

Early confocal/sectioning microscopy, first time past Abbe?

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The Abbe relation and the confocal concept are in a sense complementary. The first governs the lateral extent of the object area contributing to an image point, while in confocal microscopy the axial extent is determined by the detection conditions in the image plane, ideally a point detector.

Both are a function of the applicable optical conditions, particularly the numerical aperture of the optics and the wavelength of the light.

The development of sectioning in microscopy will be tracked, from the early concepts and implementations to the present situation where choices in sectioning microscopy range from high-speed, multi-pixel to multi-channel, single point instruments. Excitation may be single, two- or multi-photon, detection in fluorescence, transmission or through harmonic generation and other. Active manipulation of excited states can in addition achieve resolutions far beyond what can be expected from the Abbe's relation.

However all imaging is still governed by his original relation which in modern terms can be seen as a description of the direct coupling between the particular aperture conditions of the optical system used and the range of spatial frequencies that can be transferred by light of a certain wavelength from an object to the image plane.