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Summary

Such filters are widespread in all vertebrates groups, most notably fish. Several species have pigmented corneas, whose density may alter with illumination. Filters within lenses are common, occurring in animals that inhabit well-lit environments as well as the deep-sea. Pigmented humours are rare but have been reported in a few species. Various layers within the retina also contain pigments, including the primate macular pigment, that absorb short wavelength light and the inner segments of many animals, such as birds, contain coloured oil droplets.

While many of these filters are various carotenoids, other substances such as mycosporine-like amino acids, are common. The variety of filtering pigments indicates pigmentation has evolved independently on a number of occasions; a clear testament to its importance.

Most pigments serve to reduce short wavelength light and have a variety of functions including; protection of the eye by removing the most damaging photons, acting as antioxidants, and improving image quality by reducing scatter. In deep-sea fish they enhance the visibility of bioluminescence and in animals with oil droplets they refine the spectral properties of photoreceptors.