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Emerging Infections that Threaten Wildlife Biodiversity and Food Production

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ABSTRACT

Wildlife conservation is currently challenged by several infectious diseases that can induce mass mortality events. Likewise, fish in aquaculture, such as common carp, are threatened by significant mortalities associated with emerging viral diseases. Factors that allow outbreaks of infections include newly emerging or re-emerging pathogens, naïve susceptible populations, combined exposures to multiple stressors, and sub-optimal living conditions. This means that host physiological status under pathogen pressure is impacted by standard components of the disease triangle, including host susceptibility, virulence of the infectious agent, and environmental determinants. There is an increased need to disentangle how infected animals cope with progressive disease pathology and lose their ability to maintain homeostasis of key physiological parameters, succumbing to infections. Over the last two decades, the fungus *Pseudogymnoascus destructans*, the fungal agent responsible for the skin infection known as white-nose syndrome (WNS), has caused a devastating decline in North American insectivorous bat populations and only sporadic cases of mortality in Eurasia. Analysis of blood suggests that a threshold of about 300 skin lesions on both wings, combined with poor hibernation conditions, may distinguish healthy bats from those with homeostatic disruption. The fundamental pathophysiological mechanisms of mortality associated with WNS are thought to be similar to those seen in other fungal infections of amphibians and snakes. Considering the overall impact on biodiversity, *Batrachochytrium dendrobatidis* is deemed the most destructive pathogen globally, making amphibians the most endangered vertebrate class. Skin mycoses in snakes caused by *Ophidiomyces ophidiicola* occur in both wild and captive snakes in America, Australia, Europe, and Asia. Carp edema virus infection outbreaks currently challenge the European aquaculture economy, causing complex adverse effects and resulting in severe metabolic disturbances due to impaired gill respiratory and excretory functioning in fish. To conclude, conservation measures should minimise additional stressors and address the impacts of human-associated pathogen introductions.

Keywords: white-nose syndrome, Chytridiomycosis, Ophidiomycosis, Carp edema virus infection, pathophysiology

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