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Special issue "Development and evolution of sensory cells and organs"

Editorial:
Development and evolution of sensory cells and organs

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Recently, there have been great advances in our understanding of how sensory organs develop in metazoans and it has become increasingly clear that even sense organs, which arose as novelties in some animal lineages (e.g. the cranial sense organs of vertebrates), are composed of evolutionarily ancient cell types (Arendt et al., 2015; Fritzsch et al., 2007; Schlosser, 2015). In addition, several pioneering studies have begun to unravel the history and interrelationships of animal sensory cell types. For instance, investigations into the evolution of metazoan photoreceptor cells have revealed a complex history of cell type divergence as well as novel function in different animal lineages (Arendt, 2003). Technological advances now enable the comparative characterization of single cells, cell types, and tissues by high-throughput RNA sequencing (Marioni and Arendt, 2017), and allow us to study gene function, even in non-model organisms, using CRISPR-Cas mediated gene editing (Gilles and Averof, 2014). These methods promise a wealth of new data on sensory development in different animals.

However, taking advantage of this data to obtain new insights into the evolutionary history of sensory cells and organs, as well as into the forces driving evolution of sensory development, is still a considerable challenge. New conceptual approaches are urgently needed to allow us to frame testable hypotheses on the evolution of sensory cells and organs.