

A candidate subspecies discrimination system involving a vomeronasal receptor gene with different alleles fixed in *M. m. domesticus* and *M. m. musculus*

Robert C Karn^{1*}, Janet M Young², Christina M Laukaitis¹

From Beyond the Genome: The true gene count, human evolution and disease genomics
Boston, MA, USA. 11-13 October 2010

Assortative mating, a potentially efficient prezygotic reproductive barrier, can prevent loss of genetic potential by avoiding the production of unfit hybrids (i.e. because of hybrid infertility or hybrid breakdown) that occur at regions of secondary contact between incipient species. In the mouse hybrid zone, where two subspecies of *Mus musculus* (*M. m. domesticus* and *M. m. musculus*) meet and exchange genes to a limited extent, assortative mating requires a means of subspecies recognition. We based our work on the following hypothesis: if there is a pheromone sufficiently diverged between *M. m. domesticus* and *M. m. musculus* to mediate subspecies recognition then that process must also require a specific receptor(s) that is also sufficiently diverged between the subspecies, to receive the signal and elicit an assortative mating response.

We studied the mouse *VIR* genes, which encode a large family of receptors in the vomeronasal organ (VNO), by screening Perlegen SNP data and identified one gene, *Vmn1r67*, with 24 fixed SNP differences, most of which (15/24) are nonsynonymous nucleotide substitutions between *M. m. domesticus* and *M. m. musculus*. We observed substantial linkage disequilibrium (LD) between *Vmn1r67* and *Abpa27* (a mouse salivary androgen-binding protein gene that encodes a proteinaceous pheromone (ABP), capable of mediating assortative mating, perhaps in conjunction with its bound small lipophilic ligand). The LD we observed is likely a case of association rather than residual physical linkage from a very recent selective sweep, because an intervening gene, *Vmn1r71*, shows significant intra(sub)specific

polymorphism but no inter(sub)specific divergence in its nucleotide sequence.

We discuss these observations further in the poster and suggest that *Abpa27* and *Vmn1r67* are co-evolving as signal and receptor, respectively, and might act to reinforce subspecies hybridization barriers represented by reduced introgression in the European mouse hybrid zone.

Author details

¹Department of Medicine, College of Medicine, University of Arizona, Tucson, AZ 85724, USA. ²Division of Human Biology, Fred Hutchinson Cancer Research Center, 1100 Fairview Avenue N., C3-168, P.O. Box 19024, Seattle, WA 98109-1024, USA.

Published: 11 October 2010

doi:10.1186/gb-2010-11-S1-P22

Cite this article as: Karn et al.: A candidate subspecies discrimination system involving a vomeronasal receptor gene with different alleles fixed in *M. m. domesticus* and *M. m. musculus*. *Genome Biology* 2010 11(Suppl 1):P22.

Submit your next manuscript to BioMed Central and take full advantage of:

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at
www.biomedcentral.com/submit



¹Department of Medicine, College of Medicine, University of Arizona, Tucson, AZ 85724, USA

Full list of author information is available at the end of the article