



The 4th Brazil School for Single-Particle Cryo-EM 2010

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The single particle cryo-EM technique has become a universal approach for observing macromolecular assemblies at high resolution. It is now capable of imaging particles with high symmetry such as icosahedral viruses at near-atomic resolution. This achievement has been celebrated as a breakthrough and is the result of a number of technical advances, especially in image processing. Software packages such as IMAGIC, SPIDER, SPARX and EMAN (see <http://www.emdatabank.org/emsoftware.html> for a more complete list) include a comprehensive set of algorithms and procedures representing the latest developments that allow the user to take advantage of the new possibilities offered by the single particle technique. However, training is required to take full advantage of all features and to be able to set appropriate parameters to obtain the best possible results.

The Brazil School for Single-Particle Cryo-EM, founded by **Marin van Heel** (Imperial College, London, UK), ran for the fourth time this year in the Itatiaia area, a remote location between São Paulo and Rio de Janeiro, Brazil (see http://www.singleparticles.org/school_2010/index.html for more information). Its hands-on practical sessions focus on the use of IMAGIC. However, students are lectured general concepts and theoretical foundations of the field over the course of 12 days. I had the pleasure of teaching and experiencing the wonderful atmosphere that evolved between students, teachers, organizers and hotel staff during the course.

My adventure started with a long flight from Boston via Charlotte to Rio, taking a total of 14 hours. Americans currently require a visa to enter Brazil but rumor has it that this will soon change. Vaccinations against yellow fever and hepatitis A are also recommended. At Rio's international airport, I was met by one of the school organizers, Roosevelt Oliveira who shepherded me with other arriving participants to a van bound for our final destination, **Hotel Fazenda Villa-Forte**, about 100 miles south of Rio. Apart from a flat tire on the road, which was quickly replaced by our skillful driver, we arrived safely at the hotel, just in time for dinner. Others arrived from São Paulo airport.

Delicious food was one of the highlights of this school, with five opportunities to eat every day (breakfast, coffee break with snacks, lunch, afternoon coffee with more snacks and dinner). The school registration fee includes all the food and lodging, excluding drinks. For this, the hotel used an internal currency consisting of pink, blue and yellow plastic chips worth three, one and half a Brazilian real, producing something of a Club Méditerranée feeling. Most of the 22 students shared rooms, which were clean and comfortable, had screened windows, a rather loud A/C, ceiling fan and a private bath. The hotel also featured a sizeable swimming pool and a cozy bar with a pool table, inviting people to continue their discussions of the day's lectures and practicals over a beer or Caipiriñha. Every day began with a summary of what was going to be covered, followed by lectures about image processing algorithms and theory, hands-on practicals using IMAGIC and a real data set of images of worm hemoglobin, a free afternoon to recover from the morning or focus on certain aspects of the material, and more lectures in the evening, just before dinner. The rhythm of the school mimicked, therefore, that of a Gordon Conference and provided plenty of opportunity to get to know other participants or discuss special subjects. Smooth operation of the equipment and rooms was ensured by organizers Andreas Martin (a.k.a. "Mission Control"), Rodrigo Portugal, Élen Tomazela and Roosevelt while a smooth flow of lectures and practicals was accomplished by **Alexis Rohou** and technical support was provided by Ralf Schmidt (IMAGIC vendor **ImageScience**). Some of the lectures were given by guests on special topics of interest, giving the school an even broader scope. Teachers included Alexis, Charlotte Linnemayr, **Marin**, Michael Schatz (also **ImageScience**), Rodrigo, **Wah Chiu** and I. Digestion of the material was also eased by a day trip to a nearby national park where we experienced some of Brazil's rich wild life and scenery. Many of the evenings finished with music and dance, contributing to the friendly mood of the school. The last day arrived almost as a shock and people were sad to leave. A van brought students and teachers back to the airport or other destinations in Rio and São Paulo when requested.

There are several courses and workshops dealing with cryo-EM techniques, most of them covering several other techniques besides the single particle technique. However, in my opinion, the Brazil School for Single-Particle Cryo-EM provides students with the best chance to get a jump start into the world of single particle EM. It takes place in a unique setting that encourages trust, friendship and learning. The small class size means that lectures and practicals can be tuned to the students' progress, and that students can easily approach teachers with questions. Finally, participants get to experience the energy and excitement of Brazil!

The next school is planned for August 9 - 21, 2012.

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