

Breeding system and cuckoldry in the Eurasian penduline tit (*Remiz pendulinus*)



In the unique breeding system of the Eurasian penduline tit (*Remiz pendulinus*) the male starts to build a tightly woven nest while he continuously tries to attract a female by calling and singing. If he is successful he will mate with a female and the couple finishes the nest together. After 4-5 days of mating, when the nest is nearly finished and the female already laid a few eggs, either one or both parents desert the clutch. For 45-65% of the cared clutches the female takes care, while 7-18% of the nests are male cared. 28-44% of the nests with the eggs inside are deserted by both parents. After desertion both sexes look for a new mate. A penduline tit can have up to six different mates during a single breeding season. What may be the meaning of this unique behaviour?

During my Ph.D. work I searched for an answer to the question by combining field observations with DNA analysis. The field data were collected at Fehér-tó, Hungary between 2002 and 2007. The area is used by 60-90 males and 45-50 females every year. Penduline tit nests were checked every other day, the recently arrived birds were caught, ringed, their standard biometrics were measured and a few drops of blood were taken from their wing vein. Ten days old young were also ringed and their blood samples were collected.

First we identified 11 penduline tit specific polymorphic microsatellite sequences. The microsatellites were amplified with fluorescently labelled PCR primers. Lengths of the PCR products were determined through gel-electrophoresis. The identified 47 microsatellite variants were sufficient to get a good knowledge concerning the family relationships within the penduline tit clutches. Results of the parentage analyses are based on DNA fingerprint data of 123 males, 83 females and 443 young from a total of 118 nests. The most important findings of this study are as follows:

- We showed that, like in many other bird species, cuckoldry exists in the penduline tit. All three types of extra-pair young (extra-pair paternity, quasi-parasitism, egg dumping) occur within this species.
- Analysing the 365 offspring where either both social parents or only the social male was genotyped 62 were sired by an extra-pair male. Of the 78 young where we only have fingerprint data of the social female 12 were the result of either quasi-parasitism (extra-pair female) or egg dumping (both the male and the female are extra-pair).
- Analysis of the 166 young where both parents were known 50 were extra-pair: 39 originated from an extra-pair male, 7 were sired by an extra-pair female and 4 were the result of egg-dumping.
- The genotype of both parents could be identified in 55 nests. 33 of these nests contained at least one extra-pair young which derive either from an extra-pair male, from an extra-pair female or from egg dumping. In 29 nests at least one offspring were sired by an extra-pair male, in 9 nests at least one young was the result of quasi-parasitism and in 4 nests at least one chick had different parents than the social ones.
- We report that the number of extra-pair young within a nest do not predict whether the male/female will care or desert the clutch.

The main question what the meaning of this unusual mating system is we can not answer yet. The maintenance of high polymorphism might be one possibility. For a reliable answer further studies would be needed. Also for the identification of those factors that influence the rate of cuckoldry, act as cue during nest site selection we will need further studies.

In addition to the DNA-based data, we report that a properly chosen breeding site may highly influence the success of a breeding attempt. In two field experiments we found that a nest remnant acts as a cue for penduline tit males when choosing a nesting site. Furthermore penduline tit males tend to move to shorter distances than females between their consecutive nests; breeding site fidelity is lower for females than for males.