Activation of visual pigments by light and heat.

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RECOMMENDATIONS | ABSTRACT | COMMENTS

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Neuroscience / Neuronal Signaling Mechanisms

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Classified as

New Finding

Color vision is mediated by a family of over a 1000 opsins that are spectrally tuned to a range of wavelengths. Remarkably, this range is restricted to ~320-620nm even in the extraordinarily diverse class of insects {1} which make up 90% of the metazoan population on earth. This paper asks the question of why visual pigments are restricted to this range specifically at the long end of the spectrum.

Although the intuitive possibility that this is due to thermal activation and resultant basal level noise has been proposed long back, quantitative experimental analysis of this problem has not been previously attempted. Theoretical predictions from the authors suggest that thermal noise in a visual pigment increases with the wavelength at which maximal absorption occurs. Experimental results using visual pigments of varying wavelength maxima support this prediction. Overall, the results provide a striking rationale for why visual pigments with maxima in the far red range have not yet been identified and suggest that such pigments are unlikely to occur in nature because of the excessive thermal noise that they generate. However, the authors do point out that there is no physical limit to the existence of pigments even close to 700nm. It will be of interest as more opsins from organisms populating widely different ecosystems are characterized whether any are identified with absorption maxima above 620nm and if unidentified mechanisms have evolved to filter the increasing noise.

References

1. The evolution of color vision in insects.
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Disclosures
None declared

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Relevant Sections

Neuroscience
- Neuronal Signaling Mechanisms
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