Landscape genomics of the rodent *Peromyscus melanotis* on a highland temperate forest

Ella Vázquez-Domínguez
Mountains harbour enormous biodiversity

Species richness

Speciation

Endemicity

History and contemporary factors

Integration to understand patterns of diversity among mountains and between highlands and adjacent lowlands

Baron Alexander von Humboldt (Mexico 1803)

Photo: E. Vázquez-Domínguez

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A myriad of climatic, environmental, biotic and abiotic factors (space & time)

Elevation, slope, aspect, wind direction, rainfall, soil, erosion, topography, roads, human settlements ...

Latitude, geology, orography, global seasonal cycles
Phylogeography

Historical and contemporary scales

Gutiérrez-García et al. In press *J Archaeol Science*

Landscape genetics


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Sky islands

Solleiro-Rebolledo et al. 2007 *Catena*

Gutiérrez-García et al. 2013 *Quaternary Res*

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Chiapas-Guatemala highlands

Dr. Sergio Pérez-Consuegra
Universidad de San Carlos Guatemala

Peromyscus mexicanus species group

Phylogeography diversification local adaptation

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Lineages, mountain and elevation

Pérez-Consuegra & Vázquez-Domínguez 2015, 2017 *JZSER*
Pérez-Consuegra et al. In prep
Lineages and vegetation type
LGM-Holocene demography

Last Glacial Maximum

Holocene

Ella Vázquez-Domínguez / Sky Island Biodiversity and Conservation
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Trans-Mexican volcanic belt

Landscape genomics
dispersal-connectivity
heterogeneity

Peromyscus melanotis
black-eared mouse

Photo: G. Borja-Martínez
La Malinche National Park

North & Northeast slopes
Elevation gradient 2800-3500
*Pine, Abies* ..

Genomic data (SNPs) 135 individuals
Remote sensing (Landsat, LiDAR, Photogrammetry)
2- & 3-dimensional data (landscape variables)

Borja-Martínez et al. In rev *Landscape Ecol*

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Spatial genetic patterns

Spatial neighborhoods
contemporary migration

Tree height (vegetation change)

Aspect (solar radiation, terrain)
Connectivity

Tree height and NDVI

CVM-North

Tree height and litter cover

ECLM- Northeast

Highest elevation levels 3500 & 3400m

Intermediate levels 31500 & 2800m

Connectivity = Differentiation

- Forest environmental heterogeneity across different geographic scales determines dispersal, genomic structure and connectivity patterns in *P. melanotis*

- Fine-scale topography and 3D vegetation structure control key variables that can be modeled at fine scales

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Temperate and tropical sky islands

Environmental complexity drives patterns of ecological and genetic variation, key to understanding species diversity and distribution

Evolutionary and Ecological dynamics

Speciation, local adaptation, conservation

Photo: E. Vázquez-Domínguez

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Thanks!!