Bioinformatics and Comparative Genome Analysis
July 5 - July 17, 2010
Institut Pasteur Paris

Organizers:
• Odile Kalogeropoulos, Institut Pasteur Paris - France;
• Julie Thompson, IGBMC, Strasbourg - France;
• Hugo Naya, Institut Pasteur de Montevideo - Uruguay;
• Fredj Tekaia, Institut Pasteur Paris, France.

Course web page: http://www.pasteur.fr/~tekaia/BCGA2010.html
Financial support:

Institut Pasteur

international network Institut Pasteur
The international network of Pasteur Institutes
Arrows show countries of the selected students

Arrows show countries of the invited speakers
Practical matters

• Access to Institut Pasteur is controlled;

• Meeting at 8:15 am at the gate: 25, rue du Dr Roux, to get your badge.

• Welcome address at 9 am by Pr Anthony Pugsley (Scientific Director).

• Photos for your badge: 9:30-10 am;

• Lectures and practical sessions in Module 5;

• Last 2 days conferences in Amphitheatre Jacques Monod;

• You should have your badge always visible;
Practical matters

• Breakfast (Hotel)

• Lunch at the cantine (need your badge) (not open Saturday, Sunday and July 14th)

• Dinners at nearby restaurants (see list and tickets; keep invoice of each meal - give back unused tickets)

• Free days (free activities);

• Security: safe, but be alert…
Goals of the course

- Create class atmosphere
- Generate interactivity
- You make the course
- Learn new ideas/Exchange ideas
- Establish new collaborations
Lectures / Practical sessions

- Preparation is key
- Ask questions
- Make comments
- Concentration/application
- Develop critical analysis

We expect to have a lively course
Personal

- On time
- Full time presence
- Respectful of rules
- Solidarity (mix backgrounds)
- No cell phones
- Ethical use of Internet.
Course evaluation

• Questionnaire for the course evaluation:

  Complete it carefully and give it to me on July 16th during the last session (5-6 pm).

  (Avoid bias: evaluation is personal, no group evaluations!)

• During the last session (9-10 am, July 17th): you will present your course evaluation in 1/2 slides:

  what you learned, your overall impression of the 2 weeks course and your suggestions for future course organisations.

• The overall analysis of the questionnaire results will be presented.

• Presence is mandatory: presence certificates will be distributed.
Social activities:

• Visit “Spirit of Pasteur” modern art exhibition, July 7 (7-8pm)
• Drink party, July 9th at 6 pm;
• Free day: July 11th;
• Visit the Pasteur Museum, July 12th (2 - 3 pm);
• Drink party, July 13th at 7 pm;
• Free day (French National Holyday), July 14th;
• Drink farewell in the prestigious “Salle des Actes”, July 16th at 6 pm.
• Free afternoon, July 17th.
Thanks

Institut Pasteur

international network
Institut Pasteur
Introduction

Bioinformatics and Comparative Genome Analysis

Fredj Tekaia
Institut Pasteur
tekaia@pasteur.fr

Bioinformatic and Comparative Genome Analysis Course
Institut Pasteur Paris
July 5 - July 17, 2010
Bioinformatics and Comparative Genome Analysis

July 5 - July 17, 2010

Institut Pasteur Paris

Organizers/Contact:

• Odile Kalogeropoulos, Institut Pasteur Paris - France;
• Julie Thompson, Institut of Genetics and Molecular and Cellular Biology (IGBMC) Strasbourg - France;
• Hugo Naya, Institut Pasteur de Montevideo - Uruguay;
• Fredj Tekaia, Institut Pasteur Paris, France.

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Why this course?
Complete genomes
7607 projects
• 1297 published
(06/15/10)
• 4536 Bacteria
• 203 Archaea
• 1339 eukaryotes
• 232 metagenomes

http://www.genomesonline.org/
Complete Genomes sequencing projects that span the three domains of life are growing at a rapid rate.

http://www.genomesonline.org/gold.cgi
Mathematics

Statistics

Bioinformatics

Nucleotide & protein sequences and related informations

Biology

Informatics
The main objectives of the course are to familiarize participants with bioinformatics and large scale genome data analyses skills by introducing:

1- advanced fundamental algorithms used in Bioinformatics;

2- their application in genome analyses;

3- recent knowledge acquired from genomes studies and their perspectives.
Main Lecture/practical topics include:

• Genomes comparisons == evolution
  - Technical aspects - writing scripts;
  - Available genomes;
  - Methods applied to families of genes/proteins:
    multiple alignments, phylogeny analyses, motifs search (genome/gene);
  - Adaptive evolution (selection pressure);
  - Determination of families of paralogs - of orthologs
• Genomes alignments;
• Genome visualization (Cytoscape and Circos).
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<th>Day</th>
<th>Date</th>
<th>9H00-10H30</th>
<th>11H00-12H30</th>
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<tbody>
<tr>
<td>Sunday</td>
<td>July 4</td>
<td>Welcome</td>
<td>Hotel check in</td>
<td>Hotel check in</td>
<td>Hotel Check in</td>
<td>Perl</td>
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<tr>
<td>Monday</td>
<td>July 5</td>
<td>Anthony Pugley Scientific Director</td>
<td>Welcome</td>
<td>Hotel check in</td>
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<td>Perl Fredj Tekapia</td>
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<td>Introduction and overview of the course</td>
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<td>Tru Huynh Institut Pasteur Paris</td>
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<td>Fredj Tekapia Students self introduction</td>
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<td>Tuesday</td>
<td>July 6</td>
<td>Unix/Perl (Practical) Genome Analysis</td>
<td>Whole Genome Databases (Review)</td>
<td>Whole Genome Databases (Practical)</td>
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<td>Fredj Tekapia</td>
<td>Helene Chiapello INRA, Jouy en Josas - France</td>
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<td>Institut Pasteur Paris</td>
<td>Gary Benson</td>
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<td>Wednesday</td>
<td>July 7</td>
<td>Finding Motifs (Review)</td>
<td>Finding Motifs (Practical)</td>
<td>Multiple Sequence Alignments (Review)</td>
<td>Multiple Sequence Alignment (Practical)</td>
<td>Gary Benson</td>
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<td>Gary Benson Boston University Boston, USA</td>
<td>Gary Benson</td>
<td>Julie Thompson IGBMC, Strasbourg - France</td>
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<td>Thursday</td>
<td>July 8</td>
<td>Phylogenetic Reconstruction (Review)</td>
<td>Phylogenetic Reconstruction (Practical)</td>
<td>Large-scale genome comparisons (Practical)</td>
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<td>Friday</td>
<td>July 9</td>
<td>Whole genome alignment (Review)</td>
<td>Whole Genome Alignment (Practical)</td>
<td>Whole Genome Alignments (Practical)</td>
<td>Orthologs Prediction and Classification (Review)</td>
<td>Social activities</td>
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<td>Inna Dubchak Genomic Division Lawrence Berkeley National Laboratory Berkeley, CA - USA</td>
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<td>Christophe Dessimoz ETH, Zurich - Switzerland</td>
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<tr>
<td>Saturday</td>
<td>July 10</td>
<td>Orthologs Prediction and Classification</td>
<td>Orthologs Prediction and Classification</td>
<td>Cytoscape (Review)</td>
<td>Cytoscape (Practical) Mathieu Michaud</td>
<td>Extension - QA</td>
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<td>(Practical) Christophe Dessimoz ETH, Zurich - Switzerland</td>
<td>(Practical) Christophe Dessimoz ETH, Zurich - Switzerland</td>
<td>Mathieu Michaud</td>
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<td>Sunday</td>
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| Monday  | July 12 | Adaptive Molecular Evolution (PAML4)  
Ziheng Yang  
University College London - UK | Adaptive Molecular Evolution  
Ziheng Yang  
University College London - UK | Visi Pasteur Museum (1h)  
Adaptive Molecular Evolution  
Ziheng Yang  
University College London - UK | Adaptive Molecular Evolution (Practical)  
Ziheng Yang  
University College London - UK | Extension - QA |
| Tuesday | July 13 | Genomes Visualization with circos  
Martin Krzywinski  
Genome Sciences Centre  
Vancouver - Canada | Genomes Visualization with circos:  
- Circos preamble  
- Ideogram Layout  
Martin Krzywinski  
Genome Sciences Centre  
Vancouver - Canada | Genomes Visualization with circos:  
Data Tracks  
Martin Krzywinski  
Genome Sciences Centre  
Vancouver - Canada | Genomes Visualization with circos:  
Links and Rules  
Martin Krzywinski  
Genome Sciences Centre  
Vancouver - Canada | Social activities |
| Wednesday | July 14 | Free | | | | |

Week 2 (July 12 - July 17): Comparative Genomics (Methods - Applications)
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<tr>
<td>Thursday</td>
<td>July 15</td>
<td>Realistic models and efficient algorithms in Bioinformatics/Biophysics.</td>
<td>Bioinformatics and Genomics</td>
<td>Bioinformatics and Systems Biology</td>
<td>Exploring rare variation in regions of association - tools and challenges</td>
<td>Extension - QA</td>
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<td>Analysis of Genomes on structural bases</td>
<td>John Quackenbush</td>
<td>Approaches for Disease Study</td>
<td>Panagiotis Deloukas</td>
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<td>Edouard Yeramian Institut Pasteur</td>
<td>Harvard School of Public Health - Boston - USA</td>
<td>Ueng-Cheng Yang</td>
<td>The Wellcome Trust Sanger Institute, Cambridge, UK</td>
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<td>Friday</td>
<td>July 16</td>
<td>Eukaryotic Genomes Evolution, an approach with hemiascomycetous yeasts</td>
<td>Origins of New Genes</td>
<td>Synteny and Reconstruction of Ancestral Genomes</td>
<td>Georges Cohen</td>
<td>Social activities</td>
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<td>Jean-Luc Souciet Universite de Strasbourg, France</td>
<td>Aoife Molysaght</td>
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<td>Smurfit Institut of Genetics</td>
<td>Institut de Biologie de l'Ecole Normale Superieur (IBENS)</td>
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<td>Saturday</td>
<td>July 17</td>
<td>Course evaluation (Students) Questionnaire (Organizers and Students)</td>
<td>Course evaluation (Students) Questionnaire (Organizers and Students)</td>
<td>Free</td>
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<td>Sunday</td>
<td>July 18</td>
<td>Hotel check out</td>
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Thanks

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