

In This Issue

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YOUNG RESEARCHERS IN TRANSDISCIPLINARY RESEARCH

This profile by **Scovronick et al.** presents the development of an EcoHealth Forum led by early career researchers from a range of disciplines in London. The article highlights the historical difficulty in dealing with complex systems, the need for training programs to address this shortfall, and provides a brief description of how EcoHealth fits into such a discussion. The group participants share a common vision to learn and promote transdisciplinarity in research, and they do so by exploring the pillars of the ecosystem approach to health through a seminar series looking into overconsumption of meat in London.

THE THINGS THAT RATS CARRY

Hantavirus pulmonary syndrome is a human disease caused by some members of hantavirus. The virus is closely associated with one or a few rodent species, and may persist in rodent populations through interactions such as fighting or grooming. It may be transmitted to humans through airborne particles originating from the waste matter of rodents. With their longitudinal study performed in the Andean region of Chubut Province, **Polop et al.** provide data about the spatial variation in abundance of the rodent host; they suggest that the Andes hantavirus may be regionally persistent, but that the risk to humans would be localized.

Although almost half of reported human cases of plague globally occur in Madagascar, much work remains to elucidate what makes transmission and reservoir dynamics unique in this region. **Tollenaere et al.** investigated *Yersinia*

pestis infection response in natural populations of Malagasy *R. rattus* using experimental challenges of wild-caught individuals. The results of their study provide important insight for developing epidemiological models of plague transmission in Madagascar.

CHYTRIDIOMYCOSIS: ANTHROPOGENIC SPREAD AND SURVIVAL OF DIRECT-DEVELOPING FROGS

Madagascar is also one of a few amphibian diversity hotspots not yet affected by chytridiomycosis (Bd), but the large number of ecotourists visiting the country could introduce the pathogen. During an amphibian conservation workshop, government representatives were concerned that raising awareness of the possibility of anthropogenic spreading of Bd would cause tourists to get a negative image of Madagascar. **Wollenberg et al.** therefore assessed the reactions of 659 tourists to raising awareness and can confidently refute these concerns. The authors see these results as a showcase for policymaking in other amphibian diversity hotspots at risk of Bd introduction. In another study by **Longo and Burrowes**, data on the abundance of two species of anurans over 18 years, at two sites in Puerto Rico, revealed distinct population patterns associated with Bd. Using mark-recapture and monthly Bd-monitoring for 2 years, the authors show that this pathogen hinders adult survivorship even in enzootic conditions, and that juveniles had higher prevalence and Bd-infection levels than adults. This work contributes to the understanding of how resistant direct-developing amphibians persist with Bd, pointing to critical life stages and habitat variables that may induce fluctuations and/or declines in the wild.

TRAVELING THE WORLD? WHY NOT SWITCH HOSTS?

Currently, wildlife is traded globally for a multitude of purposes including food, pets, research, education, medicine, and bait. In their study, **Picco et al.** take into consideration that global wildlife trade exacerbates the spread of nonindigenous species and disease. Ranaviruses are amphibian pathogens that commonly move through the bait trade in the western United States and are associated with amphibians, reptiles, and fish. Ranaviruses are of additional concern because they can switch hosts. The authors experimentally injected largemouth bass with a bait-trade, tiger salamander ranavirus. Largemouth bass became infected, but exhibited no signs of disease or mortality. The authors conclude that amphibian bait ranaviruses have the potential to switch hosts to infect fish, but fish may act as dead-end hosts or nonsymptomatic carriers, potentially spreading infection as a result of trade.

DATE PALM SAP COLLECTION AND NIPAH VIRUS TRANSMISSION

Nahar et al. investigate nipah virus (NiV) infection, which is a seasonal disease in Bangladesh that coincides with the collection season for date palm sap. Bats pose a challenge to the quality of sap collected, as they drink from, and defecate into, the sap-collecting vessels. Bats that are infected with NiV will contaminate the sap. The authors conducted a qualitative study among date palm sap collectors (gac-hhi), who occasionally use some methods to prevent bat access. If these methods are determined to be effective, it may significantly reduce the risk of human NiV infection in Bangladesh.

BATS WITHOUT BORDERS

Breed et al. used satellite telemetry on nine flying-foxes to determine the scale and pattern of their long-distance movements. *Pteropus alecto* individuals were observed to move between Australia and Papua New Guinea on 4 occasions, and between Papua New Guinea and Indonesia on 10 occasions. This species also crossed the putative ecological boundary of Torres Strait on two occasions. The authors' findings demonstrate the potential for zoonotic viruses to be transferred by flying-foxes between countries.

This could have implications for disease risk management and for the conservation management of flying-fox populations.

AGRO-ECOLOGICAL NICHES OF THE H5N1 VIRUS

Highly pathogenic avian influenza (HPAI) H5N1 virus has spread across Eurasia and into Africa, and continues to disrupt poultry production and impair smallholder livelihoods in many countries. This study by **Hogerwerf et al.** explores HPAI H5N1 persistence at the global scale, using a multivariate analysis of 14 agricultural, environmental, climatic, and socioeconomic factors. The authors found that a combination of six variables can differentiate areas with human cases and persistence in poultry. The analysis identifies five agro-ecological clusters, or niches, representing varying degrees of disease persistence. If the disease were to be introduced, the results suggest that few countries remain where HPAI H5N1 would likely persist.

DO COLD WINTERS ASSIST THE SPREAD AND PERSISTENCE OF H5N1 IN THE WILD?

Highly pathogenic avian influenza (HPAI) is currently active in Egypt and in some Asian countries. However, in the winter of 2005/2006, the disease also reached Europe. **Ottaviani et al.** analyze the spatial pattern of the 2005/2006 European HPAI outbreak in wild birds, in relation to major wintering sites and to the wintering line for migratory waterfowl distribution. Cases were significantly closer to the wintering line than would be expected by chance and by the location of wintering sites alone. Bird congregation in wetlands with intermittent frost conditions and environmental virus may play a major role in HPAI amplification and transmission.

CLIMATE CHANGE AND HEALTH

In this article, **Habib et al.** reviewed the literature on climate change and health in the Eastern Mediterranean Region. While this region already faces numerous crises, which range from conflicts to natural hazards to a high burden of disease, increased concentration of greenhouse gases raises another set of concerns. In addition to impacting ecosystems, climate change is likely to have a

pejorative effect on human health, necessitating a strengthening of health systems and capacities in the region. The authors conclude that the existing literature on climate change from this region is sparse, and that informational gaps stand in the way of regional preparedness and adaptation.

PATHOCENOSIS: A HOLISTIC APPROACH TO DISEASE ECOLOGY

The history of medicine describes the emergence of the diseases and human attempts to stem them, and allows the

perception of emergence in a changing environment. With respect to such environmental and temporal dynamics, Mirko Grmek, a historian of medicine, conceptualized it with the word of *pathocenosis*, considering an existing interrelationship between the community of infectious agents present at a given time in a given territory. Using exemplary pathologies, **Gonzalez et al.** present evidence that the spatial and temporal evolution of diseases illustrates how a change of “natural” or anthropic origin, can lead to the emergence and spread of diseases.