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Marine Biodiversity and Ecosystems

Resilience of Fish under Environmental Acidification: Insights from Hormones and Physiology

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Time: 2025. 08. 06 Wed. 14:00

Venue: Auditorium, 1st Floor
Interdisciplinary Research Building
跨領域科技研究大樓1樓演講廳

Host: Dr. Tzu-Hao Lin 林子皓副研究員

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Abstract

Anthropogenic freshwater acidification poses a growing threat to aquatic animals, including fish. However, it remains unclear whether and how fish populations can survive under ongoing acidification. In this study, we used Japanese medaka (*Oryzias latipes*) as a model to explore the resilience of fish, integrating physiological, metabolic, hormonal, and reproductive assessments. After acidic exposure, both sexes of medaka exhibited reduced oxygen consumption and activated energy mobilization from the muscle to the liver. The muscle broke down proteins through upregulated proteolysis, while the liver accumulated macronutrients to enhance energy storage. Notably, some female-specific responses were observed under acidic conditions. The female enhanced the crosstalk between the liver and ovary via estrogen receptors (Esr) and estrogen signaling, respectively, and displayed improved reproduction under acidic stress. Gonadotropin signaling was also involved in these regulations. The offspring produced by the acidified group exhibited a smaller egg size and earlier hatching compared to the control, suggesting a different reproductive strategy. These metabolic and reproductive regulations represent a trade-off in energy allocation, prioritizing energy storage and reproduction over growth and maintenance under acidic conditions. Our findings provide valuable insight into the physiological basis of fish resilience in the face of environmental challenges and contribute to understanding the ecological impacts of environmental acidification on aquatic ecosystems.