

Nocturnal tarsier retina has both short and long/medium-wavelength cones in an unusual topography

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Abstract

The evolutionary position of tarsiers with respect to primates is still debated. The type of photoreceptors in the nocturnal *Tarsius spectrum* retina has been compared with the nocturnal New World monkey *Aotus trivulgaris* and the Old World monkey *Macaca nemestrina* by using immunocytochemical labeling for antisera known to be specific for primate cone and rod proteins. In all three species, antisera to long/medium (L/M) -wavelength specific cone opsin and cone-specific α -transducin detected a single row of cones. Only *Macaca* and tarsier retina contained cones labeled by antiserum to short (S) -wavelength specific cone opsin. Tarsier rod cell bodies were 6-12 deep, depending on retinal eccentricity. Tarsier central cones had 2- μ m-wide outer (OS) and inner segments, which came straight off the cell body. Cone morphology differed little from rods except OS were shorter. *Macaca* cones labeled for 7G6 and calbindin, *Aotus* cones did not label for calbindin, and *Tarsius* cones did not label for 7G6 or calbindin. In tarsier retinal whole-mounts, peak cone density ranged from 11,600-14,200/cones mm². The 11- to 12-mm-wide peak region centered roughly on the optic disc, although foveal counts remain to be completed. Density decreased symmetrically to a far peripheral band of 4,200-7,000/cones mm². In contrast, S cone density was very low in central retina (0-300/mm²), rose symmetrically with eccentricity, and peaked at 1,100-1,600/mm² in a 2- to 3-mm-wide zone in the far periphery. In this zone, S cones were 9-14% of all cones. L/M cones were regularly spaced, whereas S cones showed no regular distribution pattern. Although the functional characteristics of the tarsier S and L/M cone systems are yet to be determined, tarsier cone proteins and distribution have some similarities to both New and Old World monkey retinas. *J. Comp. Neurol.* 424:718-730, 2000. © 2000 Wiley-Liss, Inc.

Keywords

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