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Neuronal background of space positioning of olfactory organs in the snail *Helix pomatia*

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In *Helix pomatia* the olfactory organs are located on the top of the paired posterior tentacles. Behavioral studies have shown that the space positions of the olfactory organs change during food finding and feeding, suggesting the existence of a still unknown motor pathway and distinct muscles which execute the space positioning. In this study we demonstrated three novel bending muscles which are capable to bend the tentacles to space positions. They are attached by one end to the ventral part of the olfactory organ while by their other ends they are fixed to the base of the tentacles. Retrograde neurobiotin tracing and immunostaining revealed that cerebral neurons, containing different transmitters and neuropeptides, innervate both these muscles and the musculature of the stem of tentacles via both the peritentacular and the olfactory nerves. Anterograde tracing showed that these neurons innervate the novel muscles and additionally the musculature of the stem of tentacles from the base to the tip via the peritentacular nerves suggesting a motor response to learned odors via these nerves. Contrary, they innervate these muscles from the tip to the base via the olfactory nerves. This finding suggests that these fibers run through the glomerular region of the olfactory organ and their activity is modulated by the actual olfactory inputs. The revealed innervation pattern allows a precise execution of space positioning of olfactory organs.

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