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MICROSCOPY

Eukaryotic cell, now showing in 3D

The first high-resolution, three-dimensional (3D) visualization of a complete eukaryotic cell has been revealed. The striking images, which thankfully do not need to be viewed using 3D glasses, are not just pretty pictures — they reveal the precise architectural plan of a *Schizosaccharomyces pombe* cell.

Using electron tomography, Johanna Höög and colleagues acquired serial section images of a cell and combined these into a 3D reconstruction. The resolution of the reconstruction was such that microtubule polarity, as well as bundle architecture, could be determined. For instance, microtubule bundles contained an average of 4.4 filaments, and these microtubules were connected to one another, and to the nuclear envelope, by electron-dense bridges (of as-yet-unidentified composition).

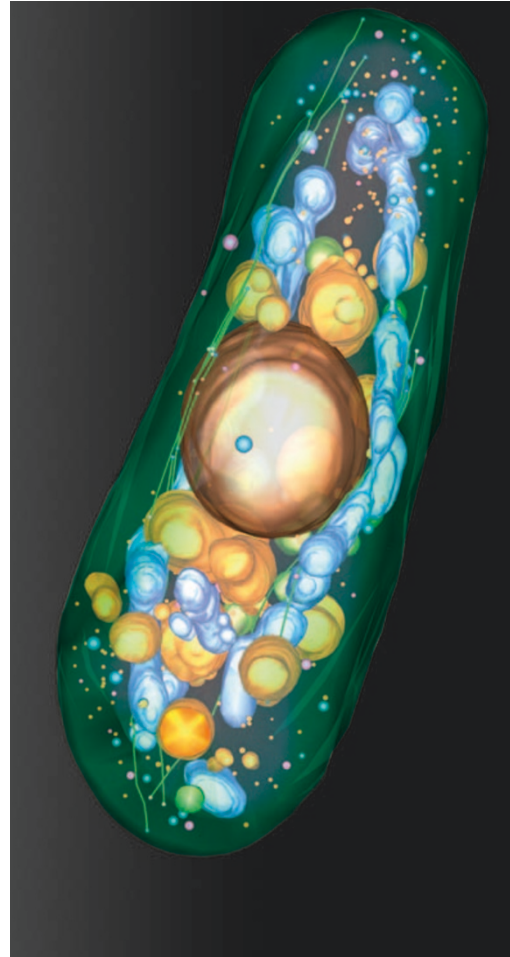
Other organelles, including vacuoles, vesicles, the nucleus and mitochondria, were also modelled. Thus, it was possible to investigate the structure–function

relationship that exists between microtubules and these organelles. For example, there is almost invariably a mitochondrion at locations where microtubule bundles are splayed apart, microtubules rarely interact with transport vesicles, and there are on average twice as many microtubules in bundles that are associated with spindle pole bodies.

“Our 3D image of fission yeast can serve as a reference map of the cell for all biologists interested in its architecture,” says Höög. “You can extract information from all sorts of cellular structures and processes from it or use it to place findings into the spatial context of the cell.” The authors have already used it to show several novel features of cellular architecture; other findings will undoubtedly pop out.

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ORIGINAL RESEARCH PAPER Höög, J. L. *et al.*
Organization of interphase microtubules in fission yeast analyzed by electron tomography. *Dev. Cell* **12**, 349–361 (2007)



The electron tomogram of an *S. pombe* cell shows the plasma membrane, microtubules and light vacuoles (green), the nucleus, dark vacuoles and dark vesicles (gold), mitochondria and large dark vesicles (blue) and light vesicles (pink). Picture by J. Höög, EMBL, Germany.