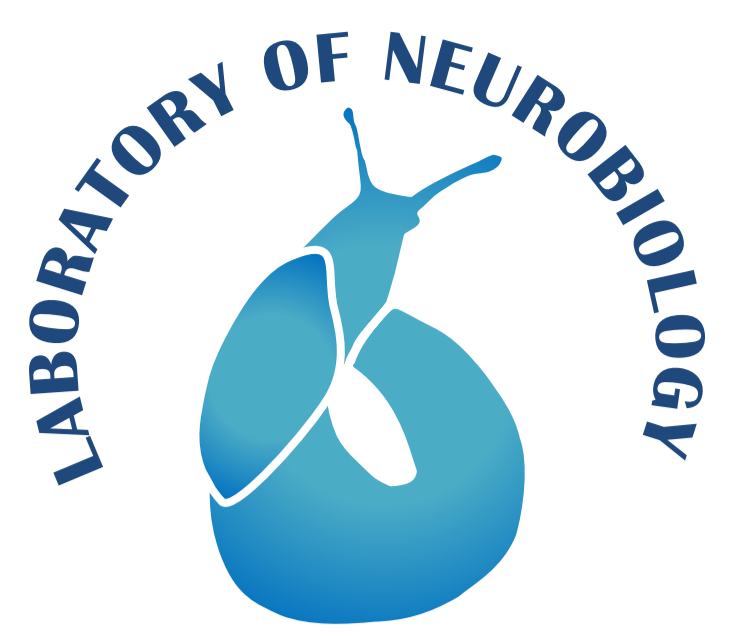


ナメクジは眼を使わなくても脳で光を感じて暗い場所に逃げ込める

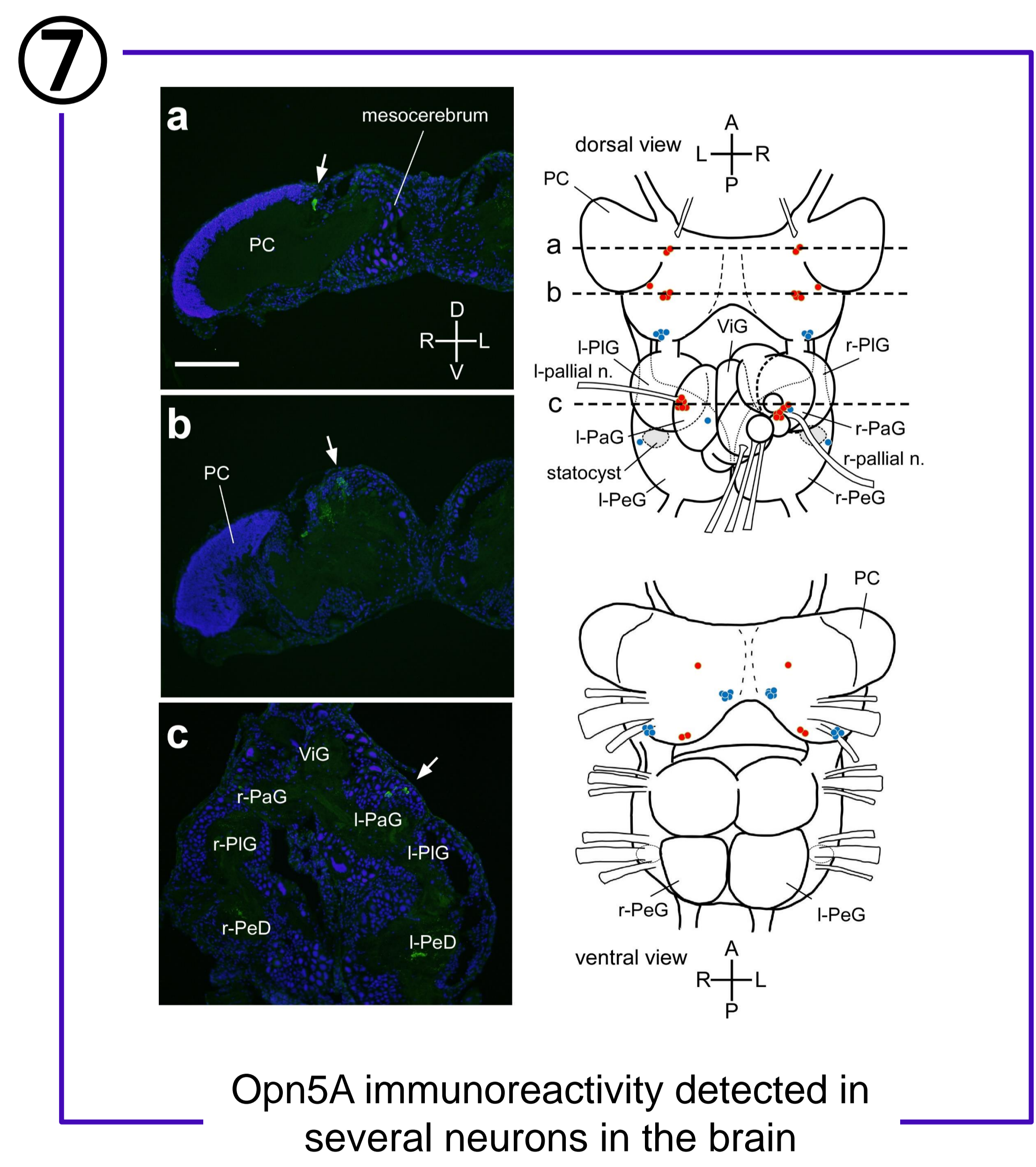
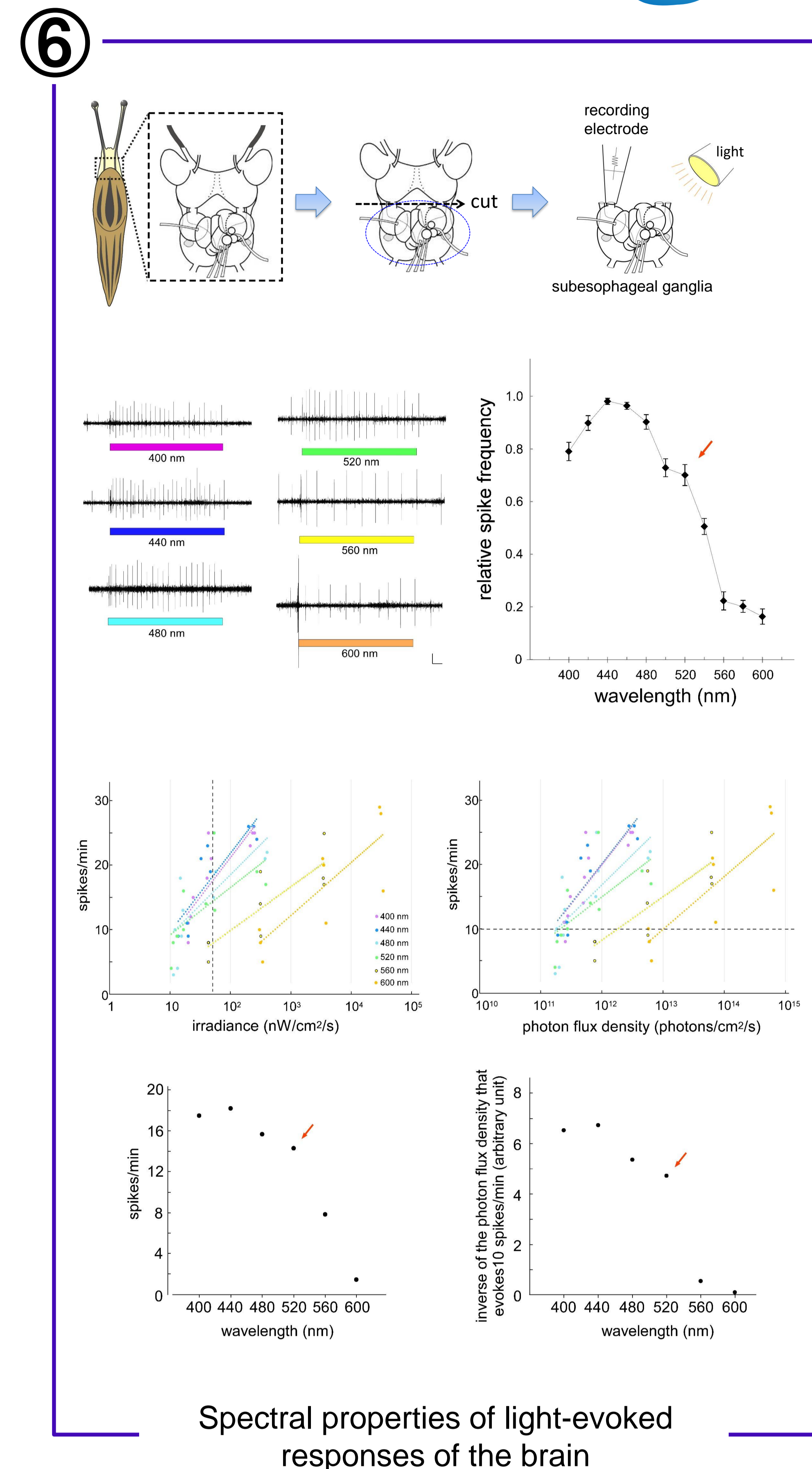
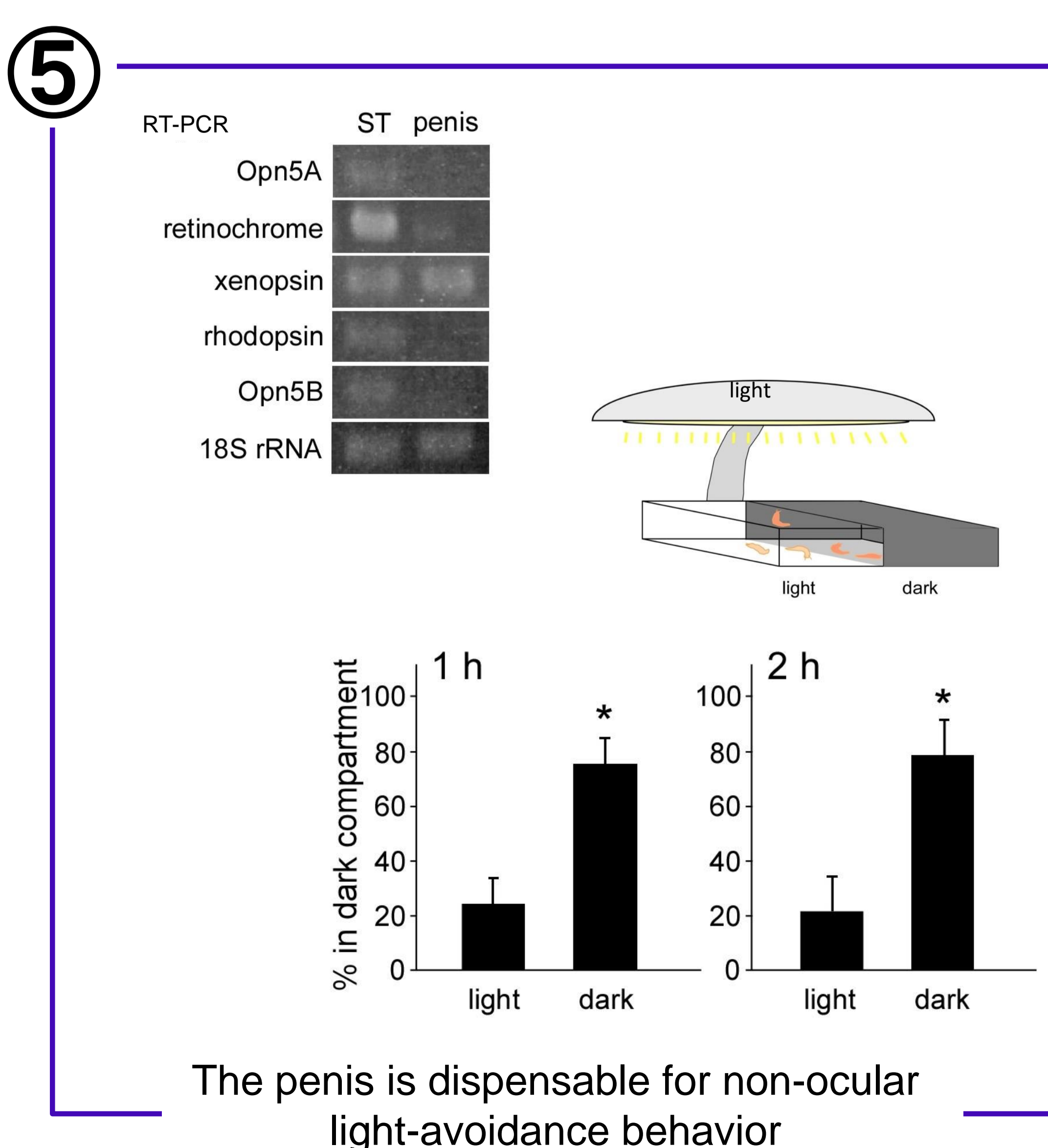
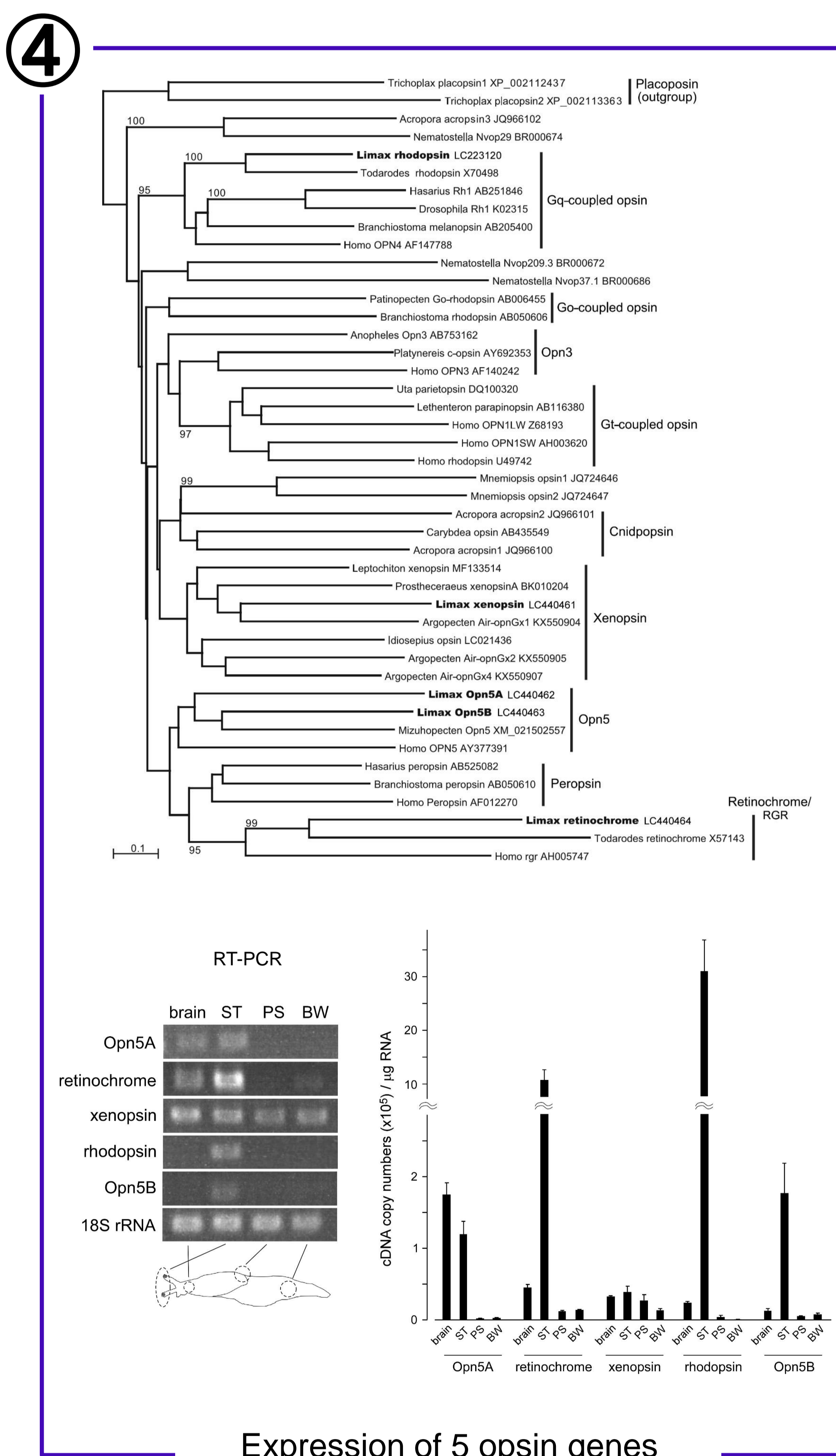
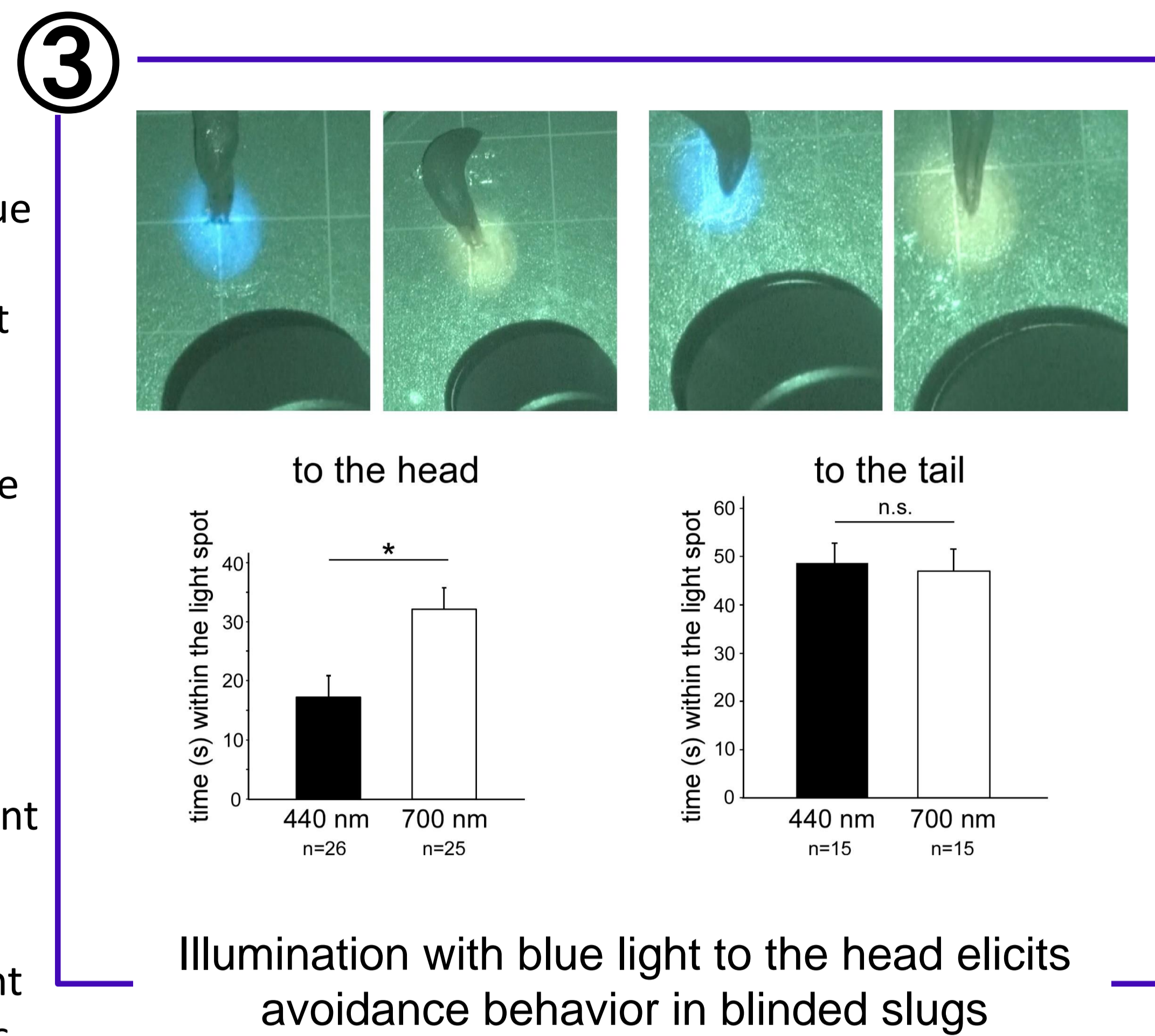
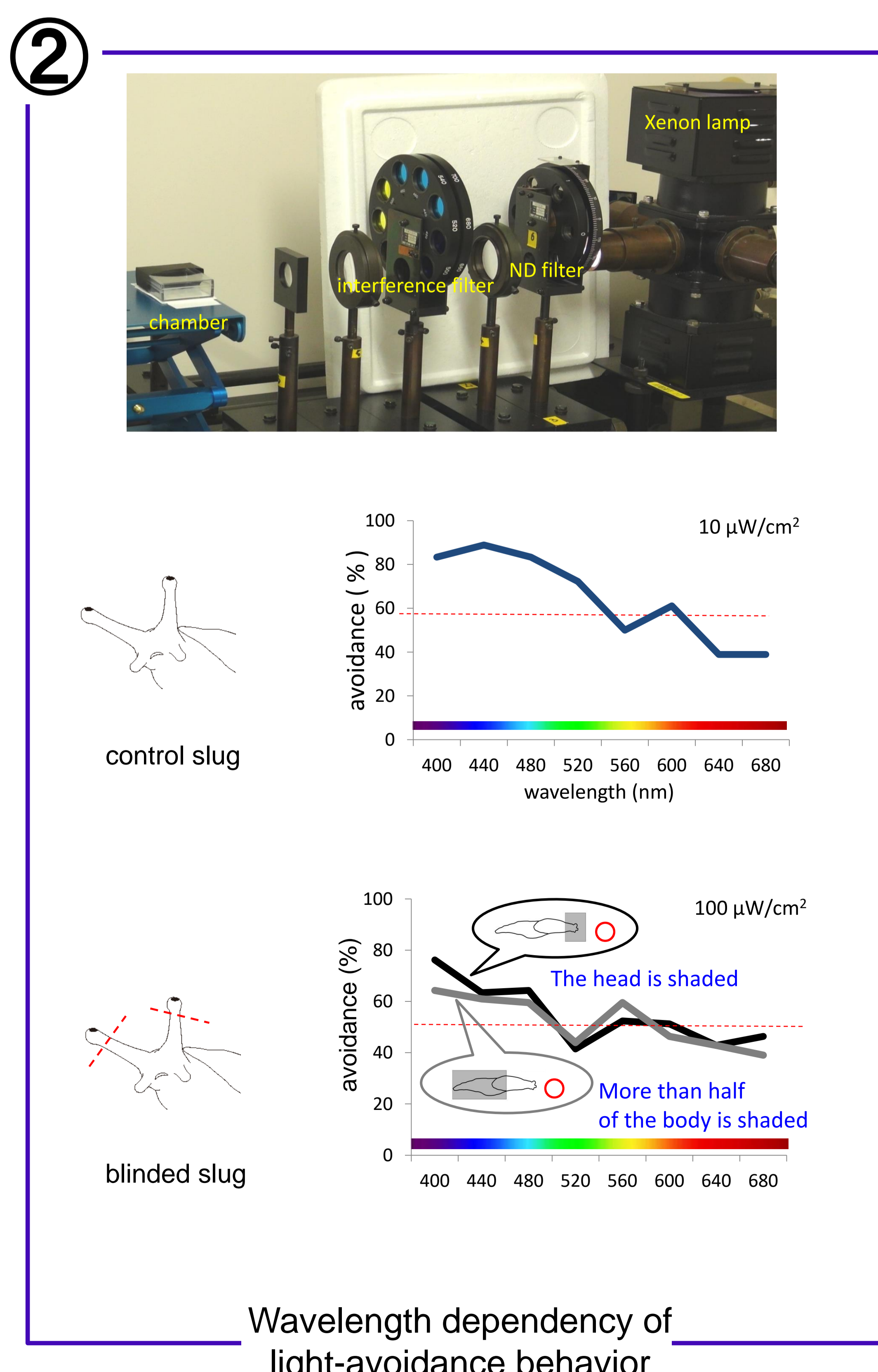
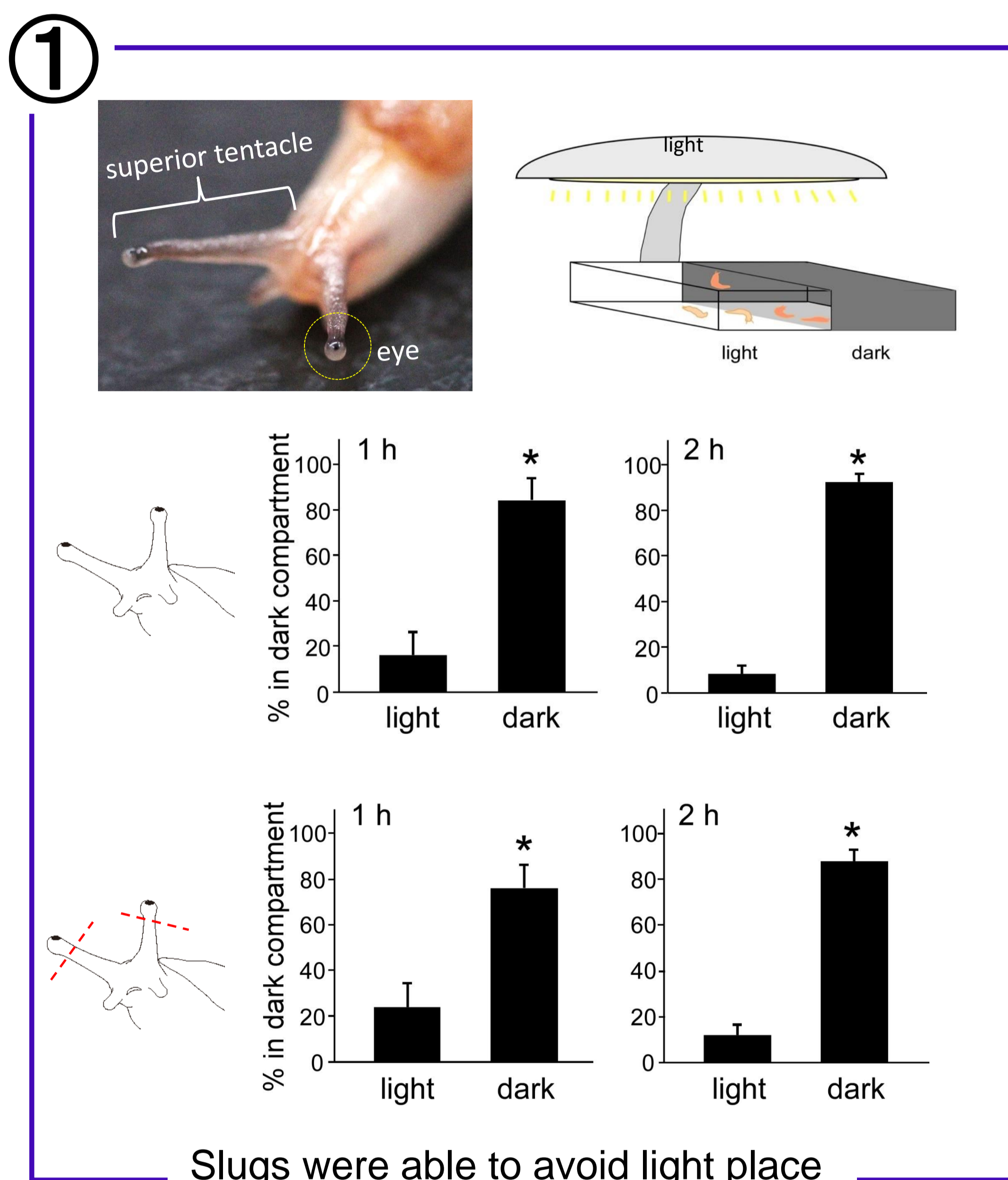
Light avoidance by a non-ocular photosensing system in the terrestrial slug *Limax*

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We found that the terrestrial slugs *Limax* avoid light even if they are blinded by bilateral eye removal. The escape behavior was more evident for the short-wavelength light. Illumination with blue light, but not red light, to the head elicited avoidance behavior in the blinded slugs. Illumination to the tail was ineffective. The light avoidance behavior of the blinded slugs was not affected by the removal of the penis, which lies on the brain in the head, suggesting that the penis is dispensable for the light sensing in the blinded slug. mRNA of the three opsins, Opn5A, xenopsin, and retinochrome, is expressed in the brain according to RT-PCR. Light-evoked neural responses were recorded from the left cerebro-pleuro connective of the isolated subesophageal ganglia of the brain, revealing that the brain is more sensitive to short wavelengths of light (400 – 480 nm). This result is largely consistent with the wavelength dependency of the light-avoidance behavior of the blinded slugs that we observed in the present study. Our results strongly support that terrestrial slugs detect and avoid light by using their brain as a light sensing organ in the absence of eyes.



Summary

1. Slug can avoid light without their tentacular eyes, probably by using the brain as a photosensor.
2. At least 3 opsin genes are expressed in the brain.
3. Photosensory neurons in brain are more responsive to the short wavelength light than long wavelength light.

A large part of the presented data has been published in Nishiyama et al. *J Exp Biol* 222, jeb208595 (2019) doi: 10.1242/jeb.208595 Matsuo Y et al. *J Comp Physiol A* 206, 907-919 (2020) doi: 10.1007/s00359-020-01447-1 Grant supports: KAKENHI from JSPS (No. 19K06772) and 奨励交付金C from Fukuoka Women's University