

In This Issue

VISCERAL PARASITE VITIATES PANDAS

Despite a great deal of research on the physiology, reproductive biology, and diet of giant pandas in the wild and in captivity, there is little information on wild panda mortality. **Zhang et al.** evaluate previously unavailable data on mortality of wild pandas. Their analyses suggest that the current most significant threat to wild panda survival is disease caused by an ascarid nematode. Furthermore, they show an increase in probability of wild panda mortality from infection by this roundworm. Loss of habitat and subsequent increase in wild panda density may be driving the spread of this emerging infectious disease that threatens the conservation of this symbolic and charismatic animal.

HORMESIS: ENIGMATIC BUT DEMONSTRABLE

Epidemiology and toxicology are necessarily concerned with the distal parts of the dose-response curve. However interesting phenomena may occur around the inflection point and be of interest to health and ecology. **Lefcort et al.** draw on the literature and their previous experimental observations to design an experimental test for the hypothesized stimulatory effects of small doses of heavy metal contaminants. Their results were unable to reject the hypothesis for both aquatic snails and periphyton that had been exposed to the contaminants for many generations. The authors raise the interesting question of whether such hormetic effects might be discernible in humans.

CHYTRIDIOMYCOSIS IN THE AMERICAS

Since its discovery in 1998, the disease chytridiomycosis has been implicated in amphibian declines, the extinction of

one species (see Schloegel *et al.* EcoHealth 3.i) and the apparent extinction of the genus *Atelopus* in Central America. Three articles in this issue address the theme of amphibian population declines caused by this fungal disease, which has now been linked to mass mortality events in Europe, North, Central and South America, Australia and New Zealand and is the subject of a flurry of research activity. We are a long way from finding a strategy to block the spread of such an emerging pathogen of amphibians and these three papers provide not only further evidence of the extent and effects that this fungus (*Batrachochytrium dendrobatidis*) has both historically and currently on amphibian populations in the Americas, but also a clear call for staunch measures to halt its spread.

Frías-Alvarez et al. set out to test whether amphibian declines in undisturbed habitat in México may be attributed to *B. dendrobatidis*. They surveyed 360 amphibians from 14 genera and 30 species. Both light microscopy and PCR assay were used to determine infection in skin samples. About half of the species tested positive for chytridiomycosis. Two endemic species, the Axolotl and the Mexican Leaf Frog, had the highest rates of infection.

Often valuable information, especially indicative of directions for future research, may be gleaned from museum specimens. **Ruiz et al.** examine formalin-fixed specimens over the past 40-years from Colombian natural history collections for presence of *B. dendrobatidis*. Out of 672 specimens representing 35 frog species from different locations within the country, three high-elevation species were found to be infected. The authors call for urgent assessment of infection in living populations of amphibians.

The critically endangered Bloody Bay Poison Frog in Tobago, West Indies, is only one of many endemic amphibian species in the Caribbean that may be at risk due

to chytridiomycosis. **Alemu et al.** used PCR analysis on 124 skin swabs to confirm *B. dendrobatidis* in three widely separated populations of the Bloody Bay Poison Frog. Though chytridiomycosis has a prevalence of about 20% and no associated clinical disease in this species, it remains a very real risk of spreading to Trinidad and other Caribbean islands. Clinical disease was not apparent, an infection prevalence of about 20% suggests this species could serve as a reservoir of infection for the region's more vulnerable species.

HEATING UP WEST NILE VIRUS

The potential role of climate variability in disease emergence is a profoundly important topic in disease ecology and global health. **Paz and Albersheim** analyze the correlations between weather conditions (especially air temperature), abundance of the mosquito *Culex pipiens*, and West Nile Virus (WNV) incidence in humans. The results show an association of the disease with mosquito abundance, escalating with the increasing temperatures resulting from the urban heat island effect. Furthermore, the temperature anomalies during the study period appear to have promoted mosquito abundance and, consequently, the disease incidence in humans. The finding that extreme heat in the early spring predicts WNV's increased incidence weeks later may prove valuable as a basis for public health intervention.

FOR URBAN MOSQUITOES, ALL WATER MAY NOT BE EQUAL

Narrowing in on the precise relationship between larval habitat type and breeding success is a critical challenge in mosquito-borne disease control. A two-year study by **Irwin et al.** found that the majority of potential mosquito habitats surveyed in Madison, WI—ditches, marshes, flood areas, and retention ponds—were free of mosquito larvae, while a select few sites consistently had abundant larvae of species serving as vectors for West Nile Virus, Dengue, and other diseases increasingly associated with urbanization.

DOWN-UNDER DISEASE WITH A PINCH OF SALT?

The widespread occurrence of dryland salinity in southern Australia in areas where native vegetation has been removed has been suggested to increase spread of the mosquito vector for Ross River Virus (RRV). **Jardine et al.** hypothesized that if this were true, and since the disease is notifiable, health records should show a relationship between ecosystem degradation and disease incidence or serological evidence of previous infection. They were unable to demonstrate such an association with their spatial analysis, but methodological limitations suggest the hypothesized link between dryland salinity and RRV warrants further investigation.

BATTLING BURULI ULCER DISEASE IN BENIN

Buruli ulcer disease is one of the fourteen diseases covered by WHO's neglected tropical diseases program. However, unlike most of the others, the vectors and mode of transmission of the pathogen are unknown, greatly hampering control efforts. **Wagner et al.** show that land use affects the probability of Buruli ulcer disease, with urbanization having a strong negative affect, whereas agriculture increased its likelihood. These associations offer new insight that may help elucidate the mechanism underlying this disease's emergence and lead to control measures.

RECEPTORS POINT TOWARDS PREDICTION

There are a plethora of known and unknown viruses waiting to emerge from wild animal reservoirs to become the next SARS or AIDS. Our ability to predict which will and which will not could save many lives. **Pulliam** reviews current progress in understanding viral disease emergence and presents a model combining ecological factors and molecular attributes for predicting emergence risk. The model suggests that viruses having the most emergence potential are those that are simultaneously highly adaptable yet evolutionarily conservative when comes to host.cell surface receptors.

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