Researcher links maternal genes to selfish behavior

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If you are more inclined to love thyself than thy neighbor, it could be your mother's fault.

Those are the findings of Francisco Ubeda, assistant professor of ecology and evolutionary biology at the University of Tennessee, Knoxville.

Ubeda, along with fellow evolutionary biologist Andy Gardner from Oxford University, examined the impact that genomic imprinting has on the carrier's selfish or altruistic behavior. Genomic imprinting is the phenomenon in which the expression of a gene depends upon the parent who passed on the gene. Every person has a set of chromosomes from each parent but due to imprinting, a particular gene -- either the one inherited via egg or sperm -- is inactivated.

A report of their research is published in the journal *Evolution* and can be found online. Ubeda and Gardner developed an evolutionary mathematical model that examined the consequences of ancestral women's tendency to follow their mates and raise their children among people they are not related to. They found this behavior spurs a conflict between mom and dad genes in a juvenile over how it should act in society.

The battle all has to do with relatedness.

"Because the child's dad stayed put, the genes the child gets from dad are

more likely to be present in her neighbors. The genes telling her to be nice to neighbors (genes for altruism) will be dad genes. Because her mom moved around to be with dad, and thus is not related to the other villagers, her maternal genes will be telling her to be mean to neighbors," Ubeda said.

Therefore, if a child finds an apple, her paternal genes will tell the child to share it with other children in the village, since the other children are likely to be relatives. Her maternal genes, will say 'keep the apple for yourself.' This research applies to all societies where females migrate more than men or vice versa. It is this demographic inequality that makes it more likely that children who are helpful to others are related through their father's genes, not their mother's genes

The findings reach beyond sharing apples. They can also be used to interpret neurological disorders. Recent research links mutations resulting in greater expression of paternally inherited genes or maternally inherited genes to psychiatric disorders such as autism or psychosis, respectively.

"The model makes clear predictions that the social structure in which individuals evolved can affect clinical phenotype and the severity of these neurological disorders," said Ubeda. "It implies that a mutation in an imprinted gene will result in the reverse clinical phenotype when the mutation is inherited via sperm or via eggs."

Therefore, a mutation resulting in greater expression of paternally inherited genes will cause pathologies related to juveniles being less competitive for resources but a mutation resulting in greater expression of maternally inherited genes will cause pathologies related to juveniles being more competitive for resources. Úbeda noted the model's assistance in better understanding the diseases gets the medical community that much closer to better treatments.

Provided by University of Tennessee at Knoxville