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Editorial

Special Issue on Aquatic Animal Health in Vulnerable Environments

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1. Introduction

Aquatic animals, whether marine or freshwater animals, and whether farmed or wild, face a number of threats related to their water environment. The technological pressures, occurrence of contaminants, and climate changes are ubiquitous in the environment and cause undesirable ecological effects that are reflected in aquatic organisms. Thus, the aim of this Special Issue is to present advances in identifying and resolving challenges related to aquatic animal health in aquacultured and free-living aquatic species. A total of nine papers are published in this issue: one review and eight research articles. They relate to various aquatic species, such as shrimp, octopus, green ormer, Mediterranean scallop, brown trout, black scorpionfish, greater amberjack, and turbot. Additionally, a variety of threats are addressed, such as microplastic pollution, seasonal temperature changes, various living conditions (free-living as opposed to aquacultured), and medicated diets for farmed species. In addition, specific technological conditions in relation to the keeping of captive animals, as well as to their release and stocking activities, are described.

The review by Thammatorn and Palić [1] addresses the overwhelming threat of omnipresent plastic litter in aquatic environments, as well as microplastic pollution, which causes a number of adverse effects in aquatic organisms. The authors presented a model case study on toxicity of glyphosate, focusing on the simultaneous exposure of aquacultured shrimp to both polyethylene and glyphosate, as the toxicity and bioaccumulation of glyphosate-sorbed polyethylene microplastics in shrimp, as well as its threat to consumers, are largely underinvestigated. A considerable environmental threat may also ensue from altruistic intents, such as from introductions of non-indigenous fish species to the end of ichthyofauna enhancement of water bodies, as described by Giantsis et al. [2]. Most of the brown trout sampled from the three outlined tributaries were thus strongly affected by stocking activities, with a threat of a complete loss of their autochthonous genetic traits. Management plans are strongly suggested for such cases, as in the work of Lyach [3], who detailed case studies of successful restoration of brown trout upon ten conservation steps, delineated in detail, to be followed in order to put an end to the plummet of brown trout populations in their native ranges. With the aim of their preservation, native fish populations also need to be investigated regarding spatial variations of their biological characteristics, as in the work of Ferri and Matić-Skoko [4]. The authors assessed intraspecific variations of black scorpionfish, reflecting their adaptations to various environmental conditions, and they also estimated the geographical scale at which local black scorpionfish could be managed. The health status of such, as well as of farmed fish, is reflected in their tissues' biochemical and haematological parameters, as described by Ferri et al. [5], who established season-specific reference ranges for black scorpionfish. Seasonally induced temperature changes, particularly in shallow seas, also affect physiology, stress responses, and survival of mollusk species [6], as low winter temperatures contribute to a decline in enzymatic antioxidant defense, particularly in Mediterranean scallop tissues. Exposure of aquatic organisms to environmental changes, predators, starvation, emerging pathogens,

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and human impact is continuous, but farmed species are additionally exposed to stress, deriving form high stocking densities, suboptimal water quality, nutritional intensity, and disease treatments. Such living conditions and medicated diets impact their overall organismal responses, as investigated in the work of Križanac et al. [7] on turbot, as well as in the work of Rigos et al. [8] on greater amberjack, respectively. To the end of optimizing and enhancing the keeping conditions of aquacultured species, particularly of yet poorly studied species, such as octopuses, Asada et al. [9] conducted a series of experiments, which may lead to the improvement of their keeping not only in research settings and public aquaria, but also in commercial aquaculture.

Although submissions for this Special Issue have been closed, the ongoing in-depth research of the aquatic animal health in vulnerable environments will surely continue to address the challenges all aquatic beings face by mere existence in our precarious era.

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