"Genetics of Laboratory Rodents" International Course Final Report

Title of the course

"Genetics of Laboratory Rodents"

Date and place

December 5th - 14th, 2011 – Institut Pasteur de Montevideo - URUGUAY

Organizers

Organizer: Martina Crispo, DVM - Head of the Transgenic and Experimental Animal Unit - Institut Pasteur de Montevideo, Uruguay
Co – organizer: Jean Jacques Panthier, PhD - Unité de Genetique Fonctionelle de la Souris - Institut Pasteur, France

Timetable

Monday Dec 5

09:00 - 09:30 **Opening session**
Dr. M Crispo (co-organizer Institut Pasteur de Montevideo)
Pr. JJ Panthier (co-organizer Institut Pasteur Paris)

09:30 - 11:30 **Lecture:** A century of mouse genetics - Origin and diversity of laboratory strains - Different categories of genetically standardized laboratory strains (*JL Guénet*).

11:30 - 11:45 ***Coffee break***

11:45 - 12:30 **Lecture:** The Management of an animal breeding facility *(F Benavides*).

12:30 - 14:00 ***Lunch***

14:00 - 16:30 **Practical session:** Basics of mouse pathology. Mouse necropsy, sampling for histopathology (*F Benavides*).

16:30 - 17:30 **Lecture:** Embryology: early embryos and main steps of mouse development *(M Crispo).*

From 17:30 ***Informal get together***

Tuesday Dec 6

09:00 - 10:30 **Lecture:** Formal genetics – Part 1 *(JJ Panthier).*

10:30 - 10:45 ***Coffee break***

10:45 - 12:30 **Lecture:** Genetic markers and genetic monitoring of inbred strains and outbred stocks *(F Benavides).*
Open discussion on mouse strain polymorphism and the genetic monitoring.

12:30 - 14:00 ***Lunch***

14:00 - 16:00 **Practical session:** Genetic mapping of a recessive mutation *(X Montagutelli, JJ Panthier and M Crispo).*
1) Strategy discussion
2) PCR and preparation of agarose gels

16:00 - 18:00 **Students presentation**

Wednesday Dec 7

09:00 - 10:00 **Practical session:** Genetic mapping of a recessive mutation *(X Montagutelli, JJ Panthier and M Crispo).*
3) Electrophoresis
Coffee

10:00 - 11:30 **Lecture:** Formal genetics – Part 2 *(JJ Panthier).*

11:30 - 12:30 **Practical session:** Genetic mapping of a recessive mutation *(X Montagutelli, JJ Panthier and M Crispo).*
4) Data scoring

12:30 - 14:00 ***Lunch***

14:00 - 15:30 **Practical session:** Genetic mapping of a recessive mutation *(X Montagutelli, JJ Panthier and M Crispo).*
5) Data analysis. Localization of the mutation using GeneLink
6) Discussion: What's next?

15:30 - 15:45 ***Coffee break***

15:45 - 17:15 **Lecture:** Functional Genetics: Experimental Modification of the Mouse Genome. Classical transgenesis in mice (*M Rubinstein*).

Thursday Dec 8

09:00 - 11:00 **Practical session:** Genetic mapping of a recessive mutation *(X Montagutelli, JJ Panthier and M Crispo).*
7) The next step(s).

11:00 - 11:15 ***Coffee break***

11:15 - 12:45 **Lecture:** Embryonic stem cells (Esc): self-renewal, pluripotency. EpiSC, iPS (*M Cohen-Tannoudji*).

12:45 - 14:00 ***Lunch***

14:00 - 15:30 **Lecture:** Mutagenesis in the Mouse and Rat. The large Mutagenesis Scale Projects (JL *Guénet*).

15:30 - 15:45 ***Coffee break***

15:45 - 17:45 **Practical session**: Dissection of embryos at E11.5 and E12.5. Analysis of expression pattern in stained transgenic embryos (*JJ Panthier, M Cohen-Tannoudji*).

Friday Dec 9

09:00 - 11:00 **Lecture**: Functional Genetics: Experimental Modification of the Mouse Genome: Targeted mutagenesis *(M Cohen-Tannoudji).*

11:00 - 11:15 ***Coffee break***

11:15 – 12:30 **Lecture:** Keeping stocks segregating for a transgene. Effects of the genetic background *(X Montagutelli).*

12:30 - 14:00 ***Lunch***

14:00 - 16:00 **Practical session:** Dissection of embryos at E11.5 and E12.5. Analysis of expression pattern in stained transgenic embryos (*JJ Panthier, M Cohen-Tannoudji*).

Monday Dec 12

09:00 - 11:00 **Lecture:** Mouse Quantitative Genetics (*X Montagutelli*).

11:00 - 11:15 ***Coffee break***

11:15 - 12:30 **Lecture:** Positional cloning of a mouse mutation: from mapping to gene identification (*J Jaubert*)

12:30 - 13:30 ***Lunch***

13:30 – 17:00 **Practical session:**
Introduction to the practical session (*M Bollati*)
ES cell culture and *in vitro* Cre mediated deletion using reporter cell lines (*M Bollati, M Crispo, M Cohen-Tannoudji)*.

17:00 – 19:00 **Students presentation**

Tuesday Dec 13

08:30 - 13:00 **Practical sessions:**
Introduction to the practical session (*AR Salgado*)
Session 1: Manipulation of oocytes and early embryos: sperm and oocyte collection and *in vitro* fertilization.
Session 2: Embryo and sperm cryopreservation.
(M Crispo, *J Jaubert and AR Salgado)*

13:00 - 14:00 ***Lunch***

14:00 – 17:00 **Practical sessions:**
Session 1: Mining on-line genetic, sequence and phenotype databases. How to get my desired mouse mutant on the web? (*J Jaubert*).
Coffee
Session 2: ES cell culture and *in vitro* Cre mediated deletion using reporter cell lines (*M Bollati, M Crispo, M Cohen-Tannoudji)*.

17:00 – 18:00 **Practical session:**
Manipulation of oocytes and early embryos: in vitro culture of fertilized embryos *(M Crispo*, *J Jaubert and A R Salgado).*

18:00 – 20:00 **Students presentation**

21:00 **Traditional Dinner**

Wednesday Dec 14

09:00 - 10:00 **Practical sessions:**
Session 1: Manipulation of oocytes and early embryos: results of the *in vitro* fertilization and culture, collection of fertilized embryos (*M Crispo*, *J Jaubert)*.
Session 2: Thawing of embryos (*M Crispo, J Jaubert and AR Salgado*).
Coffee

10:00 - 13:00 **Practical session:**
ES cell culture and *in vitro* Cre mediated deletion using reporter cell lines (*M Bollati, M Crispo, M Cohen-Tannoudji)*.

13:00 - 14:00 ***Lunch***

14:00 - 15:30 **Lecture:** Lentiviral vectors, a potent tool for the generation of transgenic rats (*I Anegón*).

15h30 – 16:30 **Closing remarks**

The Future of Mouse Genetics

- The Collaborative Cross
- The direct identification of mutations using high-throughput sequencing
- Other transgenic technologies: RNAi, ZFN, Transposons.

16:30 – 17:00 **Closing ceremony**

Invited Professors

The teaching team was composed by Scientists from the Institut Pasteur in Paris and Montevideo as well as other regional and international institutions, who are familiar with the topics.

- Jean Jacques Panthier (Institut Pasteur de Paris, France)
- Xavier Montagutelli (Institut Pasteur de Paris, France)
- Jean Louis Guénet (Institut Pasteur de Paris, France)
- Jean Jaubert (Institut Pasteur de Paris, France)
- Michel Cohen Tannoudji (Institut Pasteur de Paris, France)
- Ignacio Anegón (Institut de Transplantation, Nantes, France)
- Marcelo Rubinstein (Facultad de Ciencias Exactas y Naturales, UBA, Argentina)
- Andreia Salgado (CEMIB, UNICAMP, Brazil)
- Fernando Benavides (MD Anderson Cancer Center, Texas, USA)
- Mariela Bollati (Institut Pasteur de Montevideo)
- Martina Crispo (Institut Pasteur de Montevideo)

Students

Name	Surname	Country
Cristiane	Vinagre	Brasil
Edivana	Aparecida	Brasil
Clarisa	Santamaria	Argentina
Bruna	Castilho	Brasil
Ana	Brasil Antiorio	Brasil
Marcel	Frajblat	Brasil
Herjan	Koopman	Holanda
Romina	Pagotto	Argentina
Natalia	Mendez	Chile
Paula	Llanos	Chile
Ezequiel	Lacunza	Argentina
Lucía	Zalazar	Argentina
Maria Laura	Gimeno	Argentina

Eliana	Garcia Vaz	Uruguay
Verónica	Gutierrez	Uruguay
Sofía	Ramirez	Uruguay
Adrían	Capoano	Uruguay
Mariana	Bianchi	Argentina
Malvina	Ocampo	Uruguay
Adriana	Carvalho	Brasil

Evaluation

1. General Summary

This second edition of the course was held in Montevideo (Uruguay) from Dec 5th to 14th. Due to both the number and the high expertise of the professors, and to the fact that all participants were carefully selected among a long list of candidates, the conferences had a high international standard. It was a very successful event, both from the scientific and social points of view, allowing more than 30 researchers from different countries to spent together ten days for science discussion. Furthermore, all students received credits for their curricula, meaning that this course will be considered as a significant element of their MSc or PhD programs.

The course was held in the premises of the Institut Pasteur de Montevideo (IPMon), a novel and very well equipped technological research center directed by Dr. Luis Barbeito. More precisely, the local organization of the course was held by Martina Crispo (Head of the Transgenic and Experimental Animal Unit) and her team (Geraldine Schlapp, Lucia Goyeneche) with the support of the Scientific Department (Natalia Lopez).

More than thirty participants from around the world applied to follow the course, and priority was given to 20 regional participants based firstly on the excellence of their CV or of the laboratory where they are conducting their studies, since in our region there is no easy access to this kind of practical courses. Participants selected were from Argentina, Brazil, Chile, The Netherlands and Uruguay, mainly MSc and PhD students and veterinarians responsible for animal facilities. In addition, we decided to keep a balance between countries and universities in order to avoid as much as possible the participation of more than two students affiliated to the same university or institute.

2. Scientific highlights

The scientific program was divided into lectures and practical sessions, with a total of 20 hs and 30 hs., respectively. The lectures of the course were mainly dedicated to formal genetics, extensively covering the fields of origin and diversity of laboratory strains, genetic monitoring, genetic mapping, mammalian genomics, quantitative and functional genetics, with lectures on positional cloning, quantitative trait loci analysis, targeted mutagenesis, transgenesis in mice and rats, sperm and embryo cryopreservation and embryonic stem cells biology and engineering, among others (see annexed programme of the course). Although English was the official language of the course, a majority of the faculties were also able to speak Spanish or Portuguese

thus facilitating the transfer of knowledge either during the oral presentations or during “informal or private chats”.
Since the theoretical lectures were open to the public, students and researchers from Uruguay who did not received fellowships to participate to the course, attended nevertheless the lectures.
In addition, all the participants made a 10 min presentation of their scientific work, with the objective to have a deeper knowledge of each other. They had an evaluation of the course and all of them succeeded and obtained rather high marks.
In addition to the Pasteur Institute's partners who participated as teachers (Jean Jacques Panthier, Xavier Montagutelli, Jean Louis Guenet, Jean Jaubert, Michel Cohen Tannoudji, Mariela Bollati and Martina Crispo), we invited some other professors from Europe (Ignacio Anegón), USA (Fernando Benavides) and different South American countries (Marcelo Rubinstein and Andreia Salgado) who presented the latest advances in the fields of genetics. We covered their travels and other expenses as food and accommodation. All of them, including several internationally recognized researchers, accepted to generously participate to the Course without asking for any honorarium.

3. Organization and reaction of the participants

The organization of the course was carried out by the Transgenic and Experimental Animal Unit of Pasteur Institute of Montevideo, directed by Martina Crispo as local organizer and co-workers Geraldine Schlapp and Lucia Goyeneche, and the Mouse Functional Genetics Unit of Pasteur Institute of Paris. Co-organizers from Paris were Jean-Jacques Panthier, Xavier Montagutelli, Jean Louis Guenet, Michel Cohen-Tannoudji and Jean Jaubert.
Speakers from France, USA, Brazil, Argentina and Uruguay contributed to the high level of the conferences during the course.
Local accommodation of invited speakers and co-organizers was done at http://www.ermitagemontevideo.com/. Students were housed at http://www.australhotel.com/ together in order to have good chances of interaction among them.
Moreover, the practical trainings were achieved in time. Student presentations sessions were organized with the aim to have a better knowledge of the participant's research topics trying whenever possible to establish collaborations. Several social diners and cocktails were also organized to facilitate interactions between the participants and speakers.
The main sponsors of the course were AMSUD-Pasteur, Institut Pasteur de Montevideo, TWAS and CABBIO. The International Society for Transgenic Technologies (ISTT) contributed also as sponsor and collaborates with the diffusion of the course. Several companies (Biriden, Eleco, Tanirel, Alesco, LabDiet, Biologística, and the French Embassy), accepted to support the course, generously providing us with money, air tickets, reagents for the trainings and material for the courses.
From the feedback we had, we noted that all the participants were really impressed with the scientific level and the excellent organization of the course, as can be seen in the evaluations of the course they made (see attached evaluations). Much collaboration was established among them along the course, and the co-organizers presented a PhD program in Pasteur Institute for the interested ones.

The students and the teachers agreed in that the lectures were of high level. For many of the participants this was the first opportunity to visit Uruguay, and particularly Montevideo and the beautiful beaches of our international resort Punta del Este. All the participants agreed that it was a wonderful experience that opened their minds to the existence of this small but delightful country and their people.

4. Looking forward

To conclude, our feeling is that Genetics of Laboratory Rodents course was a very successful event. We developed some collaboration between the speakers and the participants during the course, which will contribute to improve the quality of our research and the exchange of students in this part of the world.
We agree both with the co-organizers and the participants that it would be necessary to continue organizing this kind of course in the Institute every 2 or 3 years, in order to give more opportunities to regional students to participate, since Genetics of Laboratory Rodents is a very dynamic field, as we could see during the course. We have no doubt that publicity for the next edition of this course will be broadly diffused by the attendees of the present edition.

Photos or Graphic material about the course