

SYMP08: Natural holes – a missing dimension?

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Hole nesters belong to the most intensively studied birds in Europe, some of them have become model organisms which are used to solve the general biological problems. However, almost all the knowledge of their biology comes from studies of birds breeding in artificial places – nest boxes. One does not know whether the so collected data are representative for a wider set of conditions, whether birds breeding in natural holes would react similarly. The few data gathered in natural holes so far indicate that birds breeding in nest boxes and natural holes must face quite different challenges – substantial differences in e.g. nest predation, ectoparasite infestation, or nest flooding rates have been found. Thus, the nest box data may produce a biased, one-sided picture. We are unable to calibrate the extent of this bias, though, as the necessary comparative data from the natural holes are largely missing. This symposium constitutes a first step towards making up the existing gap. It brings together, for the first time, people studying birds in natural holes from all over Europe (and beyond), who provide an overview of current studies done in natural holes. The presentations cover a wide range of topics – from methods of studies in holes, through bird/hole relationships to behaviour. I do hope that the presentations and discussions during the symposium, by mapping major gaps in our knowledge, will set major directions for future, more comprehensive studies.

SYMP08-1 Hole abundance and the nest-site preferences of hole-nesters in a primeval boreal forest of Mongolia

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I studied the abundance of holes and their utilisation by hole-nesting birds in a primeval boreal forest of west Khentii, Mongolia. Hole availability and their use by nesting birds was estimated in four different habitats in 2002. There were on average 29.6 holes/ha, with highest values in the riparian mixed forest and lowest in the spruce-fir forest. Of 108 nests of 15 bird species found, 49 were situated inside 20 ha of the quantitatively studied plots. Both richness and density of the hole-nesters were highest in the riparian mixed habitat and lowest in the spruce-fir forest. As only 8.3% of holes were occupied by birds, it suggests that the availability of holes was not a factor limiting the density of hole-nesters in the study area. Distribution of hole-nester nests across tree species, tree size and status followed mainly the varying hole availability across categories. Features of holes used by *Parus montanus* and *Ficedula parva* strongly overlapped, mainly because the latter species used holes excavated by the former. High similarity between *Parus ater*, and *Parus major* hole characteristics suggests that they could have been potential competitors. Entrance size permitting, *Phoenicurus auroreus* used a wide array of holes.

SYMP08-2 Frost cracks as a breeding niche for small passerines

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In 1986–2002, 271 nests of small passerines were found in tree holes on the Courish Spit (Baltic Sea Coast). Most of them (122 nests) belonged to marsh tit *Parus palustris*, the species intensively studied in 1986–1998. The bulk of marsh tit nests (75%) were situated in frost cracks in tree trunks. Ten other bird species, including four other tits species and two flycatchers *Ficedula* spp, nested in the frost cracks. Their choice was governed by the width of hole entrance, hole depth and shape. Marsh tits preferred to breed in the cracks no less than 20 cm deep and with entrance width of 31 mm, great tits *Parus major* bred in holes at least 10 cm wide at the nest level. Frost cracks first used by marsh tits were subsequently used by other species, because marsh tits used to widen their entrances and to enlarge their interiors. Of 86 frost cracks first found with marsh tit nests, 38 were used in subsequent years by other species, and four by other marsh tit pairs. On the contrary, of 72 cracks first used by other species only 12 were later used by marsh tits. The cracks could be used during many years: one crack contained avian nests during six consecutive seasons, another one was used in six of ten years.

SYMP08-3 A hole or nest box – what is better for flycatchers?

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During 1993–1999 we studied breeding ecology of pied *Ficedula hypoleuca* and collared *Ficedula albicollis* flycatchers breeding in holes or in nest boxes, in deciduous stands of the Białowieża Forest (NE Poland). Pied flycatchers breeding in holes commenced egg laying later and laid fewer eggs than the birds in boxes. No such differences were found in collared flycatchers. The broods of pied flycatchers were less frequently plundered by predators in holes than in nest boxes. On the contrary, the collared flycatcher broods suffered more from predation in holes than in nest boxes. These results indicate that, depending on the species and variable, the nest box data may produce valid or biased estimates but the direction of bias is unpredictable. Therefore, separate validation studies are necessary before the nest box data are generalised to other areas/conditions.

SYMP08-4 Pros and cons of holes' re-use

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Choosing the previous year hole for nesting could have advantages and disadvantages. On one hand, re-use of the hole which appeared successful in the previous year would seem to be a good idea. On the other hand, there are several studies showing that the predators can memorise hole localisations from year to year, making breeding in such places more risky. In such situation it would be better to avoid breeding in the previous year holes. After sketching a background based on the literature review I shall present results of the long-term observations of the marsh tit *Parus palustris* re-use patterns carried out in a primeval forest (Białowieża National Park, E Poland). Holes there are super-abundant, so birds have a real opportunity for choice. Predators are both diversified and abundant, what makes the hole re-use a possibly costly behaviour. I shall ask to what extent the chance of a hole being used again depends on attributes of the hole, outcome of nesting and the quality of bird. I shall also check whether change of a breeding partner influences the frequency of hole re-use.

SYMP08-5 What prompts birds to engage in extra-pair paternity?

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Extra-pair-paternity is a widespread behaviour among birds and has been found to vary greatly, both among and within species. Many studies have been devoted to explain this behaviour as well as its variation. Several hypotheses such as the good genes hypothesis, genetic diversity or avoidance of fertility have been proposed to explain the evolutionary significance of EPC in terms of fitness rewards for males and/or females. From the literature review and our own studies of several populations of Mediterranean blue tits *Parus caeruleus* occupying habitats of different quality on the mainland and on the island of Corsica, we will investigate which hypotheses are the most likely to explain this behaviour and we will show that controversial results from different studies prevent any generalisation. An emphasis will be given on mainland-island comparisons because several components of the „insular syndrome“ predict lower rates of EPP on islands. We will also report on experiments of manipulation of breeding density and examine to which extent this ecological factor can explain the intraspecific variation in the rate of EPP. From the evidence currently available, we will conclude that several hypotheses are not necessarily mutually exclusive and that it is quite unlikely that a single factor can explain the variation of such a complex behaviour. Several factors probably interplay in the decision of females, which are probably the choosing sex, to engage in EPP. Factors such as habitat quality, expressed in terms of food availability or parasite prevalence, could at least partly explain the observed variation in EPP rates. By engaging in EPC, females can gain access not only to additional mates but also to additional food resources in the territory of these additional mates.

SYMP08-P1 Importance of large diameter trees and snags for cavity nesting ducks and raptors in the northern forests of Québec

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The mean area of forest subjected to cutting in Québec is of about 3000 km²/year, and the interval between successive cuts is of about 60 years. In that context, baseline data on the characteristics of the trees and cavities used by large cavity-nesting birds like ducks and raptors is needed for an adequate planning of forest exploitation aimed at sustaining populations of these bird species. Adult common goldeneye *Bucephala clangula* and hooded merganser *Lophodytes cucullatus* females were captured in artificial nesting-boxes, and equipped with transmitters to track their movements and follow them up to the natural nesting cavities selected as alternate nesting sites. Mean diameters (DBH) of the trees used for nesting by these birds was nearly 50 cm, and mean distance from the nearest water was 300 m. The low proportion of cavities found near water indicates that the 20 m buffers currently left around lakes and streams may not be sufficient. Preliminary results from an ongoing research on raptors also support the need for the conservation of large diameter trees and snags. Cavity trees used by barred owls *Strix varia* had DBH values 45–84 cm. Research will be continued to gather more data on cavities used by raptors and to determine what is the current availability of trees and snags of adequate size. Recommendations should then be made for guidelines aimed at the conservation of large size trees and snags.

SYMP08-P2 Why young male red-breasted flycatchers *Ficedula parva* arrive later on breeding area?

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Between 2000 and 2002 I determined arrival time of 156 red-breasted flycatcher males in old-growth oak-lime-hornbeam stands of the Białowieża National Park. Yearling males arrived on average 5 days later than the older ones. There were no significant differences in tarsus length, bill length, or body mass between young and old males. However the old ones had significantly longer wings. But no correlation was observed between wing length and arrival data in the whole sample. The question arises of whether the later arrival of yearling males is due to their shorter wings or they strategically arrive later to avoid aggression. The delayed plumage maturation in males suggests that later arrival could be a way of aggression avoidance.

SYMP08-P3 Characteristics of the natural nest sites of the red-breasted flycatcher *Ficedula parva* in the Białowieża Forest

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Between 2000 and 2002 I studied red-breasted flycatcher nest sites in old-growth oak-lime-hornbeam stands of the Białowieża National Park (NE Poland). Nest tree species included hornbeam *Carpinus betulus*, lime *Tilia cordata*, pine *Pinus silvestris* and spruce *Picea abies*, old oak *Quercus robur* and elm *Ulmus spp.* Most of nest trees were alive. I divided nest sites into three categories: chimneys (in the top of broken tree), subcavities (more open holes) and shelves. First type was characteristic mainly for lime and second for hornbeam. Average height above ground was about 5 m and average nest tree diameter was depend on tree species. The diameter of hornbeams was significantly larger than the diameter of limes.

SYMP08-P4 Counting of nuthatch *Sitta europaea* eggs in holes finally possible

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Data on clutch size of nuthatches come mostly from nest-boxes. This is because counting eggs in holes has been hardly possible. The nuthatch eggs are usually invisible, they remain hidden under loose bark flakes throughout incubation. Here I show a solution to this problem. I inspected hole interiors using a flashlight bulb fixed to a bendable wire (sometimes with a little mirror), as well as an elastic plastic tube (PVC, diameter – 6 mm, length – 20–25 cm). I delicately blew through the tube to remove bark flakes from the eggs. As this species used very spacious holes, it was usually possible to uncover the whole clutch. Using this method I counted in the Białowieża National Park

(Poland), in 2000–2002, eggs in 83 nuthatch clutches. In 90% of them the size of clutch was correctly estimated. The additional advantages of this method are: very low costs and simple preparation of necessary equipment. Usage of the method will be demonstrated at the Conference.

SYMP08-P5 Clutch size of nuthatch *Sitta europaea* breeding in holes

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The study was carried out in primeval lowland forest (Białowieża National Park, Poland). In 2000–2002 data on clutch size of 75 nuthatch pairs breeding in holes in two types of deciduous stands (ash-alder and oak-hornbeam) were gathered. The average clutch size (7.9 eggs) varied slightly across seasons (7.7–8.1) and strongly declined over a season despite very synchronous egg-laying. Variation of clutch size in relation to habitat, hole attributes, and nestling food supply will be also shown.

SYMP08-P6 Forest rodent cycles and fluctuations of the collared flycatcher *Ficedula albicollis*

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The migratory secondary hole-nester collared flycatcher is single-brooded and breeds in high density in primeval oak-lime-hornbeam (*Quercus/Tilio-Carpinetum*) forests in the Białowieża National Park (BNP, Poland). Observations of 300 nests during 1988–2003 showed that predation was the main reason of breeding losses, accounting for 91% (82%–100%) of them. Local production of fledglings was affected by nest predation by rodents, mustelids and the great spotted woodpecker *Dendrocopos major*. A link between forest rodent cycles and the collared flycatcher fluctuations in numbers was found. The number of fledglings produced within the season depended positively on the number of collared flycatcher pairs breeding and negatively on the yellow-necked mouse *Apodemus flavicollis* density. Local breeding density was shaped by fledglings productivity (breeding success) of the previous year. The rate of nest destruction was related to the density of the yellow-necked mouse and independent on the collared flycatcher own density (nest predation limiting but not regulating).

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Zoologisch-Botanische Datenbank/Zoological-Botanical Database

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