

## Research shows why parents are born and not made

November 3 2008

Research published today reveals for the first time that the different roles of mothers and fathers are influenced by genetics. The study, by the Universities of Exeter and Edinburgh, shows how variation in where males and females put their parenting effort reflects different genetic influences for each sex.

The researchers based their study on the burying beetle, *Nicrophorus vespilloides*, but believe their findings are relevant to other species and possibly humans. The study is published in the journal *Proceedings of the National Academy of Sciences*.

Specialised male and female roles are common in species in which both parents take responsibility for raising offspring. Male and female burying beetles share the roles needed to rear their young, but their responsibilities differ. Females tend to spend more of their time directly caring for the offspring through feeding, which involves regurgitating food directly into begging mouths, like birds. Males indirectly help their young by preparing food and taking care of the nest.

Lead author Professor Allen Moore of the University of Exeter says: "Despite the best efforts of parents to be consistent in child rearing, it is not unusual for mums and dads to differ in the nature of their interactions with offspring. In the case of humans, until recently this was expressed as dad bringing home the bacon and mum taking care of the kids. The same pattern holds in many animals where both parents help rear the offspring - mothers often directly care for the young while the



father takes care of the nest or brings home food for the family. But why should parents specialise? Why don't they share the duties equally? Previous studies suggested that specialising is efficient. But why a particularly specialty for mums and dads? Why not work it out family by family? In this study we examine the genetic influences on parenting for the first time, and ask if different parenting styles are inherited."

The study focused on a population of burying beetles collected in Cornwall and bred over three generations. After breeding, the beetles were separated so the team could compare the roles taken by a single mother and a single father. The result was that females focused their efforts on providing direct care for their young whereas males were more inclined towards indirect care. Therefore, males and females working separately focused on the same roles they would adopt if they were raising their young together. Furthermore, the differences reflected genetics.

Moore and his colleagues found that these differences have evolved because there is a genetic correlation between sex-specific parenting traits and the number of offspring parents choose to raise.

Individual burying beetles vary in how many offspring they will care for and parents cull some of their young to create their preferred family size. This too is genetically influenced. However, evolution acts to maximise family size and this creates selection for indirect care in males and direct care in females. This is because of shared genetic influences between parenting and family size that differ for males and females. Males that tend towards more indirect care have larger families and females that are more likely to express direct care also raise more offspring. Therefore, those individuals that express these sex-specific parenting traits most keenly produce more offspring. Moore describes this as "parental care evolving along different lines of least evolutionary resistance for each sex."



Professor Allen Moore concludes: "We were somewhat surprised by our results. Males and females share the same genome so these differences in genetic influences between the sexes had to evolve from the default of no differences between the sexes. This occurred because of sex differences in shared genetic influences on other traits. But the evolution of this specialisation also helps reduce conflicts between the parents and form an efficient family unit, reinforcing the genetic differences between the sexes."

Source: University of Exeter

Citation: Research shows why parents are born and not made (2008, November 3) retrieved 28 April 2024 from <u>https://phys.org/news/2008-11-parents-born.html</u>

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