Developmental drivers of social behaviour and their fitness consequences

Supervisory team:
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Project description:
When animals are exposed to stressful experiences like food shortages or parental neglect early in life, they may later suffer from poor health and die younger. However, as experiments generally test animals in social isolation, the effects of early-life stress on later social behaviour are poorly understood. Our recent research on zebra finches, a highly social species, shows that early-life stress can have major effects on the formation and strength of social relations: chicks exposed to elevated stress hormones formed more but weaker social bonds compared to control siblings, and they occupied more central social network positions as a result. Furthermore, while control birds tended to copy their parents' foraging decisions, stressed birds exclusively copied unrelated adults (Boogert, Farine & Spencer (2014) Biology Letters; Farine, Spencer & Boogert (2015) Current Biology). Do these effects arise because juveniles use early-life stress as a cue that their parents should be avoided, or because parents preferentially invest in their unstressed, higher-quality offspring? And how do early-life stress and resultant changes in social behaviour affect individuals' health, lifespan and reproductive success?

This project will determine:
1) how early-life stress shapes the ways in which parents and offspring interact: do stressed chicks ignore their parents, or do parents invest more in their non-stressed chicks?
2) how early-life stress changes individuals' stress hormone profiles, rates of ageing, lifespan and reproductive success, and
3) whether the behavioural and physiological consequences of stress are passed down from parents to offspring (i.e. non-genetic "transgenerational effects").

Experiments will take place at the Max Planck Institute for Ornithology in Radolfzell, Germany. Here top-notch aviaries contain thriving colonies of zebra finches. The student will expose half of the zebra finch chicks to the avian stress hormone corticosterone, while control siblings receive a control substance (peanut oil). After fledging, chicks and their families will be fitted with newly developed "barcode-backpacks" and all their interactions recorded with miniature computers. The student will be trained in the latest social network analytical tools to quantify the effects of early-life stress on the birds' social phenotypes. The treated birds and their offspring will also be blood-sampled and measured throughout life to quantify their stress physiology, growth, body condition and ageing rate (through telomere shortening). This unique combination of cutting-edge physiological, behavioural and statistical tools will expand the student's scientific toolkit and increase our understanding of the developmental drivers of social behaviour.