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Editorial: Integration of development, physiology and responses to environmental change in aquatic invertebrates

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Editorial on the Research Topic

Integration of development, physiology and responses to environmental change in aquatic invertebrates

Aquatic invertebrates, particularly mollusks and crustaceans, are of great economic and food value and are therefore widely farmed throughout the world. However, studies on shellfish and crustaceans are still far from being adequate compared to vertebrates. Specifically, the mechanisms of endocrine regulation of reproduction in shellfish and crustaceans and their response to marine pollution are unknown. In addition, shellfish and crustaceans are experiencing a degradation of germplasm resources and a decline in farmed production. Therefore, in order to encourage more scholars to participate in shellfish and crustacean research, and to promote the development of the shellfish and crustacean industry, the Research Topic is calls for original and novel papers related to shellfish and crustaceans in any of the following Research Topics: (1) Molecular mechanism on reproduction and ovarian development of mollusks and crustaceans; (2) Sex determination and differentiation of mollusks and crustaceans; (3) Aquaculture technology and genetic resources evaluation of mollusks and crustaceans; (4) Environmental response, ecology and taxonomy of mollusks and crustaceans; (5) Nutrition and disease of mollusks and crustaceans.

There three studies ([Wang et al.](#), [Liu et al.](#), [Yan et al.](#)) focused on the reproduction of mollusks by using transcriptomic and molecular biology techniques, *Mytilus coruscus* and *Cyclina sinensis*. The results showed that several key genes involved in the process of sex determination/differentiation and gonadal development of mollusks.

Studies focused on the responses to environmental change of mollusks. Specifically, [Zheng et al.](#), conducted starvation experiments on mussels from the perspective of the influence of breeding density on the physiological survival condition of mussels, in order to explore the influence on the secretion of mussels' bursa and further explore the benthic distribution and cultivation of mussels. The results of this study showed that food restrictions may alter the physiology of mussel foot glands, and food shortages have potentially adverse effects on mussel attachment in a variety of habitats may increase

migration risks for mussels in suspension culture. Ge et al., elucidate the effect of ammonia nitrogen stress on the superoxide dismutase (SOD) activity and interferon-induced transmembrane protein 1 (IFITM1) of *C. sinensis*. Liu et al., investigated the effects of acute polychlorinated biphenyls (PCBs) exposure on survival, non-specific immunity, antioxidant capacity and histology of *C. sinensis*. The results showed that acute exposure to PCBs resulted in the loss and shortening of gill filaments and lateral cilia, and increased mortality, oxidative stress, immune dysfunction and energy metabolism disorder *C. sinensis*. Wang et al., conducted a transcriptome study on the immune and antioxidant effects of residual chlorine stress on *C. sinensis*, and the study provides valuable information for understanding the effects of residual chlorine stress on the survival, physiological metabolism, and molecular mechanisms of immune and antioxidant functions of clams. Moreover, Aljbour et al., investigated the metabolic and physiological performance of the upside-down jellyfish in response to UV at the cellular level. The results showed that the jellyfish was able to cope with UV-mediated increased energy requirements in an aerobic state. Zhou et al., studied genome-wide identification, structural and evolutionary characteristics, and expression analysis of aquaporin gene family members in *Mercenaria mercenaria*. This study provides a comprehensive understanding of the AQP gene family in hard clams, and lays a foundation for further exploration of the function of AQP in bivalves.

Another study Yang et al., focused on the mechanism underlying the response of *Rapana venosa* to juvenile oysters through the RNA-seq analysis. Taken together, the results show that competent larvae rapidly respond to the inducing effects of oysters via some immediate early genes, such as the transcription factor AP-1, which may further regulate downstream pathways such as the MAPK signaling pathway to cause subsequent changes, including a decrease in HSP90 and an increase in IAPs.

Except for mollusks, He et al., carried out research on technological innovations in swimming crab farming. Specifically, He et al., explored a new off-season breeding of *Portunus trituberculatus* by breeding in autumn in 2022, and compared the embryonic development rate, embryonic antioxidant capacity and hatchability, as well as digestive enzyme activities of newly hatched larvae of *P. trituberculatus* under different water temperatures in the off-season (breeding in early autumn). The results showed that the water temperature of embryonic development should be controlled within 31°C to ensure the quality of embryonic development in the crab. In addition, He et al. used a special plastic basket as an anti-injury shelter on the basis of the existing research to explore the covert behavior and molting growth of *P. trituberculatus* with

different initial body weight. Overall, the shelter played a positive role in the overall growth of the crab. Therefore, before the seedlings are put into production, it is necessary to shelters, which helps to increase the yield of the *P. trituberculatus*.

From the above aspects, the study of aquatic vertebrates still needs further strengthening and innovation.

Author contributions

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