

Testosterone regulates solo song of tropical birds

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This shows a pair of white-browed sparrow weavers. In these African songbirds, which live in status-dependent groups, it is the dominant males that call the tune -- only they sing a special, complex solo song at dawn. Females and subdominant males, by contrast, perform identical, alternating duets. Credit: MPI for Ornithology

(Phys.org)—In male songbirds of the temperate zone, the concentration of sex hormones is rising in spring, which leads to an increase in song activity during the breeding season. In the tropics, there has been little evidence so far about such a clear relationship between hormonal action and behaviour, which is partly due to a lower degree of seasonal changes of the environment. Researchers of the Max Planck Institute for Ornithology in Seewiesen have now discovered that in duetting African white-browed sparrow weavers, the solo song of dominant males is linked to elevated levels of testosterone. What is more, the male-typical solo song could be activated via testosterone treatment in female birds. The study thus shows a complex relationship between song behaviour and hormone concentration also in a tropical bird species.

In species of the temperate zone, circannual

rhythms are triggered by seasonal fluctuations in day length. The longer days in spring are accompanied by an increase of [steroid hormone](#) levels that lead to the onset of breeding activities. Consequently, there are changes in behaviour and at least in male [songbirds](#), there is a relationship between the incidence and complexity of songs and circulating testosterone concentrations. In the tropics, however, the situation is different. Birds often vocalise year-round, and there are suitable conditions for breeding during a more extended period compared to the temperate zone. In addition, in many species testosterone concentrations are at a low level throughout the year. The underlying mechanism responsible for the song changes of [tropical birds](#) therefore remains elusive.

Cornelia Voigt and Stefan Leitner from the Max Planck Institute for Ornithology now showed that testosterone plays a crucial role in the regulation of song behaviour in African white-browed sparrow weavers (*Plocepasser mahali*). These birds live in groups of two to ten individuals and are characterized by a status-dependent song, where only the dominant male sings a so-called "solo song", whereas females and subordinate males sing an alternating duet song. In a long-term study of sparrow weaver colonies in Southwestern Zimbabwe, the researchers found a relationship between [hormone levels](#) and solo song in males. Dominant males had higher testosterone values than subordinate birds, both in the early breeding season from October until December and in the late breeding season from January until March.

However, these hormone concentrations were much lower compared to those responsible for song changes in temperate zone species. It could well be that the slightly higher values of [dominant males](#) only reflect the hierarchical status itself and are not responsible for the activation of solo song. That testosterone indeed plays a role in solo singing could be proved in an experiment in

females that were kept in aviaries next to their natural habitat. These females received a testosterone implant. Within a week they started to sing the male-typical solo song that was fully developed after one month and differed only in a few features from male song. "With this study, we could show that a special type of song, the solo song, can be activated by testosterone in both sexes. Moreover, females remain receptive for the male hormone testosterone", says Cornelia Voigt.

More information: Testosterone-dependency of male solo song in a duetting songbird – Evidence from females, *Hormones and Behavior*, advance online publication, Oct 16, 2012 pii: S0018-506X(12)00249-8. [doi: 10.1016/j.yhbeh.2012.10.006](https://doi.org/10.1016/j.yhbeh.2012.10.006)

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