

Supplementary material Fig. S1. Spectral adaptation of the eye of *Principapillatus hitoyensis*. ERG amplitudes in response to spectral flashes under dark adaptation (black, average +/- standard deviation, n = 4), adaptation to bright light of 521 nm (green, n = 1) and under recovery from spectral adaptation (grey, average +/- standard deviation, n = 4). The shape of the spectral curve under recovery is similar to the one of the dark-adapted eye except for overall lower amplitudes.

Supplementary material Fig. S2. Results of fluorescence *in situ* hybridization experiments for *Er-onychopsin* and *Er-c-opsin* in the peripatopsid *E. rowelli* using sense probes as a negative control. Confocal laser-scanning micrographs of horizontal cryosections of heads. DNA was stained using propidium iodide. Anterior is up and the cuticle is autofluorescent in both micrographs. (A) Detail of a horizontally sectioned eye. Note the lack of signal demonstrating that no *Er-onychopsin* antisense mRNA is localised in the eye. Scale bar: 50 μm . (B) In contrast, antisense transcription of *Er-c-opsin* is detectable in the ventral portion of the brain (arrows) as well as in the neuronal somata of the optic ganglion (arrowheads in the inset; inset scale bar: 50 μm). Scale bar: 250 μm . Abbreviations: cc, connecting cord (=medullary portion of the central nervous system linking the brain to the ventral nerve cord); co, cornea; dp, dermal papilla; mb, mushroom body; og, optic ganglion cell layer; on, optic neuropil; pc, photoreceptor cell layer; pe, perikaryal layer of the brain; ph, pharynx; vb, vitreous body.

Supplementary material Fig. S3. Determination of minimum stimulation time for behavioural experiments on the peripatopsid *E. rowelli*. Specimens (N=7 groups, 34 animals in total) were released in the illuminable half of the arena and their behaviour was recorded for 5 minutes under constant illumination with blue light (465 nm \pm 19 nm total width at half-maximum) of different intensities. A significant light avoidance reaction was observed at 6×10^{11} photons $\text{cm}^{-2} \text{s}^{-1}$ (Friedman-test with Dunn's post-test; significance levels: ** $p < 0.01$, ns no significance; circles give the median, boxes the quartiles, whiskers represent 10/90 percentiles). In order to reduce stress for the animals in subsequent experiments, their reaction to different illumination times was compared. A stimulation of 1 minute was already sufficient to induce a photonegative reaction without the loss of significance in the applied test statistics (see main text for further details).

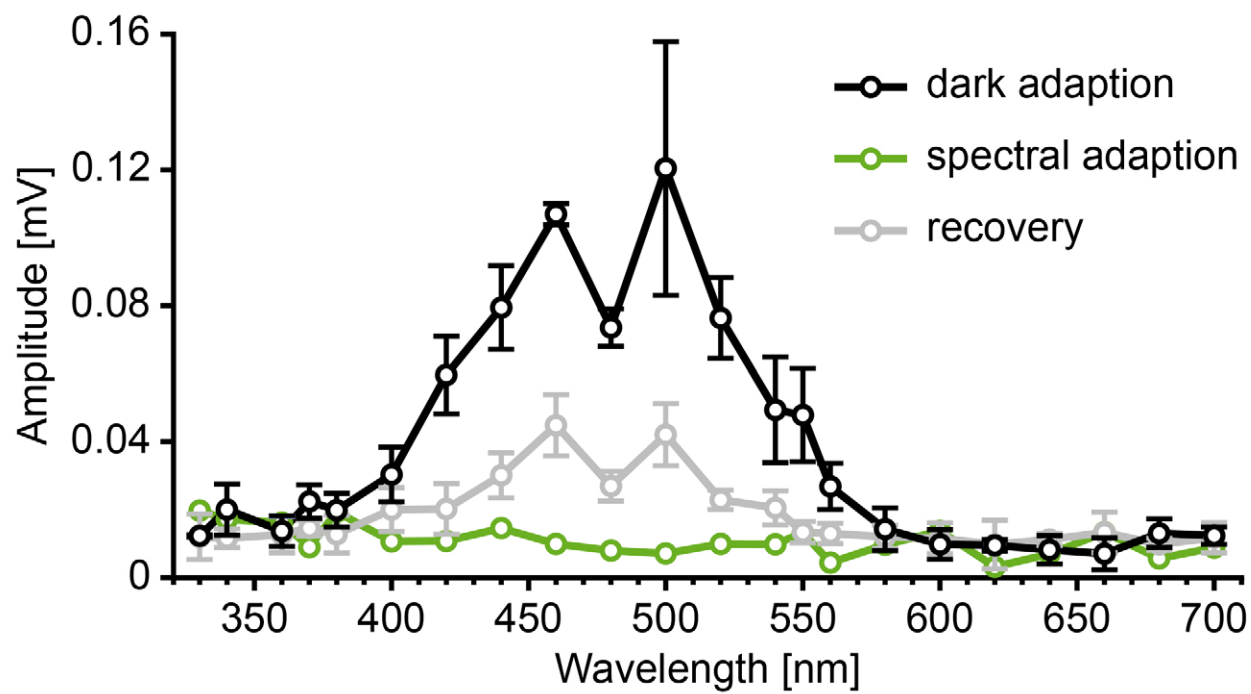


Figure S1

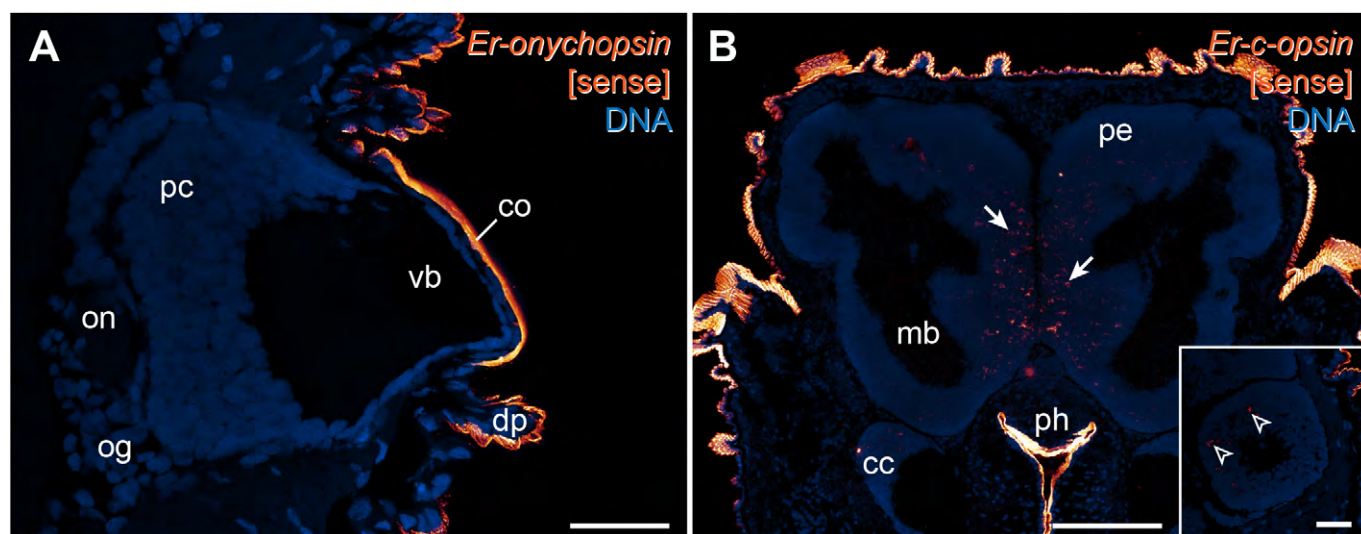


Figure S2

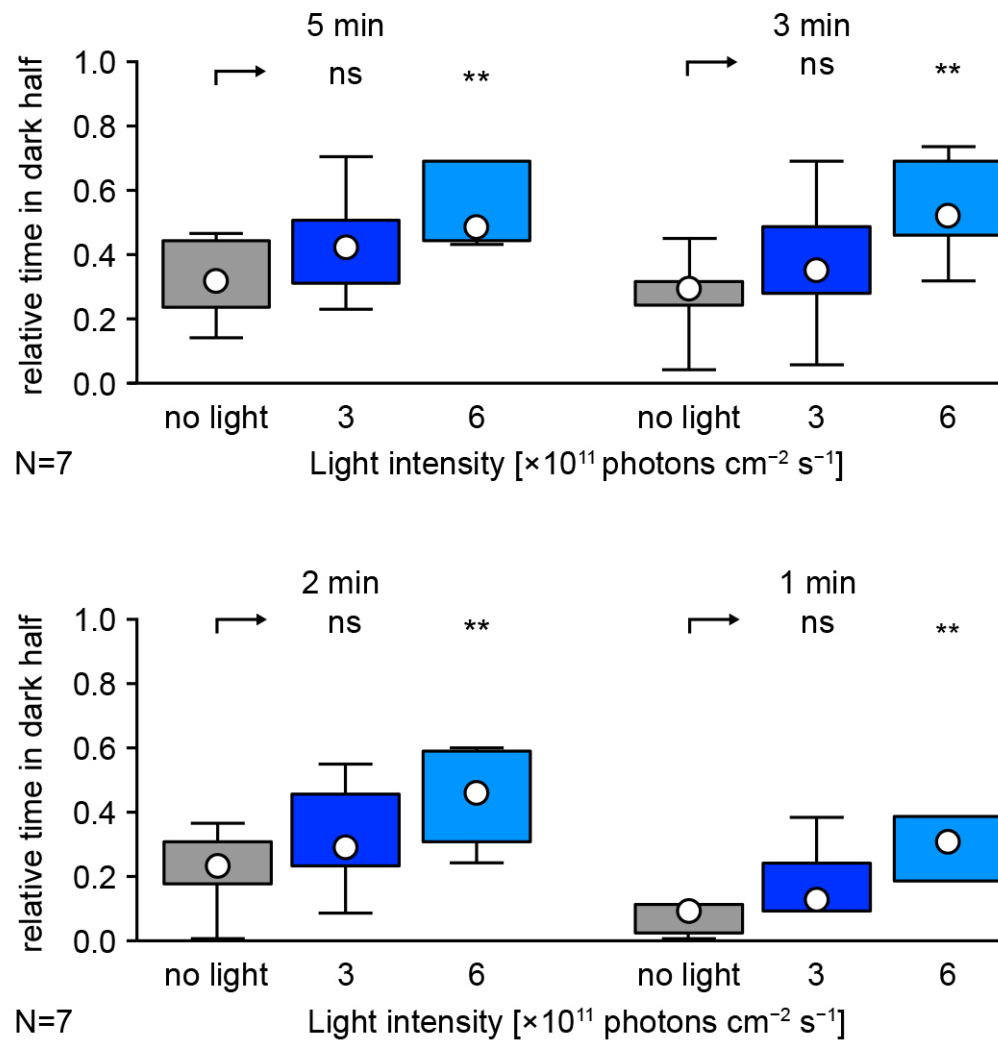


Figure S3