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Conference Abstract

Balancing risks and opportunities in ex situ conservation: host-parasite dynamics of the European weatherfish

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Abstract

The European weatherfish *Misgurnus fossilis*, once widespread across Eurasia, is now critically endangered in Flanders (Belgium), prompting the establishment of a captive breeding programme as part of conservation efforts. During rearing, juvenile weatherfish suffered heavy infections from the ectoparasitic flatworm *Gyrodactylus fossilis*, leading to mortality events. Although *G. fossilis* is a natural parasite of *M. fossilis*, high host densities in hatchery conditions facilitated pathological infection intensities, while adult fish maintained at lower densities showed no visible pathology. This suggests that husbandry practices strongly modulate dynamics of this host–parasite system in captivity. To place these observations in a historical context, we screened both captive-bred fish and archival material (1881–1973, i.e. prior to the anthropogenic introduction of Asian congeners in *Misgurnus*) for ectoparasites. Morphological and molecular characterisation revealed infections of three monopisthocotylan flatworms: *G. fossilis, Gyrodactylus misgurni* (Gyrodactylidae), and *Actinocleidus cruciatus* (Dactylogyridae). All represent new records for Belgium, with *G. misgurni* and *A. cruciatus* considered native due to their

occurrence in historical material. Notably, these parasites' abundance has declined compared to historical collections, raising concerns about their own conservation status. Since parasites contribute substantially to species-richness, ecosystem functioning, and even the health of their host individuals and populations (e.g., their immunological development and resilience) their co-decline alongside endangered hosts represents a hidden and meaningful dimension of biodiversity loss.

Our findings highlight both risks and opportunities associated with parasite conservation in ex situ programmes focused on fishes or other vertebrate hosts. High juvenile stocking densities increased parasite burdens and mortality, while improved husbandry practices allowed stable co-existence of host and parasite populations. This indicates that carefully managed captive breeding facilities may act as refugia not only for *M. fossilis* but also for its specialist parasites, maintaining ecological interactions and genetic diversity that would otherwise be lost.

While parasites are often overlooked or actively eliminated in wildlife management, they play essential roles in ecosystems and represent species of conservation concern in their own right. These results emphasise the possibility of including parasites in conservation planning. For the weatherfish and its parasites, ex situ conservation thus provides an experimental framework for developing integrated strategies that safeguard both host and parasite persistence. Future reintroduction initiatives should therefore consider whether to also re-establish native parasite populations, a decision that requires informed discussion among conservation stakeholders. By demonstrating the feasibility of host–parasite co-conservation, this study advances the idea that conservation programmes can optimise resource allocation while preserving the evolutionary and ecological relationships of multiple species simultaneously.

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Keywords

co-conservation, parasite breeding, *Misgurnus fossilis*, Monopisthocotyla, collection-based science

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Conflicts of interest

The authors have declared that no competing interests exist.