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In This Issue

Breaking Boundaries

In our increasingly interconnected world, disciplinary or taxonomic boundaries do not exist for pathogens, and yet infectious disease research occurs in many separate disciplines. These may include plant pathology, veterinary and human medicine, as well as ecological and evolutionary sciences. Within each there are different traditions, goals, and terminology, which often may lead to gaps in communication. Borer et al. discuss how an approach that is integrated across the plant–animal–human divide would advance our understanding of disease by quantifying critical processes including transmission, community interactions, pathogen evolution, and complexity at multiple spatial and temporal scales. The authors also stress that, by bridging these disciplinary and taxonomic gaps, we may attain valuable insights and important synergistic advances that will be essential for the control of infectious disease. Advances to achieve such integration require more investment in basic disease research and possibly also change in funding structures for more transdisciplinary collaboration.

To echo the viewpoints presented in the recent editorials and forums published in *EcoHealth* in 2009 and 2010, Wang et al. further discuss how understanding the links between water and health using biogeography is needed for a thorough comprehension of disease ecology. The authors vocalize a concern for diseases not addressed by international policy makers and that are transmitted and spread by water, specifically human infection of liver fluke and which is a major public health problem in Southeast Asia, to illustrate their arguments.

The most urgent reason to develop interdisciplinary research efforts may be the threat of another as wide-ranging global epidemic as the 2009 H1N1 epidemic that affected animals and humans alike. The epidemic may be reason enough to consider changes needed in global surveillance and reporting systems. To this end, Scotch et al. examined global reports of animal and human cases of the 2009 swine-origin H1N1 influenza A epidemic. The authors found that, in general, human cases were reported before animal cases at the country-level. This suggests the potential of H1N1 infection to be a situation where ''reverse zoonosis'' may occur. The findings stress the importance of integrating animal and human health data streams to maximize the potential of existing systems for reporting.

The Susceptibility Game

Ranaviruses have been implicated as a major cause of reported amphibian die-offs in the United States of America. Understanding of the factors underlying species-level differences in susceptibility remains limited despite the accumulation of reports of amphibian mortality events in wild populations. In this study, Hoverman et al. conducted a set of laboratory experiments with 19 amphibian species common to eastern North American and used comparative phylogenetics to compare and analyze susceptibility to ranaviruses. The authors demonstrate that a combination of factors including host phylogeny, life history characteristics, and habitat associations contribute to species differences in susceptibility. This knowledge enhances our ability to predict at risk species and potentially manage or reduce the negative consequences associated with ranaviral disease.

The Human Condition

Biodiversity provides humans with the most essential element for survival, food. The sustainable use of food

biodiversity is key to address prevailing nutritional problems and global food supply. The systematic approach used by Penafiel et al. reviewed up-to-date evidence showing that local food biodiversity contributes importantly with energy, micronutrients, and dietary diversification particularly to those who subsist from nature such as rural and forest communities. The review summarizes the methodologies used by the selected articles and suggests the use of a standardized methodology for future research on the links between biodiversity and human nutrition.

Climate change and environmental degradation have been implicated to negatively affect population health. Healthcare, whose entire aim and purpose is to protect and promote health, has an important role in addressing environmental challenges. In addition, an emerging body of research suggests that healthcare practitioners are factoring in environmental concerns into their practice. This paper by Patrick et al. explores the barriers and facilitators to incorporating sustainability into community-based healthcare practice in five qualitative cases. Health promotion, which is an integral part of the healthcare system, is an area of practice that can support action on sustainability. The results demonstrate that, despite multiple barriers to practice, health promotion principles can facilitate action on sustainability with a specific emphasis on community needs assessment.

With increasing evidence of the connections between the built environment and adverse health outcomes, urban sprawl is a feature of many large cities and has been shown to be associated with both overweight/obesity and physical inactivity. However, there are few studies on the impact of urban sprawl on self-rated health and mental health. Jalaludin and Garden analyzed data from the NSW Population Health Survey of communities around metropolitan Sydney, Australia, aiming to assess the effects of population density. Although these associations were statistically non-significant, the authors found that increasing sprawl was associated with an increased risk of poorer self-rated health and a lower risk of psychological distress.

What's the Big QMRA

Quantitative microbial risk assessment (QMRA) that is based on just a few indicator organisms underestimates true disease burden, which is due to a number of coexisting causative pathogens in some environmental matrices. In the meantime, the assessment of microbial hazards is constrained by time-consuming conventional microbiological techniques, leading to QMRAs of narrow geographic, time, and pathogen scope. Tserendorj et al. propose the use of molecular techniques in the survey of concentrations of select bacterial, protozoan, and viral pathogens in peri-urban irrigational canals, the results from which may then be used in the estimation of annual waterborne gastroenteritis burden. Their QMRA findings highlight the importance of monitoring the microbiological quality of canal water as a basis of interventions for reducing microbial hazards, especially in the context of WHO accepted standards for Disability Affected Life Years (DALYs).

Spore Me a Big One

A paper by Perrott and Armstrong investigates the hypothesis that habitat contamination by *Aspergillus fumigatus* can potentially account for declines of reintroduced hihi (or stitchbird, *Notiomystis cincta*) populations to modified islands. The authors report that the prevalence of *A. fumigatus* spores in the soil, air and floral nectar is much higher in young growth forests and forest edge habitats. Results suggest that hihi mortality rates between islands are potentially due to differential exposure to *A. fumigatus* spores. While disease causing microflora like *A. fumigatus* go unnoticed by most restoration ecologists, they may have the potential to do at least as much damage as more visible weed and mammal pest species.

There's a Map for That

In this paper by Andreo et al., the authors modeled the potential distribution of *Oligoryzomys longicaudatus* or Long-tailed Colilargo or Long-tailed Pygmy Rice Rat (Andes virus reservoir) in Argentina as a function of environmental variables. The maps predicted the highest occurrence probabilities along the Andes range, from 32°S and narrowing southwards. The authors also predicted high probabilities for the south-central area of Argentina. Hantavirus Pulmonary Syndrome transmission zones in human populations of Argentine Patagonia matched the areas with the highest probability of mouse presence. Therefore, the authors conclude that the mouse's presence probability may indicate an approximate risk of transmission in humans. This kind of model could be used as an

early tool to guide control and prevention plans in areas predicted to be at most risk.

Habitat loss and fragmentation are primary causes of biodiversity loss worldwide, increasing the risk of species extinction. Besides this direct consequence, these processes may also trigger other outcomes, such as the emergence of infectious diseases. In this study, Ogrzewalska et al. evaluate whether the patch size in fragmented areas of Atlantic Forest in southeastern Brazil influences the diversity of forest birds. Consequently, they also investigated this in relation to the prevalence of ticks on birds and the rickettsial infection of these ticks. The analyses showed statistically significant associations between the prevalence of ticks on birds and bird diversity and richness. The findings also showed higher prevalence of ticks on birds in degraded patches, which may have important implications for disease dynamics.

Research conducted by Little et al. examines how land use patterns influence the distribution of dengue mosquitoes in Puerto Rico. Three key findings are that these species segregate along an urbanization gradient, that both the density of the built environment and the number of tree patches characterize their habitats, and that high-resolution satellite imagery can increase our understanding of *Aedes* ecology. The authors propose and illustrate the use of simple but powerful analytical techniques that can be reproduced in other systems with relevance for a wide audience from public health officials to urban planners.

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