The pacific oyster, an emerging model for neuroendocrinology.

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In Eumetazoans, neuropeptides regulate the main biological functions and play a crucial role in the elaboration of adapted physiological and behavioral responses towards environmental constrains. Until recently, structure and functionality of the diversity of neuropeptide signaling circuits were essentially investigated in vertebrates (Deuterostoma) and ecdysozoan species. With the improvement of high throughput "omics" approaches, molecular resources have tremendously expanded, including in Lophotrochozoa -the ecdyzozoan protostome sister clade. It opens up the opportunity to refine our knowledge on the origin and the evolution of neuroendocrine signaling systems via the introduction of new models at a key phylogenetic position between Ecdysozoa and Deuterostoma. In this context, the pacific oyster *Crasssostrea gigas*, one of the most important aquaculture shellfish resources worldwide, has emerged as a helpful model due to the identification, using combined data mining and/or peptidomic approaches, of extended repertoires of both neuropeptides and G protein-coupled receptors (GPCRs). However, to gain a comprehensive picture of these valuable data in an evolutionary and comparative neuroendocrinology context, complementary information regarding the role and the modalities of interactions between the neuroendocrine components should be considered. Functional roles can often be guessed from the spatiotemporal and the stimulus induced patterns of expression of their encoding genes. Receptor/ligand pairing constitutes also an important step toward functional assessment. It also provides original material to improve the hypothesis about evolutionary trajectories of the neuroendocrine systems. Through examples of newly characterized signaling pathways in oyster (GnRH/AKH, LFRFa/sNPFR, ELH/ CRHR…) we will illustrate how the introduction of a Lophotrochozoan model may unravel pending issues about metazoan comparative neuroendocrinology.

Key words:
Neuropeptides, GPCRs, Lophotrochozoa, evolution, reverse endocrinology.

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