## Photoreceptor properties and distribution in strictly subterranean African mole-rats (Rodentia, Bathyergidae)

The visual system of subterranean rodents is assumed to be regressed in response to their lightless ecotope. According to the prevailing doctrine, negative or non-selective processes have driven evolutionary regression of the visual system in many unrelated groups of rodents that has adopted strictly subterranean mode of life. Among rodents this has been exemplified by detailed studies of the blind mole-rat *Spalax ehrenbergi*. However, recent studies involving a larger spectrum of subterranean rodent species demonstrated unexpected diversity of retinal properties and visual system designs among subterranean rodent species and thus challenged the widely held view that the visual system has undergone extensive convergent evolution in subterranean mammals. This paper examines the presence, the distribution, and photoreceptor properties in the African mole-rats (Bathyergidae, Rodentia). It describes rodopsin, S- and L-opsin expression patterns, photoreceptor densities and rod/cones proportions in five species of bathyergid mole-rats, namely *Bathyergus suillus, Georychus capensis, Fukomys damarensis, Cryptomys natalensis* and *Heliophobius argenteocinereus*. Spectral cone types and rods were assessed immunocytochemicaly with opsin-specific antibodies. All examined species have rod-dominated retinae but possess a very high cone proportions (≥ 10%). The rod nuclei possess the conventional architecture found in nearly all eukaryotic cells, with most heterochromatin situated at the nuclear periphery and euchromatin residing toward the nuclear interior, i.e., the arrangement that is typical for diurnal mammals and is not expected in animals adapted to subterranean darkness. The vast majority of cones were strongly S-opsin immunoreactive; the L-opsin immunoreactivity was much fainter, often barely detectable. Thus all bathyergid species examined feature an S-opsin dominance and low levels of L-opsin across the entire retina, a pattern that is unique among mammals. These photoreceptor properties are independent on whether the mole-rat is strictly subterranean or occasionally emerges above ground for foraging. Moreover, a comparative analysis clearly shows that subterranean life is compatible with very different spectral cone properties. Taken together, bathyergid photoreceptor mosaic is well suited to perceive daylight intensities and can hardly be considered an adaptation to subterranean vision. We speculate that S-cone dominance may be by-product of low thyroid hormone concentrations.