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Source: Acta Ornithologica, 35(2) : 211-214

Published By: Museum and Institute of Zoology, Polish Academy of Sciences

URL: https://doi.org/10.3161/068.035.0203

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ACTA ORNITHOLOGICA
Vol. 35 (2000) No. 2

Location of bird nests in vertical metal pipes in suburban built-up area of Warsaw

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Lesiński G. 2000. Location of bird nests in vertical metal pipes in suburban built-up area of Warsaw. Acta orn. 35: 211–214.

Abstract. Five bird species (Great, Blue and Coal Tits, Redstart, Tree Sparrow) nested inside vertical metal pipes of fences in Warsaw suburbs (central Poland). It appeared to be the main breeding site for a Great Tit – nearly 80% of the nests of the local population. The preferred diameter of the pipes depended on the size of the species (mainly on the length of the tarsus). It was the widest in Great Tit and the narrowest in Blue Tit. Great Tits built their nests significantly deeper (down to 1.7 m from the top) than the other species. The mean number of fully feathered nestlings per successful nest was lower in pipes than in nest boxes. Such a nest location is a local adaptation of birds living in highly a urbanised area, where natural breeding cavities are scarce.

Key words: urban birds, nest location, hole nesters, Great Tit, *Parus major*

Received — April 2000, accepted — Sept. 2000

INTRODUCTION

Many species of hole-nesting birds frequently use anthropogenic breeding sites in urban habitats. Birds showing an advanced adaptation to human settlements locate their nests in various building crevices. Some species regularly use nest boxes. Also metal pipes (vertical posts open from the top) in fences have been reported as breeding sites. However the examples of such nest location have been scarce so far (Strawiński 1963, Perrins 1980) and usually have been described as an interesting curiosity. There are no data concerning the species composition of birds nesting inside metal pipes, the frequency of these cases, nesting site characteristics, and the breeding success.

The aim of present study was to describe this phenomenon in a suburban built-up area. The assumption was to confirm the plasticity in nest location and the opportunistic behaviour of urban birds.

STUDY AREA, METHODS AND MATERIAL

The study was carried out in the suburbs of Warsaw (Łomianki) bordering to the north-western part of the city. The study area (about 4.5 km^2) was covered by residential buildings and a relatively high volume of the vegetation. Rural and industrial buildings occurred in a small part of study area.

Metal pipes used by birds were located mostly in fences (frequently in gates), rarely on sport or recreation fields. They where vertical tubes of different diameters and heights, usually open from the top and inserted into the ground. The average density of the pipes that could be possibly used by birds (open from the top, inside diameter 7–15 cm) was 68.6/10 ha in the built-up area under study.

The presence of nests inside pipes was noted on 7 plots (94.7 ha) between 1983–1985. During that time, a census with 147 single counts was made using the mapping method (Tomiałojć 1980) to determine the distribution and numbers of breeding pairs of the Great Tit *Parus major*. Additionally irregular surveys of the whole area were made between 1986–1997, aimed at finding nests of hole-nesting birds, especially those breeding in pipes.

The full description of each case involved: bird species, height of the post, inside diameter of the pipe, depth of nest location, place in the fence

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(gate or out of it), and distance from the nearest building, tree or street. Descriptions of a part or all of those data were made for 121 nests.

For 16 Great Tit nests (with success) located in pipes, the number of fully feathered nestlings was determined. Similar data were obtained for nests in nest boxes (entrance diameter 3–3.5 cm, inside bottom 10x13 cm) located at the edge of a built-up area and a forest at Łomna — about 3 km from the study area (7 nests with success in 1988). Also unpublished materials from the vicinity of the study area (Dziekanów Leśny) have been included: 11 nests with success in 1973 (data of J. Pinowski, K. Sierakowski), 5 nests in 1992, 11 nests in 1994 (data of T. Mazgajski, A. Kruszewicz, A. Kędra).

Statistical significance of differences in the analysed characteristics between various species was estimated by using the Mann-Whitney test and one-way ANOVA.

RESULTS

Among five species of birds nesting in metal pipes in the study area, the Great Tit was the most frequent (Table 1). The Redstart *Phoenicurus phoenicurus* and the Coal Tit *Parus ater* were rather scarce, the latter occurred only on the border of the built-up area and the forest.

Table 1. Frequency of birds nest in pipes. N — total number of nests in the area, n — nests in pipes.

Species	N	n	%
Parus major	117	92	78.6
Parus caeruleus	112	14	12.5
Passer montanus	204	13	6.4
Parus ater	–	1	–
Phoenicurus phoenicurus	–	1	–

The species significantly differed with regard to the diameter of the pipes selected (Table 2). The median value of the diameter preferred by the Great Tit was 1 cm higher than that preferred by the Blue Tit *Parus caeruleus* ($Z = -4.10$, $p < 0.001$) and 0.5 cm higher that preferred by the Tree Sparrow *Passer montanus* ($Z = -2.28$, $p < 0.05$). Great Tit's nests were built deeper (up to 1.7 m from the upper edge) than the nests of the Blue Tit ($Z = -3.24$, $p < 0.05$) and the Tree Sparrow ($Z = -3.27$, $p < 0.05$). There was tendency towards more frequent use of pipes in gates by tits (*Parus* spp.) than Tree Sparrows (Table 2). Only one nest of the latter species was recorded in a gate on a site not inhabited by a man. A high variability and no significant differences between species were found in the distance of nests from the nearest building, tree and street.

The strong Great Tit's preference for breeding in pipes may imply that the density of suitable pipes may be a factor limiting population density. But the correlation (calculated for small parts of the built-up area: 1.5–4 ha, n = 47, see Lesiński 1994) between these densities appeared to be statistically not significant: $r = -0.16$, $p > 0.05$. The average density of the Great Tit calculated for the study plots was 4.7 pairs/10 ha.

The numbers of Great Tit's nestlings shortly before fledging were lower in pipes than in nest boxes (respectively $\bar{x} = 5.6$, range 2–9, n = 16; $\bar{x} = 7.9$, range 4–12, n = 35; $F = 11.17$, $p < 0.05$. No differences were found in breeding success in boxes between years ($F = 0.62$, ns).

DISCUSSION

Presented results provide evidence for an importance of nest location inside pipes to some hole-nesting birds, especially to the Great Tit. The lack of correlation between the density of this species and suitable pipes can be explained by a high surplus of nest sites of that type in Warsaw suburbs. The mean density of the available pipes was over 14 times higher than the maximum density of the Great Tit population in the study area.

The preferred diameter of pipes increased with the size of the bird species as measured by the tarsus length (Table 2). This is related to the mechanism of bird locomotion up and down inside the pipes. In too broad or too narrow pipes birds are limited in climbing on a tube surface.

Moreover, narrow pipes may decrease the breeding success by reducing the space for young, as it was pointed out for the Great Tit in the study area. Similar differences in breeding success were also noted in nest boxes of different size (Löhrl 1973, Nilsson 1975, Karlsson & Nilsson 1977, Van Balen 1984, Sorace & Carere 1996). In smaller space birds lay a lower number of eggs, and this can probably be an additional factor reducing the number of fledglings in pipes. Urban populations of Great Tit raised a lower percentage of fledglings per egg than rural ones (Hôrak 1993).

But on the other hand, the risk of nest predation seemed to be lower in pipes, because they are less accessible than tree holes or nest boxes. Nest

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Table 2. Size of birds and charakteristics of nest location in pipes. M — median value, UQ, LQ — upper and lower quartilles. * — after Ferens 1971.

Species	Body size*		Inside diameter of pipe (cm)				Depth of nest location (cm)				Nest location	
	weight	tarsus lenght	M	Range	LQ-UQ	N	M	Range	LQ-UQ	N	gates	others
Parus major	18.5–21.2	17.5–23.5	8.5	7.0–11.0	8.0–9.5	86	80	15–170	60–130	70	27	48
Passer montanus	19.0–26.0	18.0–20.0	8.0	7.5–11.0	7.5–9.5	14	50	15–70	25–60	9	1	11
Parus caeruleus	10.0–12.0	16.0–20.0	7.5	7.0–9.0	7.0–8.0	11	45	5–70	12.5–60	8	4	8

predation is probably a more important factor reducing the number of fledglings than small space inside pipes. A relatively high level of predation on nests of hole-nesters was noted in forests (Nilsson 1984, Walankiewicz 1991).

The frequent use of pipes in gates can result from the fact that they provide better conditions for fixing the nest edges than do other pipes. The Tree Sparrow, however, kept a higher distance from man and probably could not tolerate human activity near gates.

The described phenomenon of nest location inside fence posts can be interpreted as a symptom of bird adaptation to urbanised area, where natural cavities are scarce. The high level of the adaptation is probably specific for the study area, resulting from the local infrastructure of the built-up habitat in the suburbs of Warsaw. It is indicative of the urban birds' plasticity in nest site selection. The Great Tit was probably the first species that learned to use metal pipes and now its adaptation is advanced. For Redstart and Coal Tit the single nests recorded in pipes could be the initial attempts. One should expect an extension in the list of bird species showing such nest location in the future.

ACKNOWLEDGMENTS

I would like to thank Prof. Jan Pinowski, Dr Tomasz Mazgajski and Mr Kazimierz Sierakowski for making available their unpublished data.

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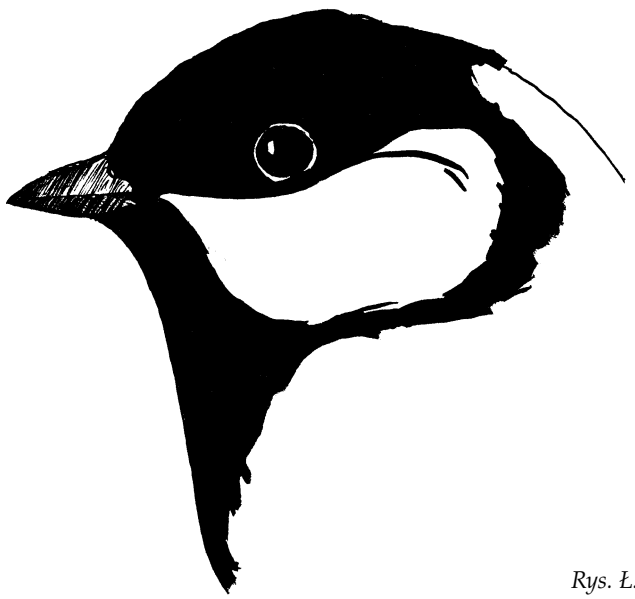
STRESZCZENIE

[Gniazdowanie ptaków w pionowych metalowych słupkach w zabudowie podmiejskiej Warszawy]

Pięć gatunków (bogatka, modraszka, mazurek, sosnówka i pleszka) gniazdowało w pionowych metalowych słupkach ogrodzeniowych w zabudowie podmiejskiej Warszawy, w gminie Łomian-

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ki. Dla bogatki słupki stanowiły główne miejsce lęgów — prawie 80% wszystkich stwierdzonych na terenie badań (Tab. 1). Najgłębiej umieszczała gniazda bogatka — do 170 cm od górnej krawędzi słupka. Wybierana przez ptaki wewnętrzna średnica słupków zależała od wielkości ptaka (najbardziej od długości skoku) i była największa u bogatki (mediana 8.5 cm), a najmniejsza u modraszki (mediana 7.5 cm, Tab. 2). Sukces lęgowy bogatki był niższy w słupkach (średnio 5.6 piskląt na gniazdo z sukcesem) w porównaniu do skrzynek lęgowych (średnio 7.9 piskląt na gniazdo z sukcesem). W zabudowie podmiejskiej Warszawy wykorzystywanie miejsc lęgowych w słupkach jest obecnie zaawansowanym przystosowaniem do życia w środowisku ubogim w dziuple.



Rys. Ł. Rejt

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