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3-Dimensional reconstruction of fluorescent structures in tardigrades

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ABSTRACT

Tardigrades are microscopic animals, thus brightfield microscopy is a well established method for tardigrade observation. Modern techniques in functional genetics like fluorescence in situ *hybridisation or fluorescently labelled expression markers demand high resolution fluorescence microscopy. Nevertheless tardigrades are still considered to be difficult objects for fluorescence techniques as they are covered by an opaque and diffracting cuticle. We show a modern technique of structured light illumination that enables us to acquire thin optical sections and consequently to reconstruct 3-dimensional structures in tardigrades with a high spatial resolution in all 3 dimensions. This technique is evaluated on taxonomically valuable internal as well as external structures of eutardigrades: the bucco-pharyngeal apparatus and the claws. The 3-dimensional reconstructions allow the measurement of distances in all 3 dimensions.*

Keywords: structured illumination, optical sectioning, fluorescence microscopy, ApoTome, 3-dimensional rendering, Tardigrada, measuring 3D structures