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### Movement ecology of rats of the genus *Rattus* and global distribution of rat-associated *Bartonella* species

**Statement of the Problem:** Animal movement resulting from intentional or unintentional human activity can introduce pathogens into new geographic areas. The objective of this study focuses on introduction of zoonotic agents via invasive rat species (*Rattus norvegicus* and *R. rattus*) to the US seaports from other continents. The bacterial zoonotic pathogens associated with commensal rats include several species of *Bartonella*.

**Methodology & Theoretical Orientation:** To conduct the proposed study, rat blood, tissue and ectoparasite samples were collected in Thailand, Vietnam, Madagascar, and several cities in the USA and Canada. Bacteria were cultured on agar supplemented with rabbit blood. *Bartonella* spp. were identified by sequence analysis of amplified fragments of 3-5 house-keeping genes.

**Findings:** The investigations have demonstrated that rats harbor *Bartonella* spp., most of which are clustered into a defined phylogenetic lineage that can be sub-divided further into a number of sub-clusters. This group was defined as *B. elizabethae* species complex. In Thailand, *Bartonella* was cultured from rats of eight *Rattus* spp. and the strains belonged to >20 genetic variants. Some of these *Bartonella* spp. were also identified in the USA seaports. The genetic diversity of *Bartonella* spp. found

in rats in the US cities was significantly lower than in Asia where these species are highly prevalent and extremely diverse.

**Conclusion & Significance:** The data suggest that some *Bartonella* spp., being evolutionary and ecologically associated with rats of the genus *Rattus*, have been dispersed from Asia to seaports around the globe where these bacteria have become established among domestic rats. The finding of *Bartonella* spp. in a high proportion of rats from around the globe suggests the need to investigate whether these agents might be responsible for cases of human pathology, especially in countries where *Bartonella*-infected rats arrive from Asian seaports.

#### Speaker Biography

Michael Kosoy is a Research Biologist and the Chief of Bartonella & Rodent-Borne Diseases Laboratory at the Division of Vector-Borne Diseases, Centers for Disease Control and Prevention (CDC). He is the author or co-author of >150 publications in area of ecology, evolution, zoology, microbiology, and epidemiology of infectious diseases. He has worked for many years in the area of ecology and epidemiology of zoonotic and vector-borne diseases. His international activities included, but not limited to P.R. China, Thailand, Vietnam, Kazakhstan, Georgia (Caucasus), Japan, Israel, Russia, Kosovo, Kenya, D.R. Congo, Peru, and Guatemala. His main research interests include disease ecology, evolution of pathogens, wildlife diseases, One Health movement, bioethics, and transdisciplinarity.

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