

## INSIDE JEB

## Slugs 'see' with light-sensitive brain



Blind man's buff – when a player wears a blindfold and tries to locate fellow players – has been played across the globe by children and adults from antiquity to the modern day. So, when Ryota Matsuo decided to test whether blind slugs can see light with their brains alone, a variation on the theme seemed to be the way to go. Removing the eye stalks of *Limax valentianus* slugs, Ryota Matsuo recorded whether the blind molluscs could still sense light by allowing them to choose between the well-lit end of a chamber and a gloomy area at the other end. Impressively, the blind snails successfully evaded the well-lit region in favour of the dark sector, although they took a more circuitous route than slugs that still had

use of their eyes. Then, Haruka Nishiyama tested which light colours the blind slugs preferred to evade by shining a spot of light on their heads, and it turned out that the animals were more sensitive to blue shades of light, turning their heads away from the illumination. Akane Nagata then searched the slugs' brains for evidence of specialised light-sensitive proteins – which are usually found in the eye – and was impressed to find that the genes encoding several such proteins (including xenopsin and retinochrome) were actively expressed to produce light-sensitive proteins in the molluscs' brains. Finally, Nishiyama and Yuko Matsuo investigated whether the brain reacted to light of different colours, and recorded

nerve signals produced by the brain when they shone blue light on it. Ryota Matsuo and colleagues suspect that the slug's brain simply compares the intensity of light from the instant before with the present light intensity to tell them in which direction to move, choosing to stay put when the brain decides that it is dark enough.

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**Nishiyama, H., Nagata, A., Matsuo, Y. and Matsuo, R.** (2019). Light avoidance by a non-ocular photosensing system in the terrestrial slug *Limax valentianus*. *J. Exp. Biol.* **222**, jeb208595. (doi:10.1242/jeb.208595)

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