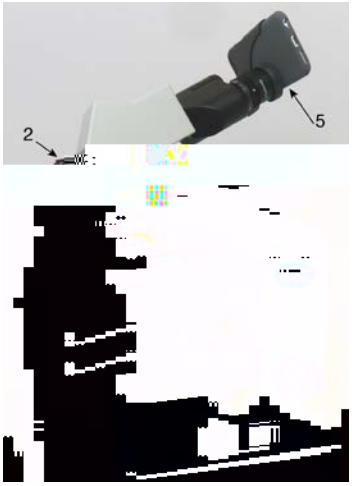
Polychromatic polarization microscope (polychromatic polscope)

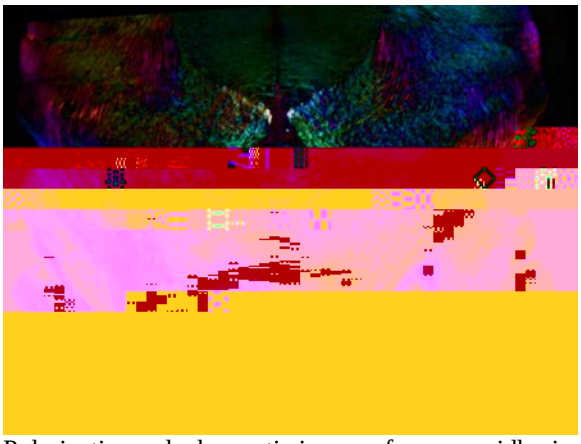
The polychromatic polscope, for the first time, exploits a new vector interference of two white light beams. The classical scalar white beam interference, which was first described by Robert Hooke in 1664, produces colors if one of the beams is retarded relative to the other between 400 nm to 2000 nm. Unlike the traditional microscope, the full spectrum interference colors in the polychromatic polscope appears even in specimens with low retardance levels of only a few nanometers, which was not possible before. The polychromatic polscope can be combined with phase contrast optics in a common setup, which allows users to see morphology of the organelles and their structural anisotropy. The image brightness shows the phase distribution and the colors depict the birefringence orientations. Simultaneous direct observation of phase and polarization images is another advantage first introduced by the polychromatic polscope.

The polychromatic polscope is based on a standard microscope, which is equipped with a special polychromatic polarization state generator and analyzer. As the beam passes through the specimen, its birefringent structures modify the polarization in such way that after the analyzer, non-birefringent parts appear gray or black and the birefringent structures are colored. The hue of the structure indicates its slow axis orientation, and the brightness of the structure is proportional to its retardance.

The polychromatic polscope opens up new possibilities for the study of biological specimens with low retardance, such as collagen fibers in cancer tissue, potentially aiding in the diagnosis of various diseases that relate to abnormal formation of molecular assemblies in cells affected byoand in creating



Polychromatic polscope for field studies. (1) microscope Olympus CX21; (2) polychromatic polarization state generator; (3) polarizer; (4) mirror unit CH20MM; (5) iPhone 6S with adapter.



Polarization polychromatic image of mouse midbrain

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