Dispensability of Mammalian DNA

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Introduction
Conserved elements in the Human Genome¹

Ultraconserved Elements² ("ultras")
481 elements perfectly conserved (100% id) over 200bp or more between human, mouse and rat.

Evolutionary Analysis
Computational Pipeline to Discover Rodent-specific Losses

Rodent-Specific Losses

What if we could separate functional sequence from neutrally evolving sequence?

Alternate species configurations achieve desired separation

Functional DNA loss rate nearly constant regardless of conservation %id

Ancestry is a better predictor of persistence

Summary
1. Ultraconserved elements 350-fold less likely to be lost than neutral DNA
2. Many thousands of non-coding regulatory loci under similar constraint, regardless of nucleotide conservation level
3. Ancestry information provides better predictor of indispensability than conservation %id alone

References:
1. International Mouse Genome Sequencing Consortium, Nature, 2002
2. Rijpkema et al., Science, 2006
3. Riel et al., Genome Dev., 2007

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