In common light microscopy samples are often located on glass slides or specific dishes, and observation is only possible from one side, namely perpendicular to the slide. However, for larger three-dimensional (3D) specimens observation from different views is desirable. Therefore, we developed a sample holder permitting rotation of the specimen perpendicular to the light path of the microscope [1]. The specimen is placed within a glass capillary or fluorinated ethylene propylene (FEP) tubing of cylindrical shape which is optically coupled to a surrounding capillary of rectangular shape fixed under the microscope. By rotating the inner tube, the specimen can thus be observed from any desired perspective perpendicular to its longitudinal axis.

Using established techniques of 3D microscopy, e.g. confocal laser scanning (CLSM) or light sheet fluorescence microscopy (LSFM) [2], image stacks are recorded under different angles and used for reconstructing the three-dimensional shape of the object. Fluorescence z-projection images of multi-cellular tumour spheroids, copepods [3] and ixodidae ticks at different rotation angles are reported as representative results.

In addition, the device can be easily adapted to a great variety of common microscopes and is suitable for various applications in science, education and industry, where the observation of three-dimensional specimens is essential.

(a) Setup: Device for the rotation applicable to the x,y-stage of common microscopes. (b) Schematic: Fluorescence excitation and detection using LSFM and CLSM. (c) Application: Fluorescence z-projection images of 4 single rotation steps of an incubated copepod with egg sac taken by CLSM.