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Parent-offspring co-adaptation in a wild bird

Carsten Lucass, Peter Korsten, Marcel Eens and Wendt Müller

The offspring of many animals depend on their parents' care (like the provision of food) and have to solicit such care through specific behaviours such as begging, as exhibited by hungry nestlings in birds. Nestlings beg more intensely when they are hungrier, to stimulate their parents to bring more food. When the parents do so, the offspring thus become less hungry and so beg less in turn. Because of the tight interplay between parents and offspring, their behaviours will evolve in order to adapt to each other, leading to 'co-adaptation' between parents and offspring. Because behaviours are flexible and parents and offspring continuously respond to each other, it is unlikely that the overall levels of begging and food provisioning are co-adapted; it is more likely that the amounts of change in both the offspring's begging when they become hungrier and the parents' provisioning in response to this begging will be co-adapted. Thus, the behavioural responses of parents and offspring may be matched within families. For example, parents that are relatively unresponsive to their offspring's begging may be better matched with very responsive offspring, because highly responsive parents would overload such responsive offspring with food, rapidly tiring themselves. To test this, we studied wild blue tits. We exchanged same-sized clutches between breeding pairs to disrupt the behavioural match between parents and their offspring. Next, we measured the provisioning responses of parents to changes in food demand of their foster brood (by temporally manipulating their brood



Blue tit brood. Photo credit: Wendt Müller

size) and the begging responses of the nestlings in relation to different hunger levels. We found the mother's provisioning and genetic offspring begging were unrelated. However, even though fathers were not raising their own offspring, the provisioning and begging responses of fathers and their genetic offspring (raised by foster parents) were related. Fathers that strongly respond to changes in brood demand have genetic offspring that only show weak begging responses when hungry and vice versa. This is the first study to show the evolutionary interplay between behavioural responses of both parents and offspring. The outcomes are highly relevant for improving theoretical models of parent-offspring co-adaptation.