

Ordered afferent projection of visual information in the terrestrial slug *Limax*

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Abstract

Background

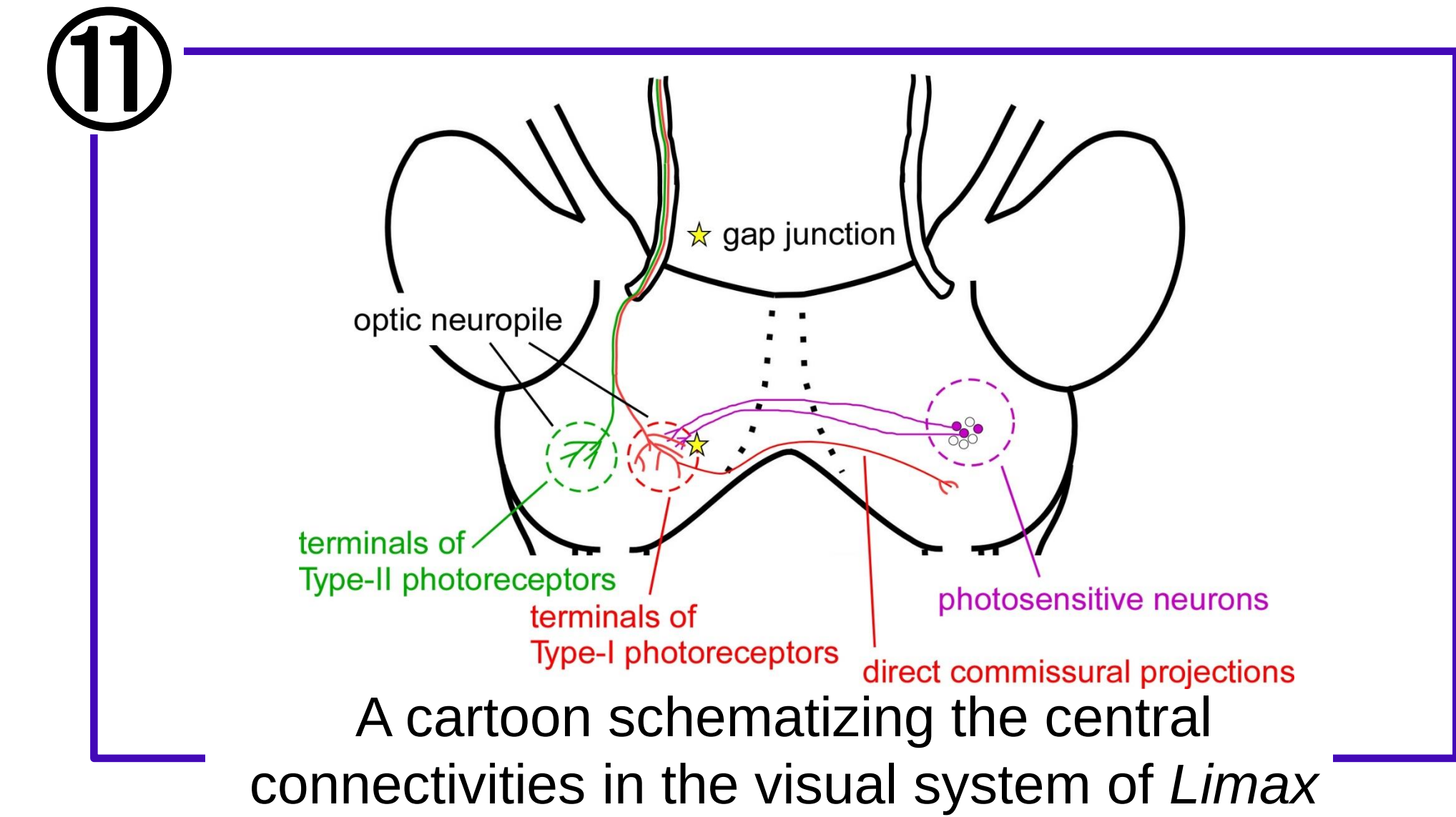
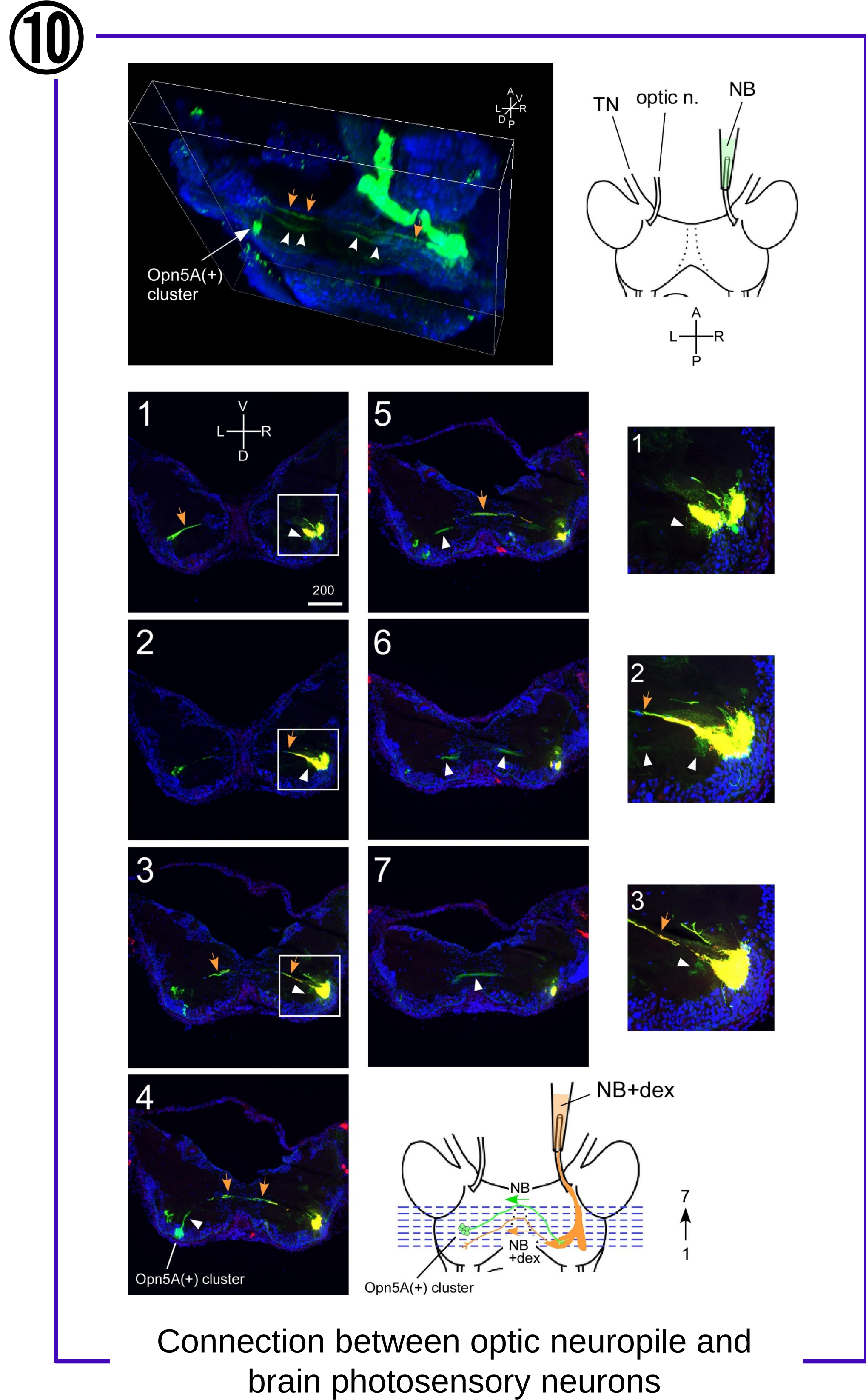
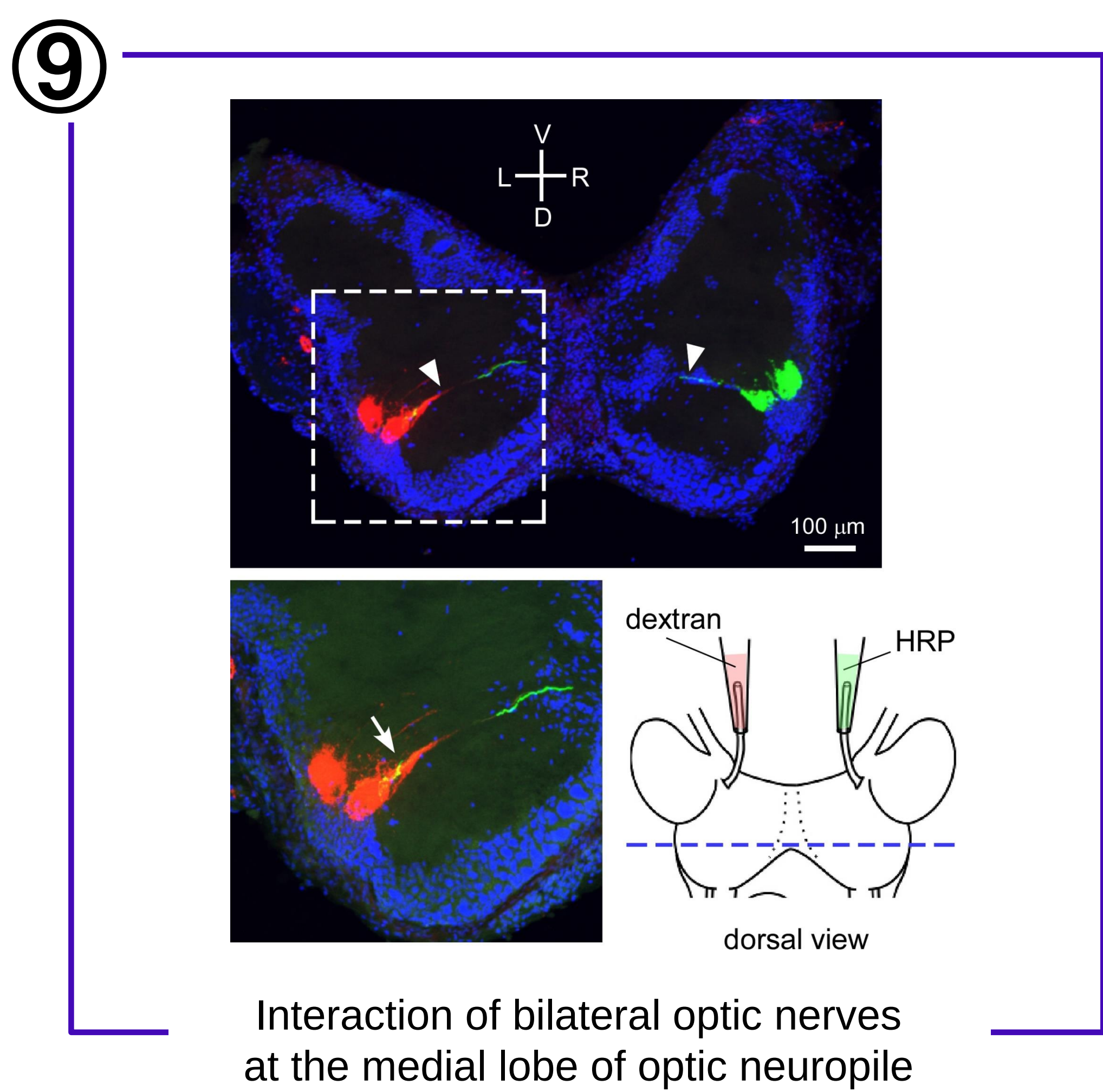
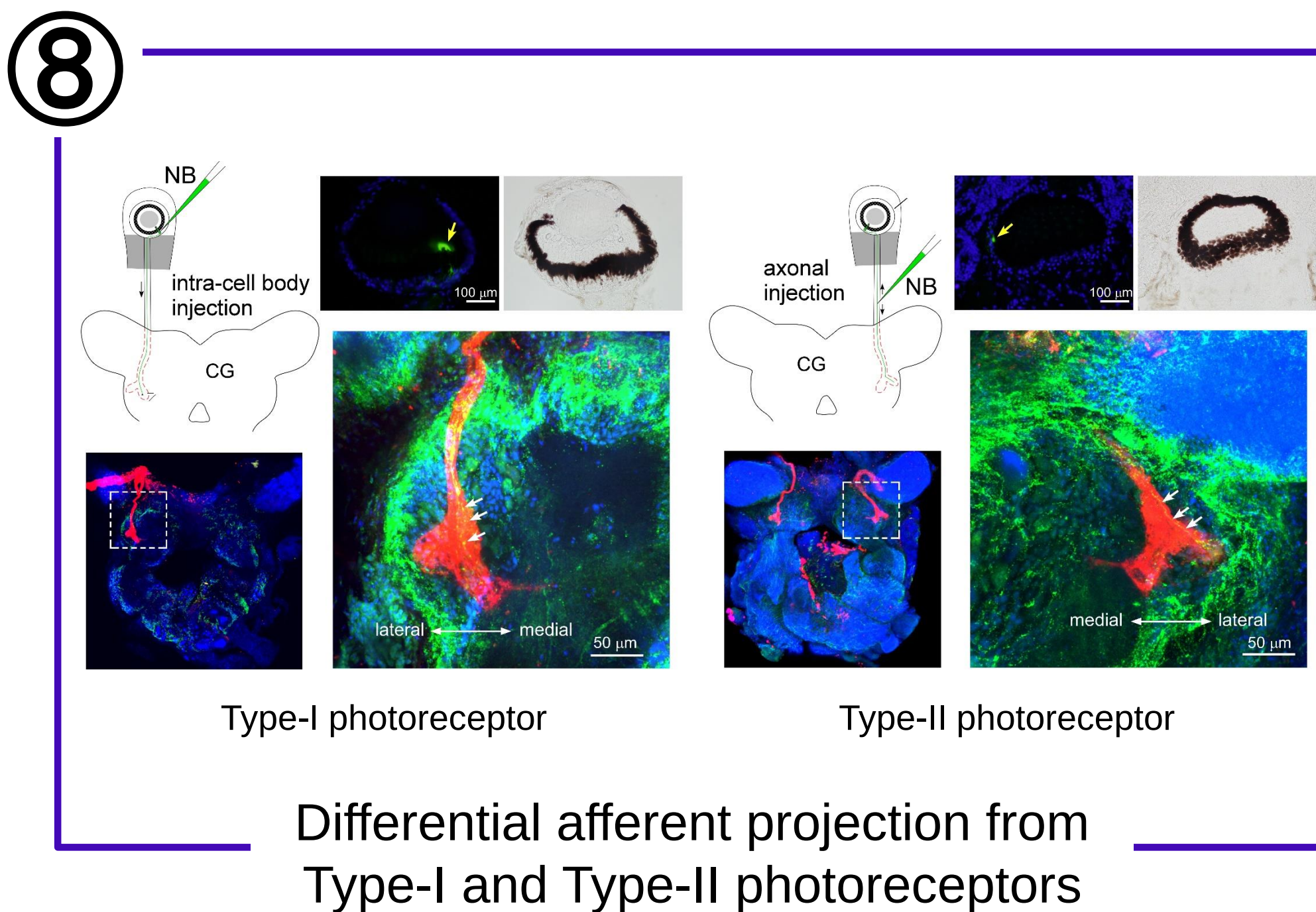
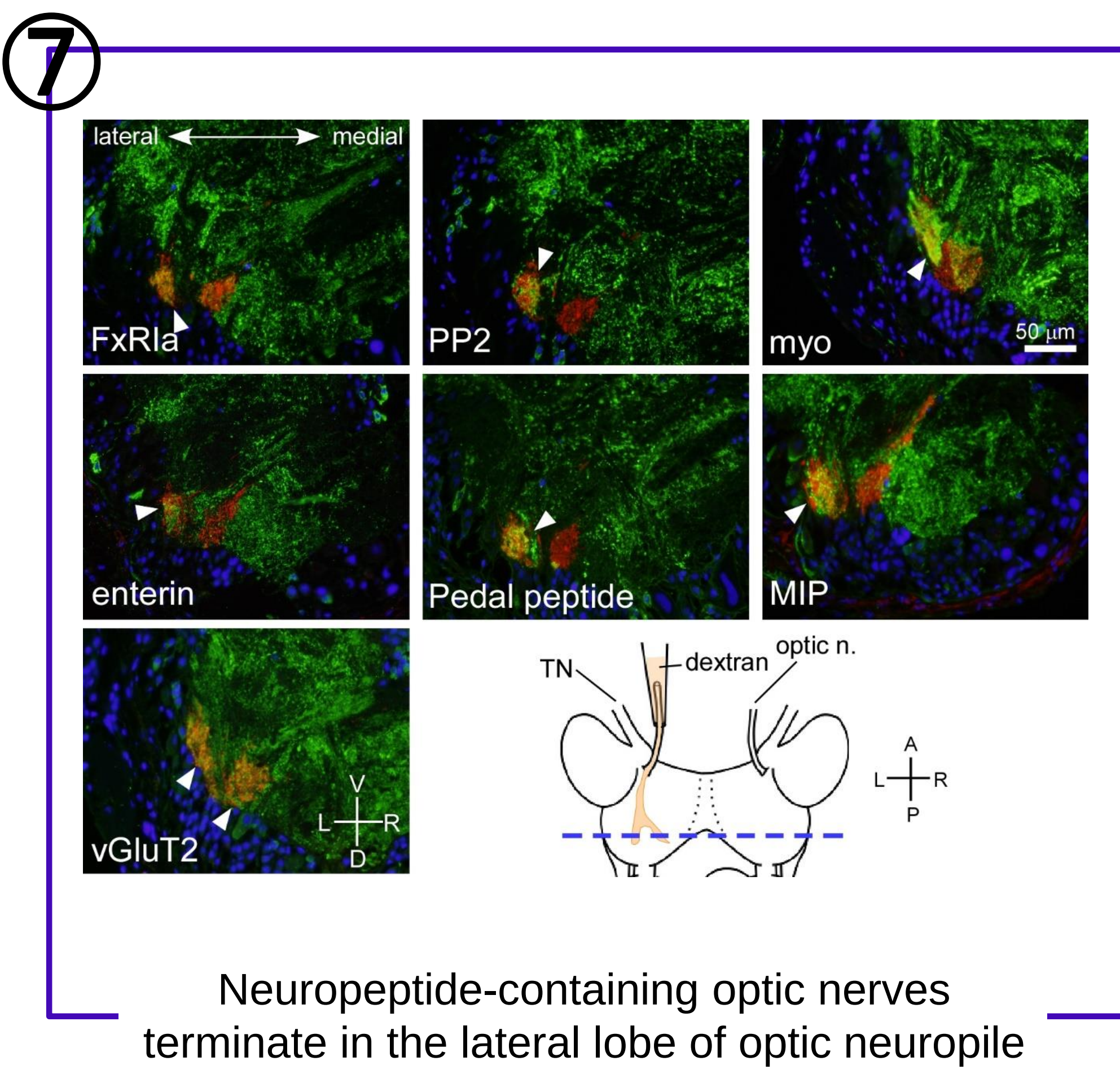
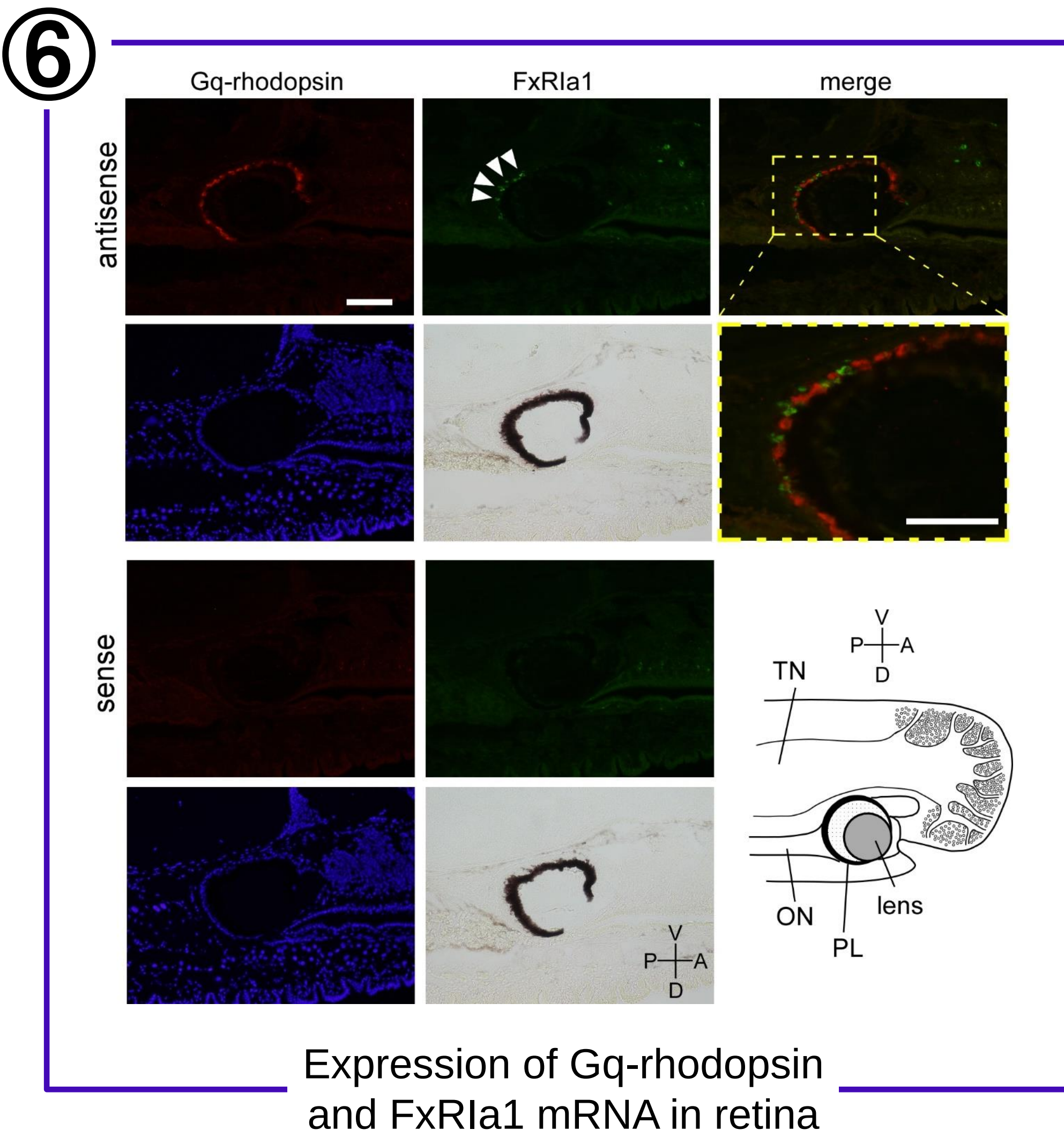
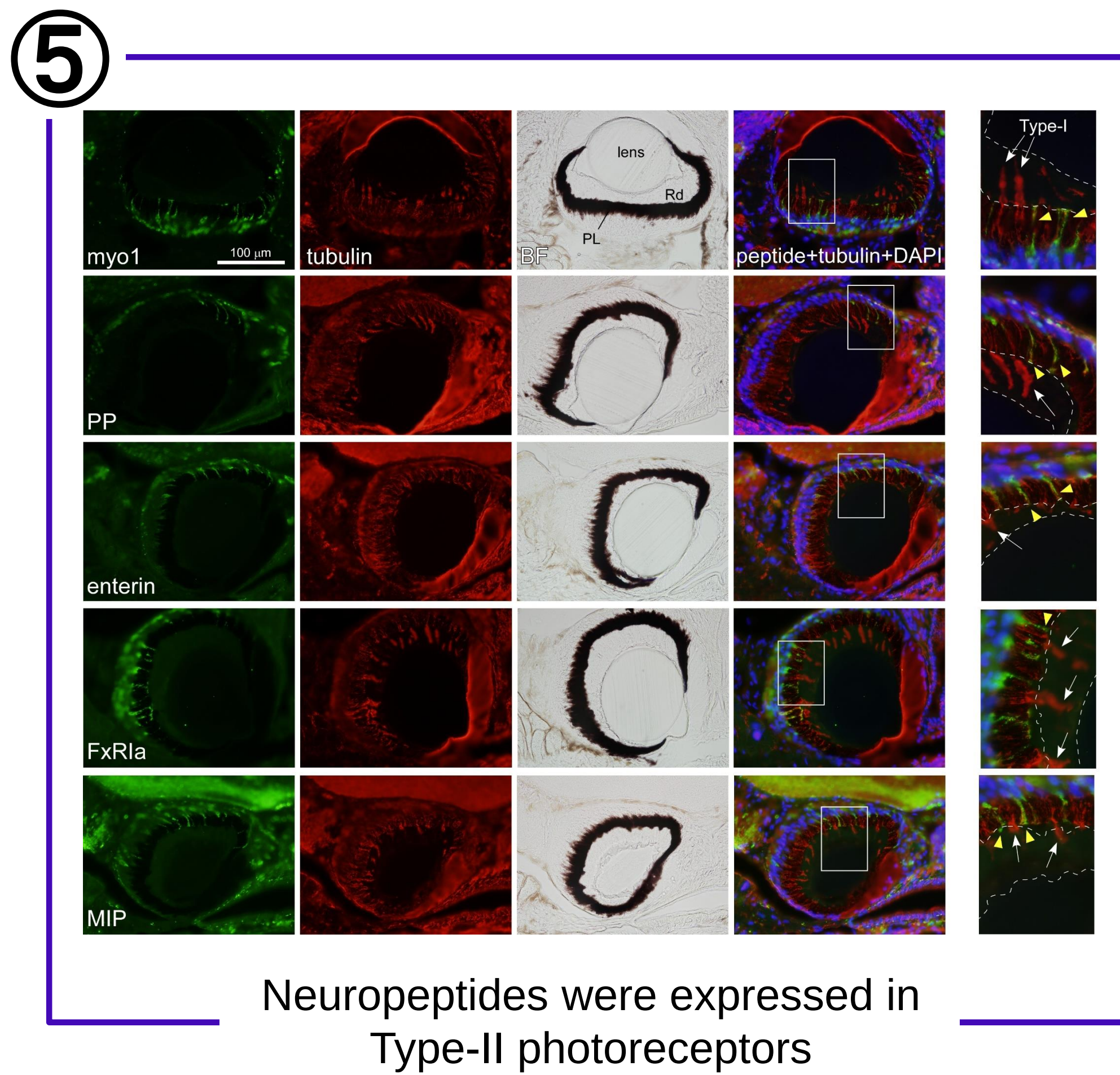
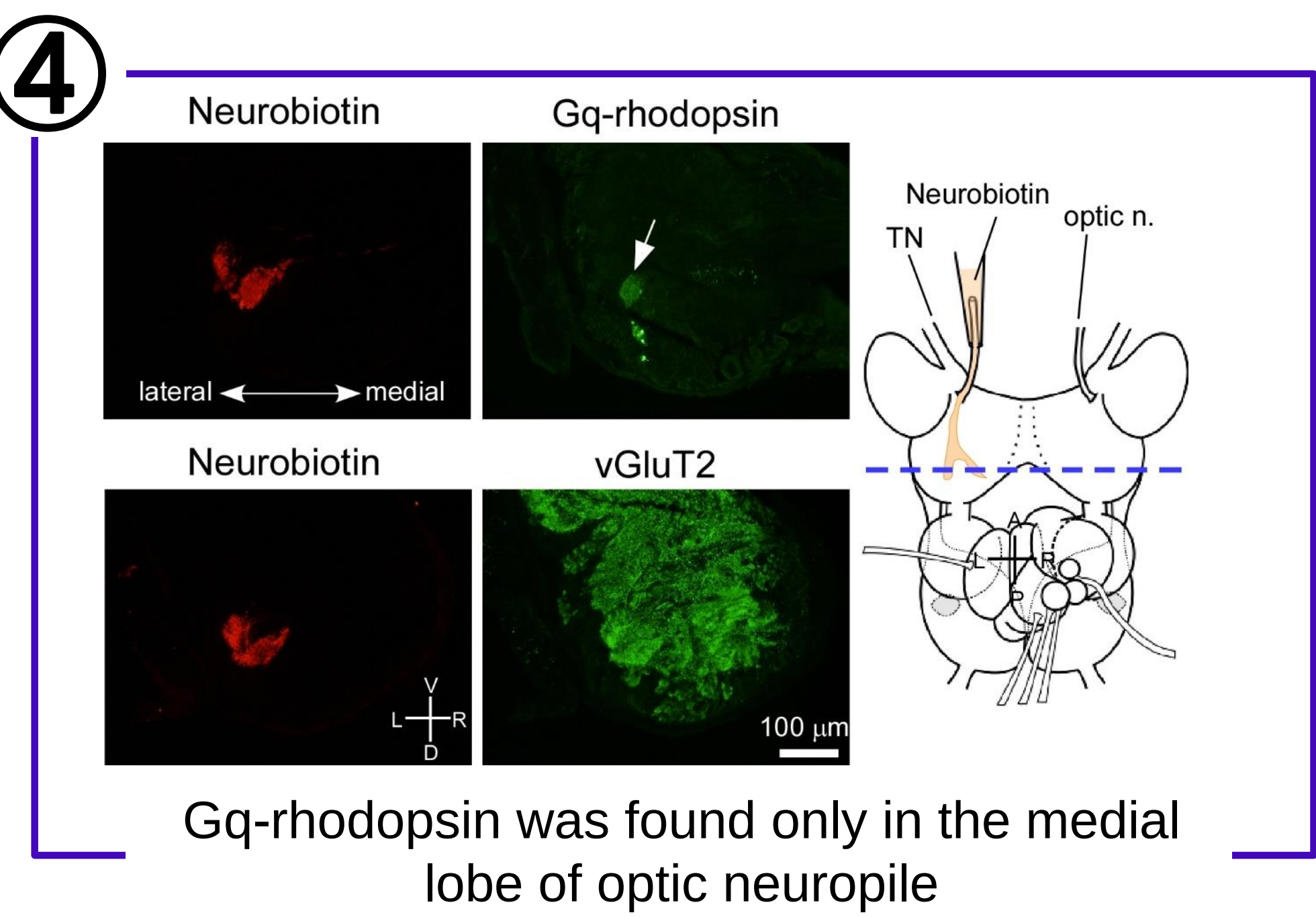
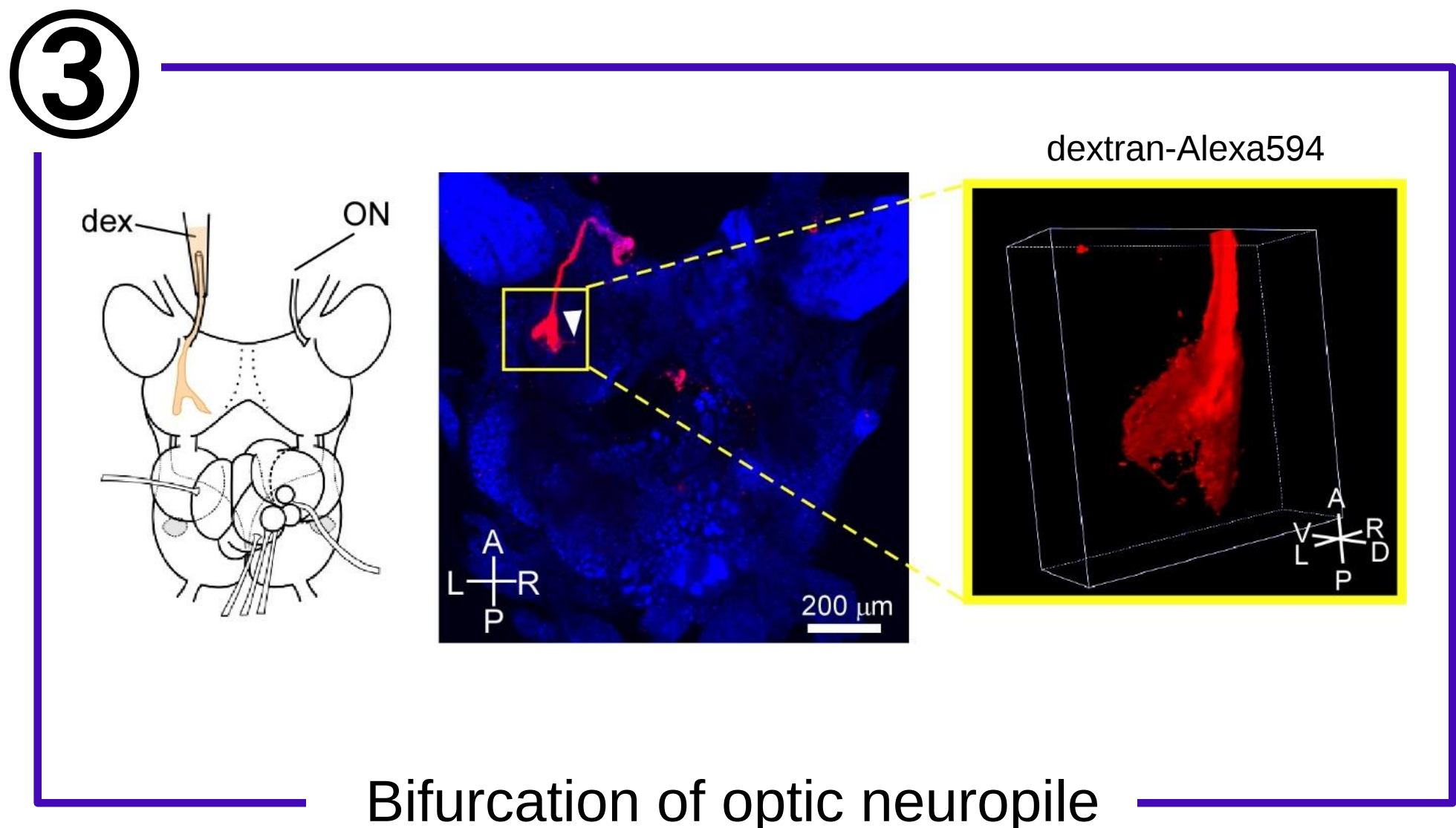
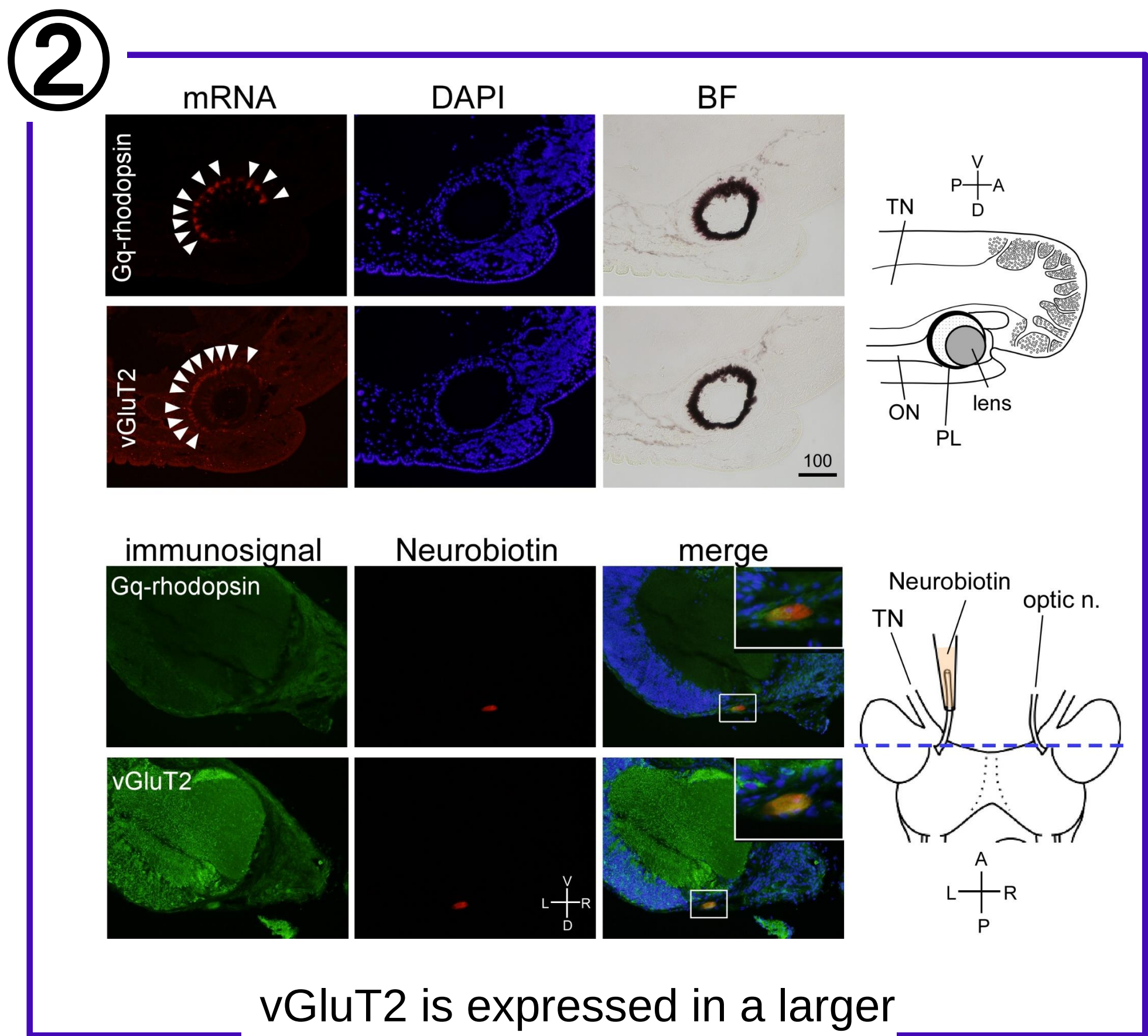
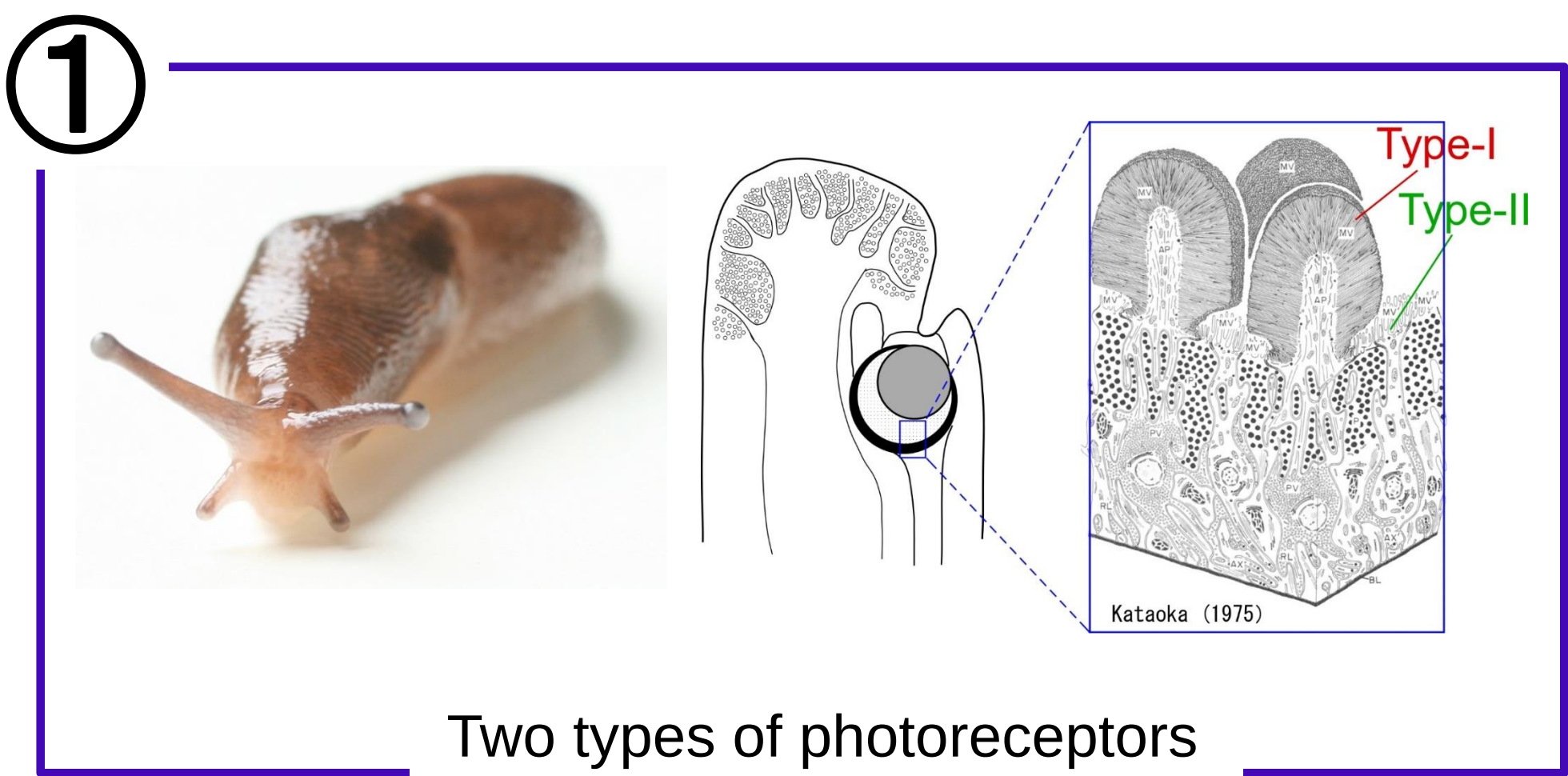
Terrestrial gastropods have a lens bearing eye on the tip of their tentacle. There are two morphologically distinct photoreceptors, called Type-I and Type-II photoreceptors, in the retina. Although both types of photoreceptors send afferent projections directly to the brain, their destinations in the brain, called optic neuropile, have remained to be investigated.

Results

We demonstrated that (1) Type-I photoreceptors send afferent projections to the medial lobe of ipsilateral optic neuropile, whereas Type-II photoreceptors send them to the lateral lobe, (2) direct interaction between bilateral optic nerves occurs at the medial lobe of optic neuropile, (3) the brain photosensory neurons form gap junctions with contralateral optic neuropile in the medial lobe, and (4) a few bilateral Type-II photoreceptors project to those in the contralateral eye.

Conclusion

Present results uncovered an ordered pattern of afferent projection from the retina, and suggest potentially different functional roles of two types of retinal photoreceptors.



Summary

- Optic nerves terminate in two optic lobes in brain.
- Gq-rhodopsin is present only in Type-I photoreceptors.
- Type-I and Type-II photoreceptors terminate in the medial and lateral lobe of optic neuropile, respectively.
- Interaction between bilateral optic nerves occurs in the medial lobe of optic neuropile.
- Interaction between retinal photoreceptors and brain photosensory neurons occurs in the medial lobe of optic neuropile.