

3D REPERTOIRE OF MOLECULAR MACHINES

Towards understanding how a cell works

What is 3D repertoire?

In February 2005 the 3D repertoire project got kicked off in Heidelberg. Eighteen organizations across seven different countries are now working together (Figure 1) to solve the 3D structures of all amenable protein complexes in the model eukaryotic organism, budding yeast. To reach its goal, the project embraces a multidisciplinary team with expertise from protein biochemistry, mass spectrometry, X-ray crystallography, Nuclear Magnetic Resonance, Electron Microscopy (EM) & Tomography to Bioinformatics.

Why solving structures? What is our biological goal?

Proteins do most of the jobs in the cell but quite rarely work alone. Proteins establish "collaborations" and form "complexes" to perform the complicated functions required for life. Understanding how a cell works requires understanding how complexes work and structural analysis is compulsory to achieve this knowledge. Moreover, elucidation of the three dimensional structure of proteins will unravel the molecular mechanisms of multifactorial diseases related to key cellular processes. 3D Repertoire is one of the few currently running structural genomic initiatives in Europe and certainly it was the first to take the challenge of solving 3D structures of complexes with an additional unique contribution from bioinformatics.

Achievements

In the first two years and a half, 3D repertoire succeeded in:

- delivering seventeen X-ray crystal structures, 16 EM structures and the cryo-EM tomographic reconstruction of the 26S proteasome;
- developing innovative methods in diverse fields, such as EM structure determination and complex prediction by *in silico* tools;
- building a database where all the experimental results from the project are deposited and which will be released in the future to the scientific community;
- establishing core facilities (mass spectrometry and EM quality control, large scale fermentation);
- providing high quality training;
- fostering extensive collaborations between the partners and joint publications in peer review journals (Figure 2).

For the future...

3D Repertoire has two more years ahead and is fully committed to speed up the pipeline for production and structural characterization of complexes, while further enhancing collaborations with other European consortia towards a common structural genomic platform in Europe.

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Figure 1
Top: Networks of collaborations within 3D Repertoire.
Below: 2nd Annual Meeting at the Center of Genomic Regulation in Barcelona, 2007.

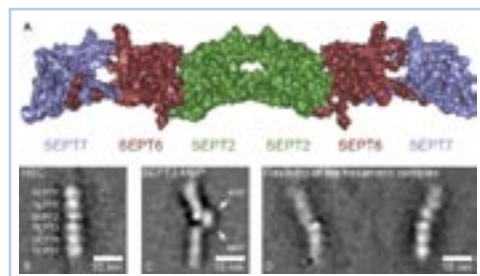


Figure 2
The human septin complex is an example of a fruitful collaboration between partners A Crystal structure of the complex of the septin complex B-D Electron microscopy reconstruction of the septin complex. (Sirajuddin, M., et al., Nature, 2007. 449(7160): p. 311-5.

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www.3drepertoire.org



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Coordinated by Professor Luis Serrano,
Center of Genomic Regulation (Barcelona)
Scientific Project Manager
Dr. Michela Bertero