana (U. de Chile)

4) Proteomic Analysis
The students will carry out two-dimensional gel electrophoresis experiments to analyze the proteome of bacteria under different conditions. The students will also participate in a demonstration of the use of mass spectrometry to identify protein and peptide fragments.
Invited Instructor : Jay Heinecke (Univ. Washington, USA)
Local Staff: Hector Toledo, Andrew Quest, Lisette Leyton (Univ. de Chile)

<u>THEORETICAL COURSE</u>
The theoretical aspect of the course will consist of 10 classes (one per day) and participation in an international symposium:
1) The possibilities and limitations of the micro array technology (David Munroe – NIH – USA)
2) Protein interactions – Structuring the complexity of cellular circuits (Chris McMaster – Dalhouise, Canada)
3) Mass Spectrometry as a tool for proteomics (Jay Heinecke – Univ. Washington, Seattle)
4) Genomics of Bacteria – Gene Annotations (David Holmes -Universidad Andrés Bello e Instituto Milenio de Biología Fundamental y Aplicada)
5) Comparative Genomics of Bacteria (Ramon Rosello Mora – CSIC-Spain)
6) Bioinformatic Data mining of genomics (Michael Galperin – NCBI-USA)
7) Small RNAs in the study of functional genomics – (James Dalberg, U. Wisconsin, USA)

8) The complexities of Calcium Signalling (Cecilia Hidalgo, U. de Chile)
9) The eukaryotic Kinome (Jorge E. Allende – U. de Chile)
10) Comparative Genomics of Eucaryotes (Douglas Wallace, Emory Univ., USA)

Symposium: The Post Genomic Frontier
Invited Speakers: *James Dahlberg, Marshall Nirenberg, *Elsebet Lund, * David Munroe, *Jay Heinecke, *Heiner Westphal, * Martin Keller, * Martin Keller, *Douglas Wallace, *Michael Galperin, Dieter Söll - USA; *Chris McMaster - Canada; Alberto Kornblihtt - Argentina; Julio Celis - Denmark; *Georges Cohen - France; Mari Sogayar - Brazil; *Ramon Rosello Mora - Spain
from Chile: *Angel Spotorno, *Pilar Carvallo, *Omar Orellana, *Enrique Jaimovich, *Andrew Quest, *Hector Toledo, *Eugenia Jedlicki, *David Holmes, Martin Montecinos, Juan Olate, *Cecilia Hidalgo.
(* have agreed in principle to participate).

Applications to participate as a student:
The practical part of the course will be limited to 20 Students: 10 from Chile and 10 from other Latin American Countries
The course is designed for doctoral or post-doctoral trainees that already have some training in molecular biology and that need to apply techniques of genomics, proteomics and bioinformatics to their specific research topics. Applicants should have a working knowledge of English.

Applications should be sent by May 15, 2005 to Dr. J.E. Allende (email : jallende@abello.dic.uchile.cl) and should include:

- CV detailing University training and research experience (publications)
- 2 Letters of recommendation from their supervisors or professors who know their research capacities
- One page in which the applicant explains why he/she thinks that the course topics are particularly relevant to his/her research work.
- Some evidence that the applicant can handle instruction and conversation in English.
- An indication whether the applicant will require a total or a partial fellowship to be able to attend the course.

There will be a limited number of fellowships for foreign students that will cover travel and living expenses.

Student Activities:
1) Pre-Course Tutorials
The accepted students will be required to go through some simple tutorial exercises in bioinformatics through the Internet previous to the course so that they can manage some of the exercises that they will do during the course.
2) Students are expected to present a poster.

Selection of Applicants:
The applicants will be selected by a Committee composed of two local organizers and 2 visiting professors.
The criteria for selection are: excellence of CV, age, geographic distribution and pertinence of the topics of the course to the candidate's own research work.

The course will be announced in the WEB site of the Faculty of Medicine, University of Chile: www.med.uchile.cl