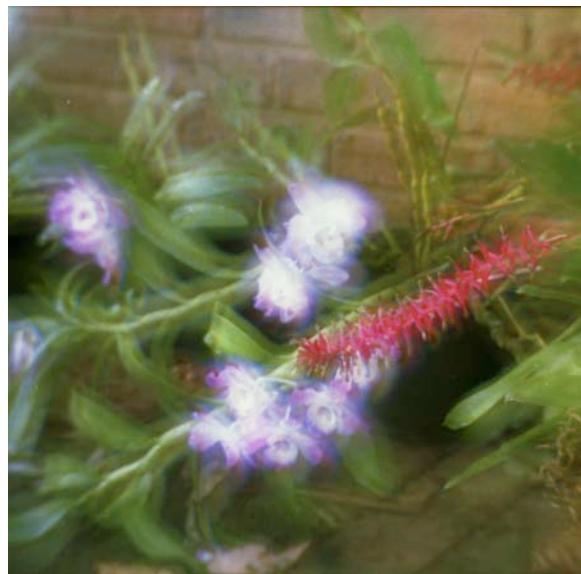


The “Chromatic” Lens

S. Manietta 2009



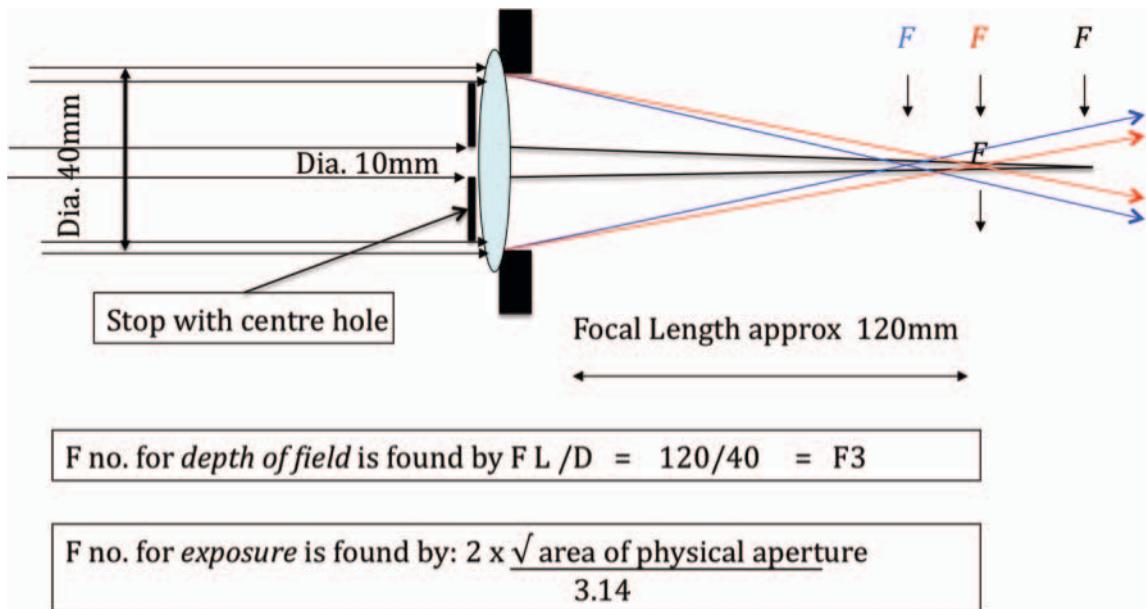
f16 annular aperture + 10mm central aperture

Background:

This concept has its origins in two disparate experiences. An art photographer shooting with a plastic camera once exclaimed that he had captured unexpected “rainbows” – (He discovered extreme chromatic aberrations). At about the same time students were making and photographing with zone plates and the question was asked: “what if the zone plate was used with a lens?” Putting these ideas together resulted in an imaginary uncorrected lens that imaged only via a peripheral circular zone – the region that causes most chromatic aberration. The resulting images were predicted to possess: Restricted depth-of-field (based notional f-number derived from diameter of lens periphery) strong chromatic errors, and rainbow coloured “bokeh”.

Method:

Rough tests were conducted with a 120mm focal length, single element plano-convex lens “blue-tacked” to a blank lens board fitted to a Rollei SL66 camera. A physical aperture of approximately 40mm meant it was working at f3.0 A central obscuring disc fashioned from the lid of a black plastic 35mm film container was “blue-tacked” to the centre of the lens. Calculating the area of the clear annulus and converting this, indicated that the “transmission equivalent” aperture equated to f16. (Required for light metering purposes) Comparative images were made using the f 16 annular aperture, an f7.5 annular aperture, full aperture, and the f16 annulus with a 10mm centre hole – assumed to be approximately equivalent to f11. (exposure value)



Explanation:

The central portion produces a relatively achromatic image while the annulus produces red, green and blue foci at different positions along the axis. Spherical aberration ensures the central focus is further from the lens. Focusing for the central projection ensures blue / cyan halos. The net effect: *a relatively sharp image, free of colour “fringes” is formed by the central portion with D-of-F and exposure characteristics equivalent to f12. This is overlaid by a heavily “fringed” out of focus image with D-of-F characteristics equivalent to f3.0 and exposure characteristics equivalent to f16.*

A more interesting possibility is to create a lens with increased central curvature to bring the achromatic image forward and thus achieve red halos.