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WHAT A SPARROW BIB CAN REVEAL

It has long been known that male House Sparrows (*Passer domesticus*) with a large bib dominate other sparrows with smaller bibs. Also during the breeding season females prefer males with large badges, as the bib is also called, even though these males show more sexual interest in other females than males with smaller bibs (Møller 1987). But why do females prefer an unfaithful partner? Is it because of his large bib, or is the answer more complex?

Key words – bib, bursa of Fabricii, fault bars, feather lice, House Sparrow, *Passer domesticus.*

To answer this question a sample of 1,000 House Sparrows collected by the author in the 1960s at many localities in Denmark, was studied after two relevant papers were consulted; Burrows and Titus (1939) documented for domestic fowl (*Gallus domesticus*) that cocks with larger testes produced more sperm than males with smaller testes; and two other researchers showed many years later that the more sperm delivered the larger the probability of fertilization (Martin & Dzuik 1977). Because the cost of producing eggs is high for a female, it must be in her interest to mate with a male with a high probability of fertilization. Therefore, we measured the length and width of the bib of all males from the breeding season and compared that with the size of the gonads and found that the males with the largest bib also had the largest testes (Møller & Erritzøe 1988).

Our hypothesis was: can a female gain other advantages by choosing a male with a large bib, e.g. indirect fitness benefits due to resistance to parasites? Is a large bib also a sign of good health? To answer that question we studied a gland of the immune system called bursa of Fabricii, also recorded in the above-mentioned collection. This gland is situated near the cloaca of young birds and play a central role in antibody synthesis, but has regressed completely before sexual maturity. All young males in the sample were examined for the bursa of Fabricii and also examined for fault bars and feather holes in their wing feathers. Fault bars are narrow transparent, transverse bands in feathers that are produced as a result of stress during feather growth. Feather holes are frequently seen in House Sparrows and caused by feather lice. This time the size of the bib was measured for the young males, disregarding the light feather tips partially covering the black feathers during early spring. Males with the largest bibs

had fewer fault bars and feather holes and a smaller bursa Fabricii compared to males with smaller badges (Møller *et al.* 1996).

This supports the hypothesis that the bib size is a reliable indicator of health status in the House Sparrow, and females may obtain fewer parasites from their mates and acquire genes for parasite resistance for their offspring by mating with males with large bibs. Males with large bibs are frequently involved in extra-pair copulations with other females, differing widely in health status, and this may increase parasite virulence because parasites of different genetic origin find themselves in a single host competing for a limiting resource. In addition, frequent extra-pair copulation opportunities may reduce male parental care (Møller *et al.* 1998).

But the story does not end here. It is well known that following post-nuptial moult male House Sparrows acquire new feathers on the chin and throat that have light tips partially hiding the basal black parts of the bib feathers. This can be considered a compromise between a seasonal change of appearance and the cost of a pre-nuptial moult. The light tips are worn off during winter and spring, mainly due to preening and dust bathing. The presence of light feather tips provides males with better camouflage potentially making it more difficult for predators to find him (Møller 1989).

Using observations of House Sparrows during winter, Møller recognised that some males used more time preening their feathers, especially their throats, with their beaks. This gave the idea to once more check the skin collection. The males were now sorted chronologically and the light tips of the throat feathers were measured in three different locations. In this way it was possible to estimate the rate of feather wear. The examination showed not surprisingly that males with the largest testes had the greatest wear on their throat feathers, and acquired a black badge sooner that the less favoured males. The only plausible explanation for this difference was that they used more time for preening their badges, as shown by the field observations (Møller & Erritzøe 1992).

The males with the smaller badges and lower social status have no wish to reveal their true identity to the females. It must also be an advantage for them because the less rivalry with other males may give them better time to foraging, but not an advance for their health, because the best defence against ectoparasites is frequent preening (Clayton 1991, Møller *et al.* 1998).

These studies in a single Danish population provide a number of insights into the complexity of the life of House Sparrows. There are many other populations of House Sparrows studied elsewhere in Europe and in other continents, often showing different coloration and behaviour from what we have recorded. This suggests that the ecological conditions may differ among populations, and that we may learn even more by further studies of such differences.

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Fig. House Sparrows from Denmark (three from November and two from May). Note the difference in bib size also within the same month