

The selection of song perches among high-mountain passerines of Southeastern Spain

Wahl von Singwarten bei Gebirgsvögeln SE-Spaniens

By Regino Zamora

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Abstract

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The characteristics of the song perches used by seven passerine species that nest in the high-mountain areas of the Sierra Nevada (SE Spain) have been studied. Significant interspecific differences appear both with respect to the height of perches used and the physical nature of the substrate. A comparison between the song perches used and those available reveals that all the species select the highest suitable perch. The consequences of this selectivity is considered in relation to male sexual display and sound transmission.

Zusammenfassung

ZAMORA, R. (1991): Wahl von Singwarten bei Gebirgsvögeln SE-Spaniens. — Ökol. Vögel 13: 181-185. Merkmale der Singwarten von 7 Singvogelarten in Gebirgen SE-Spaniens werden untersucht. Zwischen den einzelnen Vogelarten bestehen deutliche Unterschiede in der Art (Fels und verschiedene Sträucher) und Höhe der genutzten Singwarten. Ein Vergleich der mittleren Höhe der genutzten Singwarten mit der der verfügbaren Warten zeigt, daß alle Arten die höchsten geeigneten Sitzgelegenheiten wählen. Die Bedeutung dieser Wahl im Sozial- und Sexualverhalten und für die Gesangsausbreitung wird diskutiert.

1. Introduction

Most passerine species are territorial during the nesting season and very often their territories are heterogeneous, comprising several microhabitats, each related to some specific aspect of the birds' reproductive biology. Studies carried out to date have tended to concentrate on the birds' feeding microhabitats (LANDRES & MACMAHON 1983, SABO & HOLMES 1983, ROBINSON & HOLMES 1984, and many others), and that of the nest-site and its immediate surroundings (e. g. CLARCK et al. 1983, MARTIN & ROPER 1988, ZAMORA 1990, etc.), probably because feeding and

Author's adress:

Departamento de Biología Animal, Ecología y Genética, Facultad de Ciencias, Universidad de Granada, 18001 Granada (Spain).

nesting are the two components that most closely define the ecological characteristics of the reproductive period. Nevertheless, other factors are important in this period, such as the availability of perches, which may serve as singing post for open-country passerines without flight song (CODY 1985), and these have received much less attention (but see WIENS 1969, ZIMMERMAN 1971, HARRISON 1977, CASTRALE 1983, SORJONEN 1986, PAYNE 1987).

The purpose of this paper is to describe the characteristics of song perches used by seven passerine species that nest in the high-mountain areas of Sierra Nevada (SE Spain), to make interspecific comparisons, and to compare the availability of suitable perches with their actual use. Later, I consider the selection of song perches in relation to the male sexual display and sound transmission.

2. Study area and methods

The study area is a part of the pasture-scrubland that slopes gently upward from about 2000 m to 2400 m in the Sierra Nevada (Southeastern Spain). The bushy vegetation consists mainly of *Juniperus communis* and *Genista baetica*. This vegetation is interspersed with rocks and grass, making the whole terrain a typically heterogenous high-mountain area with the same general topography. A detailed description of the composition and structure of the habitat can be found in ZAMORA (1988).

The observations were made in the early morning, during May and June of 1985. These months are when males establish their territories and when pairing begins. When I saw a singing male, I recorded the physical characteristics and height of its perch. Bearing in mind that the bird always sings at the top surface of the rock or shrub, the measure of perch height corresponds to the maximum height of the perch, measured vertically from the bird to the ground. I took only the first observation for each male per day to insure independence of the data.

To determine if the birds had any preferences in their choice of perches within the available possibilities, I traced an imaginary circle of 6 m radius around the song perch, noting the height and characteristic of the highest shrub or rock that might represent potential song perches within the sampling circle, excluding obviously the song-perch which is used as a central point of reference. This quantification was possible because the rocks and shrubs were clearly separate in the field and easily identifiable. A minimum of 32 Common Wheatear (*Oenanthe oenanthe*), 25 Rock Bunting (*Emberiza cia*), 19 Black Redstart (*Phoenicurus ochruros*), 17 Wren (*Troglodytes troglodytes*), 16 Whitthroat (*Sylvia communis*), 10 Hortolan Bunting (*Emberiza hortulana*) and 10 Linnet (*Acanthis cannabina*) individuals were represented. The number of individuals were calculated by means of transect counts in the same study area (see data in ZAMORA 1988).

3. Results

Not all of the species that nest in the study area sing from perches: the Skylark (*Alauda arvensis*) and the Tawny Pipit (*Anthus campestris*) males almost always perform their mating displays by singing in flight, whereas the Common Wheatear and Whitthroat combine short song flights with perched displays. The Rock Bunting, Hortolan Bunting, Wren, Black Redstart and Linnet sing exclusively while perched (see ZAMORA 1988 for a community analysis).

Table 1 shows the range of perches and their physical characteristics chosen by the seven species. The Black Redstart is at one extreme (86.4 % rock as opposed to 13.6 % scrub) and the Whitthroat at the other (0.7 rock and 99.3 % scrub). The interspecific comparison by means of the G-test shows highly significant differences ($G = 368.4$, $df = 24$ $P \lll 0.001$).

Table 1. Substrates used as song perches by the seven passerine species. Figures in the table corresponding to substrates are percentages. The substrate under the heading »others« refers to scarcely found shrubs, such as a *Lonicera arborea* and *Rosa* sp. The sample sizes are also shown.

Substratum	Wren	Whitethroat	Wheatear	Black Redstart	Rock Bunting	Hortolan Bunting	Linnet
Rock	17.3	0.7	54.2	86.4	42.6	3.3	34.8
<i>Juniperus</i>	22.0	8.1	18.1	4.5	27.8	4.9	30.4
<i>Genista</i>	13.4	43.0	22.9	1.5	10.2	68.9	8.7
<i>Berberis</i>	44.1	46.7	4.8	7.6	17.6	21.3	26.1
Others	3.1	1.5	—	—	1,9	1.6	—
Sample size	127	137	83	66	109	61	23

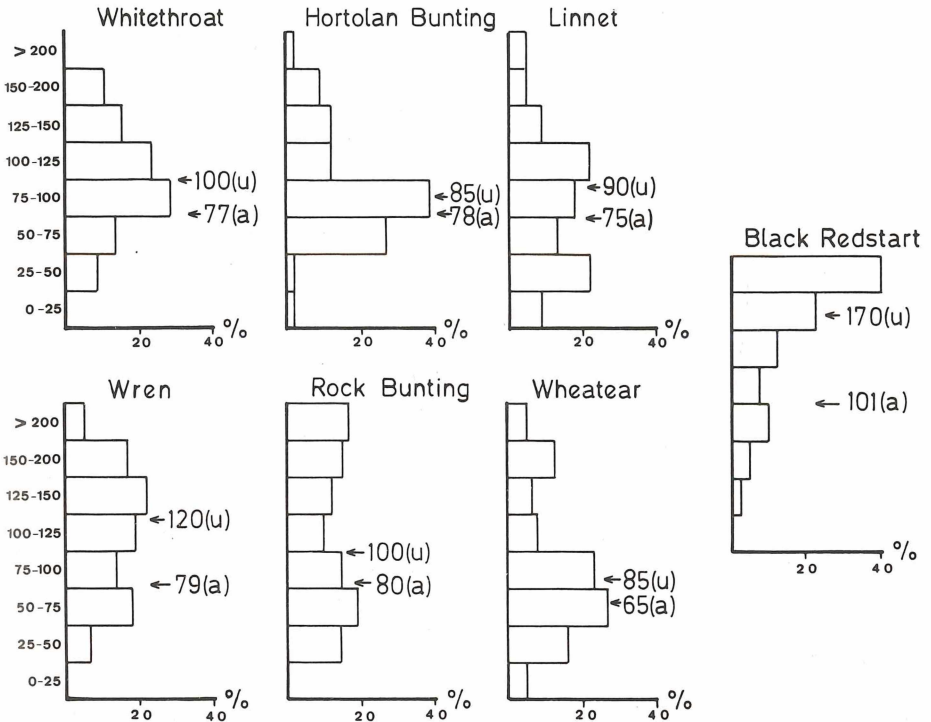


Fig. 1. Perch height distribution of passerine birds. Figures next to histograms are the median of perch used (u), together with the median of the highest perch available (a) in the immediate surroundings (see Methods). Arrows indicate the exact position of the median values. The sample sizes are the same as in Table 1.

As can be seen in Fig. 1, the seven passerine species that sing while perched show a substantial level of intraspecific variability with respect to the height of the perch. Some species showed differentially shaped distribution; for example, the White-throat shows a nearly symmetrical distribution, whereas the Black Redstart shows a skewed distribution towards the highest values. On the other hand, the Rock Bunting's perches approach a bimodal distribution, with two maximum values towards the highest and lowest point respectively. A interspecific comparison between the height of the perch, by means of the Kruskal-Wallis non parametric analysis of variance with tied ranks, showed statistical differences ($H = 57.94$, $df = 6$, $p < 0,001$). A posteriori non parametric Turkey test showed that these differences are due to the Black Redstart, which differs significantly from the remaining six species, and to the Wren, which differs from the Hortolan Bunting, Linnet and Wheatear.

One final analysis was to test the level of selectivity of the species on the basis of perch height. I compared the heights of the song perches chosen by every bird with the highest perch available in the immediate vicinity (see Methods) by means of the Wilcoxon paired-matched test. Clearly significant differences can be seen for all the species ($p < 0.05$ for the Hortolan Bunting, and $p < 0.005$ for the remaining species, see Fig. 1).

4. Discussion

On the basis of perch substrates, three groups of species can be distinguished: preferentially rock-perch species (the Black Redstart); both rock and shrub-perch species (the Common Wheatear, Rock Bunting and Linnet); and preferentially shrub-perch species (The Wren, Hortolan Bunting and Whitethroat). These substrate preferences are directly related to their specific habitat selection in the high-mountain areas (ZAMORA 1988, 1992).

The seven species overlap extensively in perch height, although the species that sing from rock-perches, especially the Black Redstart, have the possibility of perching higher than the preferentially shrub-perch species because the shrub layer is very stunted in the high-mountain areas (ZAMORA 1988). In this respect, *Berberis vulgaris*, the highest shrub species, is used preferentially as a song-perch by some birds (e. g. the Wren and Whitethroat) despite its scarce distribution in the high-mountain areas.

From this study, it can be safely concluded that the seven species normally choose the highest available perch in different sectors of the habitat, and do not exhibit fixed, narrow ranges in perch heights used. This fact appear also in many species that nest in scrub or grassland (WIENS 1969, 1973; ZIMMERMAN 1971), although only CASTRALE (1983) and the present study attempted to confirm statistically the causal impression gained in the field (see also GREIG-SMITH 1984). Thus, the song-perches may become a potentially limiting factor in the choice of territory, bearing in mind the requirements of height, compared with the rest of the rocks and shrubs in the immediate surroundings, and in the high-mountain habitats as a whole (ZAMORA 1988, 1991).

Despite the fact that a bird singing from a vantage point makes itself an easily identifiable prey, this behavior also has several advantages: by displaying himself openly, the male provides a visual as well as an audible warning to other males to keep off, while at the same time attracting potential mates (Ericsson & Wallin 1986). Furthermore, the use of elevated song-perches probably improves the long distance song propagation because there is a greater increase of sound attenuation when the singing bird is closer to the ground (MORTON 1975, MARTEN & MARLER 1977, MARTEN et al. 1977, COSENS & FALLS 1984). It is noteworthy that the median perch height of the high-mountain passerines is nearly 1 m, which represents an optimal height for sound transmission without distortion in open areas (MARTEN & MARLER 1977, MARTEN et al. 1977). The selective use of the highest perches acquires even greater importance in the high-mountain habitats, where the short available breeding time will benefit the rapid pair formation facilitated by the conspicuous visual and acoustic displays of the male. In this respect, the availability of adequate song-perches appear to be an important factor that conditions the reproductive biology of birds, particularly in seasonal environments where the vegetation is sparse.

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Autor(en)/Author(s): Zamora Regino

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