

Cold-blooded mothers: Magpie parents seem to induce mortality of 'unwanted' chicks

May 3 2010

Human parents often pay more attention to a few favored children among all of their offspring. It has already been known that birds do it too, and it may result in some baby birds dying in the nests. According to the recent discoveries published in *Journal of Avian Biology*, the top journal in the field of ornithology, one of our famous garden birds, magpies, also favor some of their nestlings, but in a fairly strange and unique manner.

Dr. Sang-im Lee and her colleagues at Seoul National University and Ewha University, [South Korea](#), examined the mortality of magpie nestlings and found 'rarer-sex disadvantage'. This means that sons die out more when more daughters are present in the nest, and daughters die more when more sons are in the nest. "This pattern is not compatible with previous hypotheses" says Dr. Lee. So far, mortality of nestlings that are sexually size-dimorphic (i.e. one sex larger than the other, like magpies and many other birds) was often attributed to two mechanisms: larger sex vulnerability or size dominance. Larger sex vulnerability predicts that the nestlings of the larger sex (sons in magpies) die when [environmental conditions](#) deteriorate and parents cannot deliver sufficient amount of food, which is especially critical to those who need more food (sons in magpies). The size dominance predicts that the nestlings of the larger sex dominate over the nestlings of the smaller sex (daughters in magpies). Dr. Lee says that she first expected that magpies, just like many other birds, would fall into one of these previously described mechanisms. But her PhD research unexpectedly revealed the 'rarer-sex disadvantage' - a phenomenon never observed in birds before.

Does this indicate that "same-sex gangs" harass the rarer sex in the nest? According to Dr. Lee's hypothesis, the observed mortality patterns of chicks may be related to how parents behave towards the nestlings rather than how nestlings behave towards each other. Because the nestlings of the rarer sex are more likely to die, the sex composition of the nestlings at the end of feeding period becomes more biased towards the direction of the original bias observed when the nestlings hatched. This bias is nest-specific. Almost as if each pair of magpie parents had some "ideal" sex composition of their children in their minds, but somehow they could not reach it when the nestlings were "born" (to be more exact, at the time of hatching from eggs; the sex of the child is determined by the type of sex chromosome in the egg), and therefore they induce mortality of nestlings to reach their ideal brood sex composition during a five-week long parental care.

It has already been known that several species of birds (e.g. tits, sparrows, etc) are able to adjust their brood sex ratio as early as egg laying. Then why do magpies rely on mortality of nestlings to realize their "ideal" broods, instead of adjusting it at early stages like other birds? The possible answers for this are either "they cannot adjust it" or "they can adjust it but they'd better not to." Since birds' sex is determined by the type of sex chromosomes, similar to us, random segregation of sex chromosome may hamper any adaptive adjustments of nestlings' sex by the parents. Or, it may be payable for magpies that they do not have any kind of adjustments at the beginning, since they have long feeding periods compared to other [birds](#) like tits and sparrows and they would never know what lies ahead. Thus, they start with random sex composition, leaving some room for adjustments through sex-biased mortality of nestlings. As a mother of a daughter, Dr. Lee says "it would be surely a sad thing to make your chick die, but they are probably doing the best of the worst job."

Although we don't know all the factors that may make each pair unique

with respect to their parental strategy, Dr. Lee and her colleagues have evidence suggesting that parents in good condition or with better skills rear broods that are biased towards sons and poorer parents rear broods with more daughters. In many bird species, the quality of parents is reflected in their breeding time. It is usually assumed that the parents who breed earlier are the better ones in terms of health and also at rearing children. When the authors checked the laying dates of the parents, they found that, although the early parents did not significantly produce more sons at the beginning, they induced mortality of daughters to make their broods contain slightly more sons later when the nestlings are ready to leave their nests. It may be that only good parents can afford sons, who are known to require 10% more food than daughters.

Apart from unraveling a rare phenomenon, Dr. Lee and her colleagues suggest that the strategies that the parents use are set as a "package", where specific initial sex composition of a brood is correlated with a specific parental "attitude" towards sons and daughters. This should be a warning against the convention of exchanging nestlings between broods in ornithological studies" says Dr. Lee. Researchers often exchange nestlings between the nests to manipulate certain conditions to test the effect of 'common garden' but not 'common parents'. However, this might result in messing up all the inter-connection between parental strategies and brood composition that "goes with" the specific parental strategy. Hence, extensive studies should be done in a manner similar to the methods of Dr. Lee's and colleagues before meaningful results can be obtained from experimentation.

Dr. Lee and her colleagues are now investigating what is going on in the nest by putting "hidden" cameras into the nests. If parents induce the mortality of specific chicks, it could be through biased feeding and the researcher can directly watch it in the video. More things are to be unraveled with the breeding of our garden bird magpies, to whom we are so close that we haven't thought of peeping at the nests.

Provided by Seoul National University

Citation: Cold-blooded mothers: Magpie parents seem to induce mortality of 'unwanted' chicks (2010, May 3) retrieved 21 June 2024 from <https://phys.org/news/2010-05-cold-blooded-mothers-magpie-parents-mortality.html>

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