

Nest quality in relation to adult bird condition and its impact on reproduction in Great Tits *Parus major*

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Abstract. Birds’ nests are special structures built with reproductive aims. Size and structure of the nest can arise from evolutionary trade-offs between benefits such as the insulation from unfavourable conditions, maintenance of eggs or chicks, or security against predation, and costs such as energy spent in construction of the nest and the risk of predation in more visible nests. Therefore, building a good nest is beneficial in terms of reproductive output but expensive in terms of time and energy, so probably only “good” parents would be able to build “good” nests. Our objective was to study possible relationships between the quality of the parents and the quality of the nest, and between the quality of the nest and breeding performance in a Great Tit *Parus major* population. We found positive relationships between different components of the nest quality and components of breeding performance. However, we did not find any significant relationship between quality of the parents and that of the nest. A weak, though significant positive correlation was found between female size and breeding success rate.

Key words: Great Tit, *Parus major*, breeding performance, clutch size, nest size, parental quality

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Factors responsible for the long-term dynamics of the Pied Flycatcher *Ficedula hypoleuca* populations in the taiga of Karelia, Russia

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Artemyev A. V. 2008. Factors responsible for long-term dynamics of the Pied Flycatcher *Ficedula hypoleuca* populations in the taiga of Karelia, Russia. *Acta Ornithol.* 43: 10–16. DOI 10.3161/000164508X345284

Abstract. A Pied Flycatcher population breeding in nest-boxes in a Karelia forest was studied from 1981 to 2007. Breeding density varied between 47.3 and 94.6 pairs/km². The density of the breeding population was influenced by three demographic factors: maximum summer population density in the previous season, male return rate and immigration rate. Three relatively independent processes play a significant part in the population dynamics of the study area: 1) initial abundance and reproductive intensity, 2) survival rate between breeding seasons, and 3) redistribution of birds across their range. The weather in spring, when the birds arrive and settle, was found to be equally important. The population density, nest site fidelity of adults and yearlings, and immigration rate were related to temperature patterns in May. It may be assumed that the spring weather influences the birds' survival and their distribution across the northern part of their range, as well as the participation of one-year old birds in breeding.

Key words: Pied Flycatcher, *Ficedula hypoleuca*, abundance, dynamics, demography, weather, ambient temperature

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The abundance and suitability of tree cavities and their impact on hole-nesting bird populations in beech forests of NE Iberian Peninsula

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Camprodon J., Salvanya J., Soler-Zurita J. 2008. The abundance and suitability of tree cavities and their impact on hole-nesting bird populations in beech forests of NE Iberian Peninsula. *Acta Ornithol.* 43: 17–31.

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Abstract. The availability and suitability of tree cavities for hole-nesting birds were surveyed in three beech wood types (mature, cleared and coppice forests) in the North east of the Iberian Peninsula. We sampled the occupation of cavities and the abundance of hole-nesting birds. We also tested experimentally with tit nest boxes whether the lack of suitable nest-holes may limit the abundance of secondary cavity-nesters. We surveyed hole-nesting birds before and after nest box provision. Trunk and branch cavities (25.9%) were significantly more abundant in mature woods, and are correlated with the density of secondary occupants. Stump and root cavities (74.1%) were more abundant in coppice forests. Shortage of big diameter's (> 45 cm DBH) and good bearing trees explained the lack of cavities in managed forests. Only small proportion of available cavities was used by birds (5.5%). All occupied cavities were placed in trunk (5.5%) and presented smaller diameter entrances than the whole availability of cavities. Nest boxes occupation rate was higher in the plots where suitable nest holes were scarce (managed woods), and consequently it brought an increase on both Great Tit and Blue Tit populations. These two species populations were favoured from the next breeding season after the provision of nest boxes, but not in mature stands nor in control sites (with no nest boxes). Therefore, results show that suitability of cavities rather than availability determines secondary hole-nesting bird abundance in managed forests.

Key words: hole-nesting birds, tree cavities, beech forests, forestry, nest boxes, Great Tit, *Parus major*, Blue Tit, *Cyanistes caeruleus*, Iberian Peninsula

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Nestbox use and reproductive parameters of Tree Sparrows *Passer montanus*: are they affected by the presence of old nests?

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García-Navas V., Arroyo L., Sanz J. J. 2008. Nestbox use and reproductive parameters of Tree Sparrows *Passer montanus*: are they affected by the presence of old nests? *Acta Ornithol.* 43: 32–42. DOI 10.3161/000164508X345301

Abstract. There is a controversy over the effects of old nest reuse on the breeding biology of hole nesters. Some authors have shown that the presence of old nest material could increase ectoparasite pressure and/or reduce cavity size, whereas others argue that it could facilitate nest-building and serve as an informative cue for breeding birds. However, the possible functions of old nests may not be limited to the reproductive period in birds that perform autumnal courtship or use nest cavities as shelters during the winter season, as is the case with the Tree Sparrow. The importance of the presence of old nest material on nest box choice during the non-breeding period and its implications on the subsequent breeding performance of this multi-brood species are assessed. Occupancy rates and reproductive parameters (such as phenology, clutch size, nestling condition, breeding success) were compared between woodcrete and wooden nest boxes with and without old nest material inside. During the non-breeding period no effect of box type or its content on nest box selection was discovered, but in spring it was found that the strong preference of birds for breeding in woodcrete nest boxes was independent of the presence of old nests. In relation to this latter point, evidence was found that old nest reuse could negatively affect the reproductive output of Tree Sparrows: clutches were laid later, nestlings had longer wings (which presumably fledged earlier) and reproductive success was lower in nest boxes containing old nest material. The results of this study suggest that, taking the non-breeding and breeding seasons as a whole, the accumulation of old nest material seems to be detrimental rather than advantageous to this species.

Key words: Tree Sparrow, *Passer montanus*, old nest, nest reuse, breeding, autumnal courtship, roosting site, woodcrete, nest site choice

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The weight of female-built nests correlates with female but not male quality in the Blue Tit *Cyanistes caeruleus*

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Mainwaring M. C., Benskin C. McW. H., Hartley I. R. 2008. The weight of female-built nests correlates with female but not male quality in the Blue Tit *Cyanistes caeruleus*. Acta Ornithol. 43: 43–48. DOI 10.3161/000164508X345310

Abstract. Among bird species where only one parent constructs the nest, the “sexual display hypothesis” predicts that building behaviour and the structure of the completed nest is a post-pairing, sexually selected signal that informs the non-builder of her/his partner's quality and/or willingness to invest in reproduction. Moreover, the “differential allocation hypothesis” predicts that an individual's investment in parental behaviours, such as nest building, will vary in relation to the partner's quality. These hypotheses were examined in the socially monogamous, hole-breeding Blue Tit, a species in which the female alone builds nests. Parental quality was quantified by recording body size, feather mite load and age. The weight of nests was found to correlate positively with female head-bill length and feather mite load, but not with any indicators of male quality. This result is in accordance with the “sexual display” hypothesis, and demonstrates that nest size could be a form of intra-specific communication that helps inform the non-building partner of the builder's reproductive quality.

Key words: Nest weight, nest building, maternal construction, sexual display hypothesis, differential allocation hypothesis, hole-breeding passerine, Blue Tit, *Cyanistes caeruleus*

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Dependence of nest mass on nest hole depth in the Great Tit *Parus major*

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Mazgajski T. D., Rykowska Z. 2008. Dependence of nest mass on nest hole depth in the Great Tit *Parus major*. *Acta Ornithol.* 43: 49–55. DOI 10.3161/000164508X345329

Abstract. Predation is considered an important factor affecting the life histories and breeding strategies of hole nesting birds. Breeding losses in this group of birds are related to such nest site characteristics as entrance size, nest site depth and danger distance - the distance between the outer edge of the entrance to the centre of the nest's bottom, which determines how far a predator unable to enter the hole would have to reach to obtain its contents. It is suggested that birds assess predation risk and adjust their breeding investments accordingly. We tested the hypothesis that in shallow nest sites, birds build smaller nests to maintain the largest danger distance possible. During the experiment, two types of nestboxes were available to birds: those typical for small passerines (with a depth of 21 cm), and shallower ones (with a 16 cm depth). Breeding parameters were obtained by controlling nestboxes, the distances between eggs and entrances were measured, and nests were weighed just after the young fledged. Breeding phenology and clutch size did not differ between the types of nestboxes. Nest site depth influenced nest mass, and according to our assumptions, nests were significantly lighter in shallow nestboxes. A clear, negative relationship was found between nest mass and the danger distance — eggs in larger (heavier) nests were closer to the entrance. Breeding success (number of fledglings per eggs laid) was lower for shallow nestboxes compared to normal ones, and nest mass negatively influenced the number of fledglings and breeding success. The results of this study suggest that Great Tits perceive nest site depth and adjust nest building according to predation risks. Nest size (mass) in shallow sites may be limited by the danger distance, but it is also possible that the number of trips with nest material, which could lead to the detection of the site, is also important. However, both explanations are not mutually exclusive, and both are related to avoiding predator pressure.

Key words: Great Tit, *Parus major*, nest site selection, predation risk, nest predation hypothesis

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Nest construction rate and stress in female Pied Flycatchers *Ficedula hypoleuca*

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Moreno J., Martínez J., Corral C., Lobato E., Merino S., Morales J., Martínez-de la Puente, Tomás G. 2008. Nest construction rate and stress in female Pied Flycatchers *Ficedula hypoleuca*. *Acta Ornithol.* 43: 57–64.
DOI 10.3161/000164508X345338

Abstract. Nest building effort has received scant attention in the literature although it may involve costs which can be detected as physiological stress. We prolonged nest construction effort in a population of Spanish Pied Flycatchers by removing nests from nest-boxes and forcing females to build a second nest. In comparison with control nests, the experimental females had to work for longer periods and accumulate more nest material, but nest construction rates (g of nest material per day of construction) were not affected. There was a positive association of clutch mass with nest construction rate. To measure physiological stress, we captured females shortly after laying to obtain blood samples for heat-shock protein quantification. Heat-shock proteins quantify stress at cell level. The level of HSP60 in peripheral blood was positively associated with total nest construction rate (including second nests for experimental females), but not with laying date, clutch mass or experimental treatment. A third of the variation in the HSP60 level was explained by the nest construction rate. Fast nest builders are physiologically stressed, suggesting that the nest construction rate may constitute an index of female physiological performance.

Key words: nest construction rate, physiological stress, Pied Flycatcher, *Ficedula hypoleuca*, stress proteins, nest building, female performance

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Repeatability and method-dependent variation of blood parameters in wild-caught Great Tits *Parus major*

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Norte A. C., Sheldon B., Sousa J. P., Ramos J. A. 2008. Repeatability and method-dependent variation of blood parameters in wild-caught Great Tits *Parus major*. *Acta Ornithol.* 43: 65–75. DOI 10.3161/000164508X345347

Abstract. When interpreting responses to experimental manipulations or particular environmental cues, it is necessary to have previous knowledge about the natural variation of the response traits. We studied how nine blood parameters, including four enzymatic activities, varied with time in wild Great Tits by assessing their repeatabilities over periods of 45 days, in the same season (Spring or Autumn/Winter), in the same year and over a four years period. The accuracy of the measurements of these blood parameters was also assessed. Measurement error reflected essentially sample and time of storage rather than assay effects. Hematocrit and haemoglobin had low repeatabilities within Spring, ranging from 0.26 to 0.31; Heterophil/Lymphocyte ratio (H/L), white blood cell count (WBC), total plasma cholinesterase and red blood cell glutathione peroxidase (GSH-Px) activities had moderate to high repeatabilities over periods of 45 days (repeatabilities ranged from 0.47 to 0.81 for GSH-Px and H/L, respectively), but also during longer periods such as during Spring (total plasma cholinesterase activity) and Autumn/Winter (WBC, H/L and GSH-Px). Of the blood parameters measured, total plasma cholinesterase, glutathione peroxidase and the haematological parameters WBC and H/L seem relatively constant and therefore reliable indicators of Great Tit's physiological condition within, at least, a 45 days time frame.

Key words: repeatability, health state, condition, blood profile, *Parus major*, accuracy, glutathione peroxidase, plasma cholinesterase

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Blowfly infestation at the nestling stage affects egg size in the Pied Flycatcher *Ficedula hypoleuca*

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Potti J. 2008. Blowfly infestation at the nestling stage affects egg size in the Pied Flycatchers *Ficedula hypoleuca*. *Acta Ornithol.* 43: 76–82. DOI 10.3161/000164508X345356

Abstract. The long-term effects on the egg size of breeding females that had suffered parasitism when they were nestlings are described for a wild population of Pied Flycatchers naturally parasitized by the blowfly *Protocalliphora azurea* larvae, a common nest-dwelling, blood-sucking ectoparasite of cavity-nesting birds in the Mediterranean region. As adults, females reared in blowfly-infested nests laid smaller eggs than their counterparts raised in nests not infested by blowflies. This relationship held irrespective of female size, condition and maternal egg size, and was random with respect to female quality and consistent across a female's lifetime. Except for egg size, no long-term effects on host longevity or other fitness components, such as lifetime reproductive success, were detected. Although the mechanisms causing long-term depression of host egg size remain unknown, the recent discovery that *Protocalliphora* blowflies transmit viruses to nestlings offers new avenues of research on this issue.

Key words: egg size, nest ectoparasites, blowflies, Pied Flycatcher, *Ficedula hypoleuca*, nestling growth, *Protocalliphora azurea*, *Dermanyssus*, mites

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Density and diversity of hole-nesting passerines: dependence on the characteristics of cavities

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Remm J., Lõhmus A., Rosenvald R. 2008. Density and diversity of hole-nesting passerines: dependence on the characteristics of cavities. Acta Ornithol. 43: 83–91. DOI 10.3161/000164508X345365

Abstract. In addition to the well-known limiting effect of cavity abundance on the density of hole-nesting passerines, other aspects of cavity availability may shape their communities as well. Notably, where there is a considerable aggregation of cavities, territory-holders may prevent the occupation of the nearest cavities by other birds, whereas a supply of diverse cavities may reduce interspecific competition. We used multivariate general linear models to explore whether, and how, variables describing the supply of small cavities are related to the density and diversity of hole-nesting passerine communities in 33 hemiboreal old forest stands. The total density of 12 species (1.3 ± 0.8 pairs/ha) increased with cavity density and diversity, but was not affected by cavity aggregation. As expected, cavity diversity also promoted bird diversity; indeed, the densities of different species were positively related to the densities of different cavity types. The results indicate that segregation in nest-cavity selection affects the co-occurrence of passerine species and, at the mean densities of small tree-cavities in the region (2.3/ha), cavity aggregation does not markedly reduce their availability. In conservation management, therefore, it is important to maintain a diverse supply of cavities in addition to their abundance, in order to sustain hole-nester communities.

Key words: hemiboreal forests, nest site selection, old growth, secondary cavity-nesters, spatial aggregation, tree cavities

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Absence of edge effects on nest predation in the Collared Flycatcher *Ficedula albicollis* in the primeval forest of Białowieża National Park, NE Poland

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Stański T., Walankiewicz W., Czeszczewik D. 2008. Absence of edge effects on nest predation in the Collared Flycatcher *Ficedula albicollis* in the primeval forest of Białowieża National Park, NE Poland. *Acta Ornithol.* 43: 92–96. DOI 10.3161/000164508X345374

Abstract. Nest predation is a major factor limiting breeding bird populations in primeval tree stands. Factors such as food limitation, availability of nesting sites or competition are not so important. Nest predation is usually more common along the edges of forests than in their interiors. The aim of this study was to determine how breeding losses in the secondary cavity-nester Collared Flycatcher *Ficedula albicollis* that bred in natural holes varied with distance from the forest edge in primeval stands of the Białowieża National Park (NE Poland). A comparison of the breeding losses along the edges and in the interiors revealed no statistical differences. The main nest predators were the forest species *Apodemus flavicollis*, *Martes martes*, and *Dendrocopos major*. It is better to keep forest tracts unfragmented, with a belt of bushes and thickets or woodland in an early successional stage along the edge. This would protect forest birds from predators living in open habitats.

Key words: edge effect, predation, Collared Flycatcher, *Ficedula albicollis*, primeval stands, secondary cavity nesters

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Hatching asynchrony and brood reduction in Blue Tits *Cyanistes caeruleus* may be a plastic response to local oak *Quercus robur* bud burst and caterpillar emergence

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Stenning M. J. 2008. Hatching asynchrony and brood reduction in Blue Tits *Cyanistes caeruleus* may be a plastic response to local oak *Quercus robur* bud burst and caterpillar emergence. Acta Ornithol. 43: 97–106. DOI 10.3161/000164508X345383

Abstract. Blue Tits exhibit extreme variation in clutch size and hatching asynchrony, which is the focus of this study. This paper reports an in-depth study of breeding Blue Tits showing that variation in Blue Tit hatching asynchrony can be explained by a number of phenological variables including particularly, date of bud burst in the local oak tree, which signals caterpillar emergence (34%), also date of first egg (14%) and female weight (8%). Hatching asynchrony explained 9% of the variation in brood mortality in this southern English population. Early incubation relative to clutch completion (incubation asynchrony) in Blue Tits explained 85% of the variation in hatching asynchrony, differs between years and advanced hatching in early and fledging in late laid eggs. Consequently, because fledging is usually synchronous, hatching asynchrony shortens the total time spent in the nest and explained 28% of the variation in nesting time from clutch completion to fledging. I present experimental evidence that brood reduction resulting from hatching asynchrony may be particularly adaptive towards the end of the breeding season, with 91% of the variation in the productivity of asynchronously-hatched broods being explained by, and increased with, date of hatching. About one fifth of birds delayed daytime incubation until after clutch completion, probably in wait for caterpillars to appear. Although the delay period was variable and extended total nesting time it always resulted in synchronous hatching. I propose that Blue Tits may have evolved plastic responses to environmental cues such as oak bud burst, which causes them to incubate at the optimum time to ensure maximum fledging success and chick fitness.

Key words: Blue Tit, *Cyanistes caeruleus*, hatching asynchrony, brood reduction, phenotypic plasticity, incubation, phenology

Do small hole nesting passerines detect cues left by a predator? A test on winter roosting sites

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Ekner A., Tryjanowski P. 2008. Do small hole nesting passerines detect cues left by a predator? A test on winter roosting sites. *Acta Ornithol.* 43: 107–111. DOI 10.3161/000164508X345392

Abstract. There are a lot of studies about relationships between prey and predators. However most have focused on the influence of lethal predators on their prey. We suggested that non-lethal effects may also be very important for a complete understanding of prey-predator interactions. Among many influencing factors predation is important because it affects survival probability, especially in winter, which is a critical period for many passerines living in temperate zones. Apart from killing prey, predators may also have an indirect influence on the choice of nocturnal resting sites. Therefore, small passerines should detect and avoid places where a predator has operated previously. We tested this prediction using data on wintering small passerines, mainly on Great Tits. The study was performed during the winter season of 2005/2006 in western Poland. In the experiment, we put fur and mangled feathers in half of 100 randomly selected nest boxes. Boxes were checked every ten days, from January–March. The birds showed a significantly stronger preference towards "clean" nest boxes (without predator traces). It seems that non-lethal predator influence modifies winter dispersion of birds and wintering passerines may detect, by visual signals left behind, nest boxes where predation has previously occurred.

Key words: Great Tit, *Parus major*, nest boxes, non-lethal predator-prey interaction, predator traces, predator detection, roosting site preferences, cavity nesters

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Hatching asynchrony in the Red-breasted Flycatcher *Ficedula parva* in relation to breeding season, peak food abundance, and high predation

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Mitrus C. 2008. Hatching asynchrony in the Red-breasted Flycatcher *Ficedula parva* in relation to breeding season, peak food abundance, and high predation. *Acta Ornithol.* 43: 113–117. DOI 10.3161/000164508X345400

Abstract. Hatching asynchrony has been recorded in many altricial bird species. Also, more than 70% of clutches of the Red-breasted Flycatcher hatched asynchronously. The annual variation in the proportion of asynchronous clutches depended on median dates of egg laying, in the years when females started egg laying later more asynchronous clutches were observed. The females from synchronous clutches started egg laying significantly earlier than females from asynchronous clutches and were more synchronised with the peak of caterpillars. No differences in clutch size and number of fledglings between asynchronous and synchronous clutches were found. The frequency of females that started incubation earlier showed no significant difference when mated with either after-2nd-year or 2nd-year males. Also, breeding success was not significantly different between broods of various hatching types and was 87% for asynchronous clutches and 94% for synchronous clutches. The time of breeding and high predation pressure could be main reasons for females of the Red-breasted Flycatcher to start incubation before laying the last egg of its clutch.

Key words: hatching asynchrony, hollenesters, age, Białowieża Forest, primeval conditions

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