Color Vision by Rods

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As has been made plausible for cones, rods might produce color signals on multiple quantum hits in single rods. The most likely color that could be produced in this way would then be white, no matter what the wavelength constitution of the quanta involved in these multiple hits.

Discussion

Waardenburg: Are you of the opinion that the rods can detect not only blue but also red and green? I have here a reprint from the Archiv für Augenheilkunde, vol. 71 (1912), pages 157–166, with a paper by Dr. V. O. Sívén, Lecturer of Physiology in Helsingfors in Finland. This author argues against the well-known duplicity theory according to which color sensations are only brought about by the cones, and the rods are entirely color-blind. For the term ‘congenital achromatopsia’ he wants to substitute the term ‘monochromasia’, since he can present a number of arguments to prove that the rods can discern light blue. One of these arguments is that in twilight, with a nearly cloudless sky, adapted to a darkness in which the red poppy and even the blue cornflower are invisible as colors, we can nevertheless discern that the sky is light-blue, not because we have learnt that it is but because we really see it. This is observed with that portion of the visual field that is rich in rods. He further disputes Helmmoltz’ theory, which ought to postulate that if yellow originates from cooperation of red and green receptor, its visual field cannot be larger than that of these components, whereas in reality it is considerably larger. This is one of the subordinate matters mentioned in this important article. My question is therefore: It is possible for the rods to detect blue or other colors, although, naturally, to a much smaller extent than the cones?

Bouman: There are several contemporary visual scientists who also claim to have conclusive arguments in favor of blue sensations mediated by rods. I tried in my lecture to explain my suggestion for the existence of the photopic signals produced by rods. They lead to ‘white’ sensations not to blue.