

Ultraviolet visual sensitivity in lacertid lizards

E. FONT; G. PÉREZ I DE LANUZA; P. CID & A. LATORRE

Instituto Cavanilles de Biodiversidad y Biología Evolutiva (ICBiBE), Universidad de Valencia, APDO. 22085, 46071 Valencia, Spain; enrique.font@uv.es

In the last decade, ultraviolet (UV) vision and colouration have become increasingly appreciated as an integral part of vertebrate and invertebrate behaviour. Previous studies have suggested that UV-reflecting skin patches of several lacertids may function as signals for intra- and interspecific communication. An important step towards an understanding of the signalling role of UV reflectance patterns is knowledge of the lizards' visual sensitivity. Here we characterize the visual system of four lacertid species, with special reference to retinal oil droplet types and distribution, spectral transmission of the ocular media, and DNA sequencing of opsins to detect expression of a putative UV-sensitive opsin gene. In all species examined four classes of retinal oil droplets, named according to size and apparent colour, were found: yellow, light yellow, large colourless, and small colourless droplets. Spectral transmission measurements of the ocular media show that wavelengths down to approximately 300 nm are transmitted ($T_{50} = 310-365$). Results of genomic DNA sequencing using degenerate primers show that all species examined have a functional shortwavelength-sensitive type 1 (SWS1) opsin. The lacertid SWS1 opsin is identical at 13 critical sites to that in the presumed ancestral vertebrate (which had UV vision), and other lizards in which UV visual sensitivity has been confirmed using microspectrophotometry, indicating that the lacertid SWS1 opsin may be maximally sensitive to UV light. Taken together, these results suggest that lacertids are sensitive to light in the UV waveband, very likely by means of an independent photopigment similar to the UV-sensitive photopigment found in other lizards.

