Does nocturnality drive binocular vision? octodontine rodents as a case study

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Binocular vision is a visual property that allows fine discrimination of in-depth distance (stereopsis), as well as enhanced light and contrast sensitivity. In mammals enhanced binocular vision is structurally associated with a large degree of frontal binocular overlap, the presence of a corresponding retinal specialization containing a fovea or an area centralis, and well-developed ipsilateral retinal projections to the lateral thalamus (GLd). We compared these visual traits in two visually active species of the genus Octodon that exhibit contrasting visual habits: the diurnal Octodon degus, and the nocturnal Octodon lunatus. The O. lunatus visual field has a prominent 100° frontal binocular overlap, much larger than the 50° of overlap found in O. degus. Cells in the retinal ganglion cell layer were 40% fewer in O. lunatus (180,000) than in O. degus (300,000). O. lunatus has a poorly developed visual streak, but a well developed area centralis, located centrally near the optic disk (p