

## In This Issue

### AMPHIBIAN DECLINE

Five articles in this special issue address the theme of amphibian population declines. Global amphibian population declines first became a major conservation issue in the early 1990s, and this phenomenon has been widely cited as a case of amphibians acting as sentinels for anthropogenic environmental changes. However, a series of declines in remote, apparently untouched tropical montane regions in the Americas and Australia could not be explained by habitat loss or other commonly cited threats to wildlife. Here, a fungal disease was identified as a key causal candidate for amphibian loss. This disease, chytridiomycosis, has now been linked to mass mortality events in Europe, North America, Central America, South America, Australia, and New Zealand and is the subject of a flurry of research activity. While we are a long way from finding a strategy to block the spread of such an emerging pathogen of frogs, the author of our article about the cover art, **George Rabb**, gives us poignant food-for-thought on why we should urgently find new ways to understand and deal with this new type of conservation threat. To this end, articles in this issue address the pathogenesis, ecology, and impact of this disease and provide clues as to if and how it can cause host extinction, as well as a tantalizing promise of potential therapy.

In the first article, **Carey et al.** provide critical information on the *pathogenesis* – the development of disease – caused by *Batrachochytrium dendrobatidis*, a fungal pathogen implicated in amphibian population declines. Their research provides vital information on the dose of infective stages necessary to cause infection, how environment may affect infection, and how the pathogen is transmitted. Most importantly, it addresses the key question, why did boreal

toads disappear so dramatically across much of their range during the late 1970s and early 1980s?

The distribution of infectious disease agents may depend on a number of variables. **Carnaval et al.** report the presence of an emerging disease of amphibians in a wide range of species across the Brazilian Atlantic rain forest, a habitat of significant conservation concern. The presence of this disease here, in the absence of known declines, may help dissect out the roles of host and environment in explaining its impact. One theory is that amphibians in this hot, lowland forest are able to clear infection which is caused by a fungus that fares poorly in high environmental temperatures.

Both common sense and host-parasite evolutionary-ecological theory predict that pathogens do not normally cause the extinction of their host population. However, there are a growing number of counterexamples, including the amphibian pathogen *B. dendrobatidis*. **Alford et al.** report the first evidence that this pathogen can persist on animals other than amphibians – in this case, freshwater shrimps. The significance is twofold. First, it provides a mechanism for this pathogen to persist as amphibian populations decline to extinction. Second, it provides a method by which this emerging disease is spread as humans, birds, and other animals move freshwater fauna across the landscape.

Since its discovery in 1998, the disease chytridiomycosis has been implicated in amphibian declines, the extinction of one species (see **Schloegel et al.**, in this issue) and the loss of a significant proportion of the genus *Atelopus* in Central America. In a groundbreaking report and the first of its kind, **Harris et al.** describe the discovery of bacteria in the skin of amphibians that inhibit the growth of this fungal disease in vitro. Although it is unclear what

the potential for therapy is, these bacteria may represent part of our future armory to deal with this important disease.

## SCHISTOSOMIASIS, SNAILS, AND FISHING PRESSURE

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The article by **Stauffer et al.** provides a clear demonstration of changes in the rates of infection arising from a seemingly unrelated natural resource management issue. Using trophic cascade-type reasoning, the authors argue that fishing by people living around the shores of Lake Malawi decreases populations of snail-eating fish and this relieves predation of aquatic snails, allowing close-shore populations of snails and their parasites to increase. The significant parasite in this case is the trematode *Schistosoma*, and the authors show increased incidences of schistosomiasis in children around the lake as an indirect consequence.

## CLOSE TO DANGER — INSIGHTS INTO WEST NILE VIRUS RISK PERCEPTION

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One of the most important aspects of disease prevention depends on whether or not a community heeds the warnings given by health experts. In this regard, the study by **Zielinski-Gutierrez and Hayden** underscores the importance of community participatory approaches to develop

health preventive messages that will ring true for local communities. Such approaches afford greater success in reducing the risk of human infection from mosquito-borne West Nile Virus. The study also highlights the importance of understanding local ecology when responding to West Nile Virus — providing insights into risk perception that may be applicable to preventing other mosquito-borne disease.

## CROSS-TRAINING IN VETERINARY MEDICINE AND WILDLIFE CONSERVATION

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The emerging field of conservation medicine, increasingly recognized as essential in the battle to protect global biodiversity, for understanding infectious disease emergence, and for protecting ecosystem sustainability, requires veterinarians trained in wildlife conservation. Yet, such training opportunities are limited due to the challenges of establishing interdisciplinary programs in academia. In a profile by **Warren**, a training initiative at Murdoch University in Perth, Australia, is described that is attracting students from all over the world as well as throughout Australia. The author explains how the university's commitment to interdisciplinary training, a flexible program, and long-distance learning has overcome impediments to interdisciplinary programs.

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