

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 Tekaiia**, Institut Pasteur Paris, France.

Course web page: <http://www.pasteur.fr/~tekaia/BCGA2010.html>

Financial support:



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The international network of Pasteur Institutes





The World POLITICAL

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



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Introduction

Bioinformatics and Comparative Genome Analysis

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Organizers/Contact:

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Why this course ?

BACTERIA

1085

ARCHAEA

83

Complete genomes

7607 projects

• 1297 published

(06/15/10)

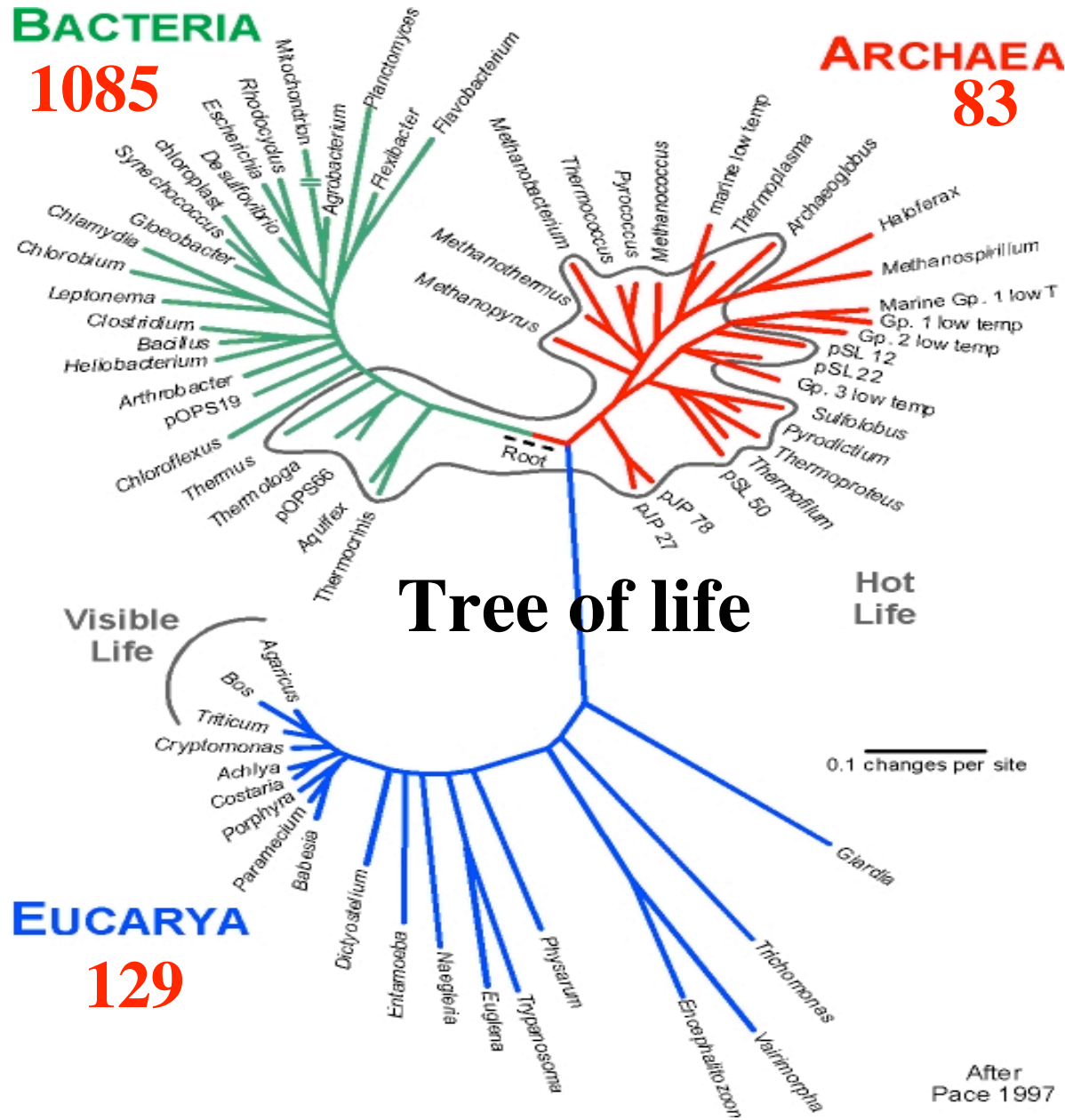
• 4536 Bacteria

• 203 Archaea

• 1339 eukaryotes

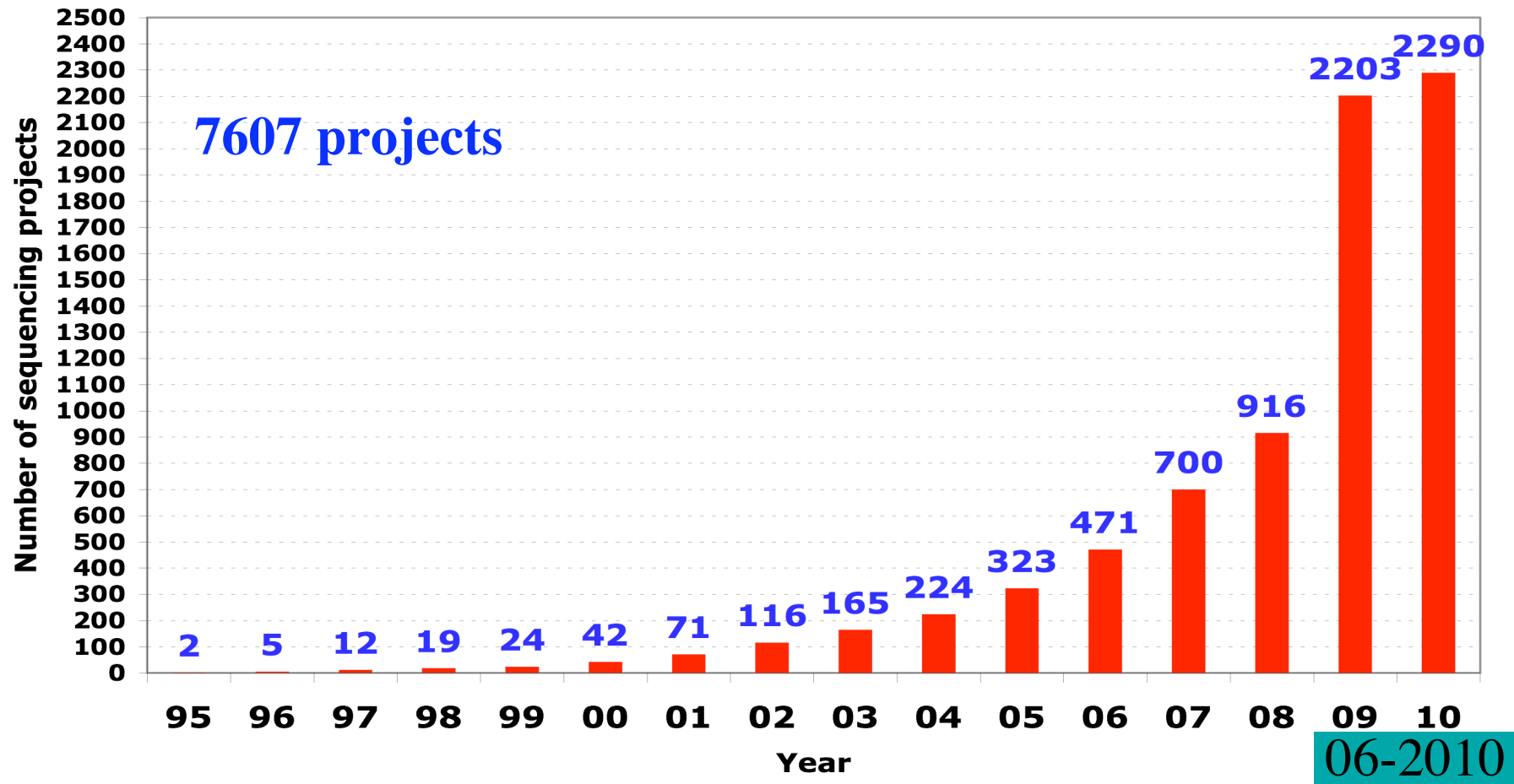
• 232 metagenomes

• 3 phylogenetic domains;



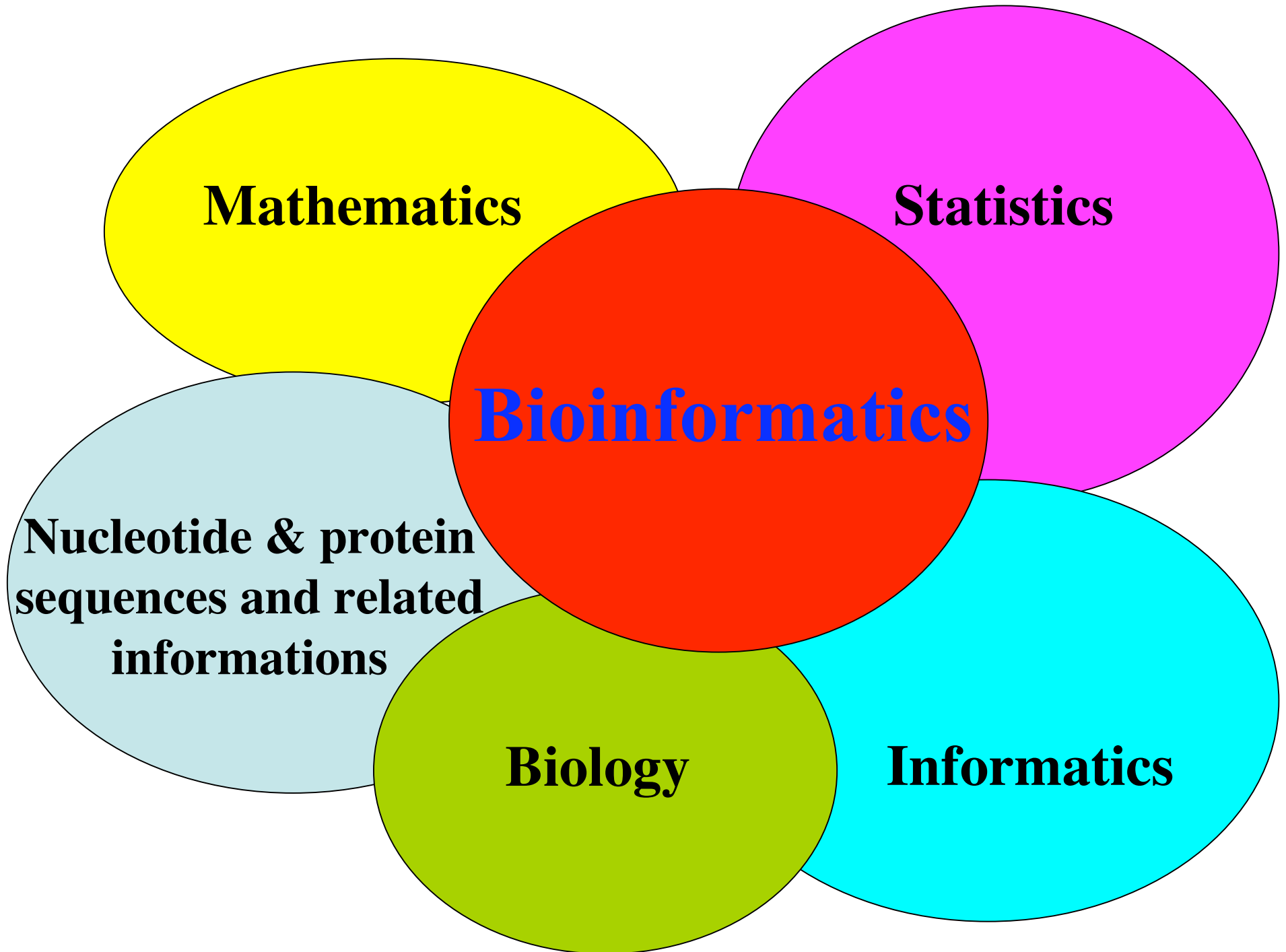
<http://www.genomesonline.org/>

Number of complete genome sequencing projects



Complete Genomes sequencing projects that span the three domains of life are growing at a rapid rate

<http://www.genomesonline.org/gold.cgi>



Bioinformatics and Comparative Genome Analysis

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).

Week 1 (July 5 - July 17): Background: Material and Methods

Day	Date	9H00-10H30	11H00-12H30	14H30-16H00	16H30-18H00	18H00-19H00
Sunday	July 4			Hotel check in	Hotel check in	Hotel Check in
Monday	July 5	Welcome Anthony Pugsley Scientific Director Introduction and overview of the course Fredj Tekaia Students self introduction	UNIX Tru Huynh Institut Pasteur Paris	UNIX Tru Huynh Institut Pasteur Paris	Unix/Perl Tru Huynh Institut Pasteur Paris	Perl Fredj Tekaia
Tuesday	July 6	Unix/Perl Minimum to know Fredj Tekaia Institut Pasteur Paris	Unix/Perl (Practical: Genome Analysis) Fredj Tekaia Institut Pasteur Paris	Whole Genome Databases (Review) Helene Chiapello INRA, Jouy en Josas - France	Whole Genome Databases (Practical) Helene Chiapello INRA, Jouy en Josas - France	Gary Benson
Wednesday	July 7	Finding Motifs (Review) Gary Benson Boston University Boston, USA	Finding Motifs (Practical) Gary Benson Boston University Boston, USA	Multiple Sequence Alignments (Review) Julie Thompson IGBMC, Strasbourg - France	Multiple Sequence Alignment (Practical) Julie Thompson IGBMC, Strasbourg - France	Gary Benson
Thursday	July 8	Phylogenetic Reconstruction (Review) Julie Thompson IGBMC, Strasbourg - France	Phylogenetic Reconstruction (Practical) Julie Thompson IGBMC, Strasbourg - France	Large-scale genome comparisons (Practical) Fredj Tekaia Institut Pasteur Paris	Large-scale genome comparisons (Practical) Fredj Tekaia Institut Pasteur Paris	Large-scale genome comparisons (Practical)
Friday	July 9	Whole genome alignment (Review) Inna Dubchak Genomic Division Lawrence Berkeley National Laboratory Berkeley, CA - USA	Whole Genome Alignment (Practical) Inna Dubchak Genomic Division Lawrence Berkeley National Laboratory Berkeley, CA - USA	Whole Genome Alignments (Practical) Inna Dubchak Genomic Division Lawrence Berkeley National Laboratory Berkeley, CA - USA	Orthologs Prediction and Classification (Review) Christophe Dessimoz ETH, Zurich - Switzerland	Social activities
Saturday	July 10	Orthologs Prediction and Classification (Practical) Christophe Dessimoz ETH, Zurich - Switzerland	Orthologs Prediction and Classification (Practical) Christophe Dessimoz ETH, Zurich - Switzerland	Cytoscape (Review) Mathieu Michaud	Cytoscape (Practical) Mathieu Michaud	Extension - QA
Sunday	July 11	Free				

Week 2 (July 12 - July 17): Comparative Genomics (Methods - Applications)

Day	Date	9H00-10H30	11H00-12H30	14H30-16H00	16H30-18H00	18H00-19H00
Monday	July 12	Adaptive Molecular Evolution (PAML4) Ziheng Yang University College London UK	Adaptive Molecular Evolution Ziheng Yang University College London - UK	Visit 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 15 - July 16): Lecturers on "What did we learn from genomes studies and perspectives"

(Amphitheatre Jacques Monod: Access is free for interested research community.

Note: Access to the Institut Pasteur is subject to an Identity document presentation)

Day	Date	9H00-10H30	11H00-12H30	14H30-16H00	16H30-18H00	18H00-19H00
Thursday	July 15	Realistic models and efficient algorithms in Bioinformatics/Biophysics. Analysis of Genomes on structural bases Edouard Yeramian Institut Pasteur	Bioinformatics and Genomics John Quackenbush Harvard School of Public Health - Boston - USA	Bioinformatics and Systems Biology Approaches for Disease Study Ueng-Cheng Yang National Yang-Ming University, Taipei - Taiwan	Exploring rare variation in regions of association - tools and challenges Panagiotis Deloukas The Wellcome Trust Sanger Institute, Cambridge, UK	Extension - QA
Friday	July 16	Eukaryotic Genomes Evolution, an approach with hemiascomycetous yeasts Jean-Luc Souciet Universite de Strasbourg, France	Origins of New Genes Aoife Mclysaght Smurfit Institut of Genetics University of Dublin Trinity College Dublin - Ireland	Syteny and Reconstruction of Ancestral Genomes Hugues Roest Crollius Institut de Biologie de l'Ecole Normale Superieur (IBENS)	Georges Cohen Institut Pasteur Paris	Social activities
Saturday	July 17	Course evaluation (Students) Questionnaire (Organizers and Students)	Course evaluation (Students) Questionnaire (Organizers and Students)	Free	Free	Free
Sunday	July 18	Hotel check out				

Thanks



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