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Acta Cryst. (2008). A64, C1**Report on a project on 3D imaging of the biological cell by single-particle X-ray diffraction**David Sayre

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Single-particle x-ray diffraction is an extension of x-ray crystallography which allows the specimen to be any small solid bounded object. In Shapiro et al. [Proc. Nat. Acad. Sci. USA (2005), 102, 15343-15346] and Thibault et al. [Acta Cryst. (2006), A62, 248-261] the reader can find descriptions of a recent StonyBrook/Berkeley/Cornell two-dimensional imaging of a yeast cell by this technique. The present work is aimed at extending the technique to the three-dimensional imaging of a cell. However, the usual method of doing that, namely rotating the specimen into many orientations in the x-ray beam, has not as yet given sufficiently good three-dimensional diffraction data to allow the work to go forward, the largest problem being the difficulty of preventing unwanted change in the specimen through the extended exposure to a hostile environment of x-rays and in some cases high vacuum and/or extreme cold. The present paper discusses possible methods of dealing with this problem, including the lowering of exposure to just two specimen orientations as needed for stereoscopic 3D presentation. Thanks in this work go to many, starting exactly 60 years ago, at IUCr1, or IUCr 1948, under Professor Ewald as the first IUCr president. There Henry Lipson and A.L. Patterson suggested to me the Fourier transform, not the Fourier series, as a thesis subject in x-ray crystallography, thus implanting in me the possibility of imaging the general, not just the crystalline, specimen. Today I wish to thank especially Janos Kirz, Chris Jacobsen, Veit Elser, Pierre Thibault, David Shapiro, Andrew Stewart, Enju Lima, Huijie Miao, Xiaojing Huang, Jan Steinbrener, Stefano Marchesini, and Johanna Nelson.

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