Año: 2021

Título artículo: Iberian hares with anciently introgressed mitochondrial DNA express a marginal environmental niche

Revista, volumen, páginas: Journal of Biogeography. 48:2328–2336.

Autores: Carpio AJ, Melo-Ferreira J, **Martinez-Haro M***, Farelo L, Campos R, Alves PC, Acevedo P.

***Instituto Regional de Investigación y Desarrollo Agroalimentario y Forestal (IRIAF), Centro de Investigación Agroambiental El Chaparrillo, Ciudad Real, Spain

RESUMEN: The role of mitochondrial DNA (mtDNA) in local adaptation has been thoroughly debated, and the ancient pervasive mtDNA introgression from *Lepus timidus* into *Lepus granatensis* allows testing of this hypothesis. Here, we study the environmental niche of animals with introgressed mtDNA, to gain insights about the potential selective pressures maintaining the introgressed haplotypes. We modelled the frequency of the *L. timidus* mtDNA lineage within the *L. granatensis* distribution area. The response variable was the presence of the *L. timidus* lineage at the individual level. Finally, the variation in the introgression frequencies was plotted along the environmental gradients (identified by the models), after controlling for latitude. The results showed that (i) the niche of the introgressed populations occupy marginal environmental conditions relative to the complete niche of *L. granatensis*, (ii) both latitude and environment, and their overlaid effects, explain the variation in the introgression frequencies, and (iii) after controlling for latitude, clines in mtDNA introgression frequency are associated with transitions in the environmental gradients, even when the analyses were restricted to the territory where the introgressed haplotypes occur. While the strict demographic explanation for mtDNA introgression in *L. granatensis* implies that geography, resulting from the post-glacial expansion of the species, explains the gradients of introgression, our results show correlations with environmental gradients that are not geographically structured. Our results relate the prevalence of introgressed mtDNA with more extreme climatic conditions in the range of *L. granatensis*, suggesting that environmental selective pressures could have played a role in determining the spatial maintenance of mtDNA haplotypes originating from the cold-adapted species. These results are thus relevant to understand the response of the species to the ongoing processes of global change, which will alter the selective pressures by reducing the specific niche of the introgressed mtDNA lineage.

Agradecimientos: This work was supported by Fundação para a Ciência e a Tecnologia (EXPL/AAG-MAA/1082/2013 Project; ECOMITO –Unravelling the ecological impact of mitochondrial introgression). Further support was obtained from project NORTE-01-0145-FEDER-000007 supported by the Norte Portugal Regional Operational Programme (NORTE2020), under the PORTUGAL 2020 Partnership Agreement, through the European Regional Development Fund (ERDF). AJC was supported by a "Juan de la Cierva" contract from Universidad Castilla-La Mancha (FJCI-2017-33114). **MMH was funded by Junta de Comunidades de Castilla-La Mancha and the European Regional Development Fund (SBPLY/17/180501/000514).** PA received support from UCLM through an extension of Ramon y Cajal contract (RYC-2012-11970). JM-F and RC were supported by Fundação

Ctra. Toledo - Albacete, s/n
13700 Tomelloso, Ciudad Real
Tel: 926 50 80 60
e-mail: secretaria_iriaf@jccm.es
iriaf.castillalamancha.es
www.castillalamancha.es

para a Ciência e a Tecnologia, FCT, Portugal (CEECIND/00372/2018 and DL57/2016/CP1341/CT0001 research contracts respectively). We thank Pierre Boursot for insightful discussions. No research permits were required.

Ctra. Toledo - Albacete, s/n
13700 Tomelloso, Ciudad Real
Tel: 926 50 80 60
e-mail: secretaria_iriaf@jccm.es
iriaf.castillalamancha.es
www.castillalamancha.es