

THE GENETIC ARCHITECTURE AND EVOLUTION OF PLEIOTROPY ASSOCIATED WITH EVOLUTIONARY CHANGES IN DEVELOPMENTAL TRAJECTORIES

Individuals are composed of suites of traits that arise from a common genome through shared developmental processes that together determine their fitness. Consequently, fundamental to our understanding of the genetic basis and evolution of complex traits is the concept of pleiotropy, where a single gene affects the expression of multiple traits. Although patterns of pleiotropy have important genetic and evolutionary implications, we have a limited understanding of their genomic basis and evolution. We propose to advance our understanding of pleiotropy using an experimental system in which multivariate selection has been used to reshape patterns of growth and development in mice. By focusing on developmental traits we will also further our understanding of the relationship between the traits produced by the developmental system. To achieve our goals we will apply cutting edge computational tools in an experimental population created by intercrossing mouse strains with highly divergent ontogenies. Using these tools we will map molecular variation to multidimensional phenotypic variation to achieve the following objectives. 1) Characterize the patterns of pleiotropic effects that contributed to multivariate evolution 2) Examine whether pleiotropic effects constrained the patterns of genetic variation 3) Determine the role that context-dependent pleiotropic effects played in shaping patterns of multivariate evolution 4) Determine the contribution of maternal effects to patterns of pleiotropy 5) Understand how ontogenetic changes impact patterns of pleiotropy among adult traits, 6) Determine the contribution of genomic imprinting to patterns of pleiotropy.

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ABOUT THE PROJECT

FAPESP Process 2013/50402-8

Term: Feb 2015 to Jan 2019

Regular Research Grant

UKRI – BBSRC

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