CANARY ISLANDS BLUE TITS (*Parus caeruleus* ssp) - DIFFERENCES AND VARIATION IN TERRITORIAL SONG - PRELIMINARY RESULTS

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INTRODUCTION

On the Canary islands there exist four subspecies of the *teneriffae*-group of *Parus caeruleus*. This group consists of six subspecies (Vaurie 1957) and differs in morphology (Martin 1988) and song (Becker *et al.* 1980) from the *caeruleus*-group which lives in Central Europe. The subspecies *P.c.degener* inhabits dry habitats with few trees on Lanzarote and Fuerteventura. *P.c.teneriffae* and *P.c.palmensis* live in laurel-woods (Laurisilva) and pine forests (*Pinus canariensis*) on the islands of Tenerife, La Gomera and Gran Canaria and La Palma. El Hierro's pinewoods are inhabited by *P.c.ombriosus* (see figure 1).

The four Canary Islands' subspecies differ in size, bill-shape and length, tarsus length and colour (Grant 1977).

This paper deals with the acoustical differences in territorial displays between the Canarian subspecies. So far only the songs of *P.c.teneriffae* on Tenerife have been regarded (Lack & Southern 1949, Marler 1960, Becker *et al.* 1980).

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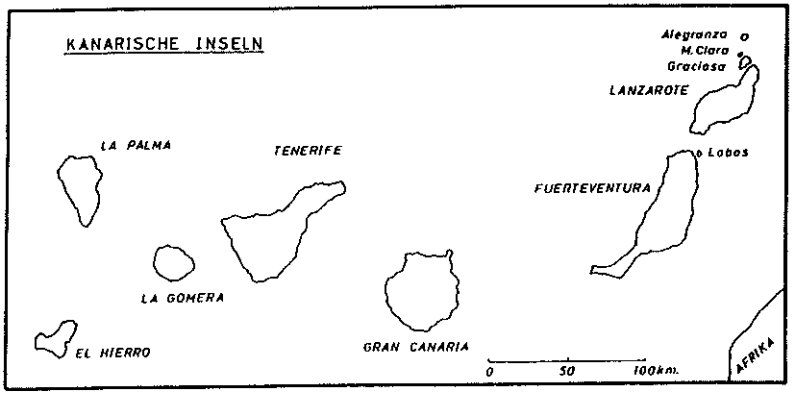

Figure 1. The Canary Islands (from Kunkel, 1987)

RESULTS

The songs, which are mainly used to define the territory, to keep rivals away and to attract females, differ in many features between the subspecies (Thielcke 1970).

Territorial displays of all subspecies consist of several element-groups. Song is variable and manifold in element combination. Therefore there exist a great number of different song-types on every island. That large variability makes territorial songs of the *teneriffae*-group different from those of the *caeruleus*-group, which consist mostly of phrases (Becker *et al.* 1980).

P.c.degener of Lanzarote uses high-pitched and hook-formed elements with a small opening angle or sinus notes. The rapid frequency changes make the songs sound rough to the human ear. The territorial songs of *P.c.degener* on Fuerteventura are characterized by diverse hook-formed elements with a large opening angle combined with frequency-modulated sinus notes. The songs have a relative small frequency range between 3 and 6 kHz.

P.c.tenerifae on Gomera, Tenerife and Gran Canaria has, in contrast to the territorial displays on Fuerteventura, a wide frequency range (between 3 and 8 kHz). The songs often consist of combinations of short lasting hook-formed or slope-like elements. On Tenerife and Gomera, those elements can be

combined with short frequency modulated notes. These element types also characterize the songs of *P.c.ombriosus* on El Hierro. Here the frequency modulation takes part in even shorter periods and in a small frequency range. It ranges from 4 to 8 kHz.

P.c.palmensis differs from all other subspecies. It uses - like European Great Tits (*Parus major*) - sinus notes with a small frequency range. Two or more of these notes may alternate in a song. Other song types consist of u-formed elements with a wide opening angle or the combination of those elements and sinus notes. Territorial displays of *P.c.palmensis* have a relative small frequency range between 3.5 and 6.5 kHz. Most important is the fact that vocal differences from one island to another do not conform with the taxonomic subspecies defined by morphological structures and colour.

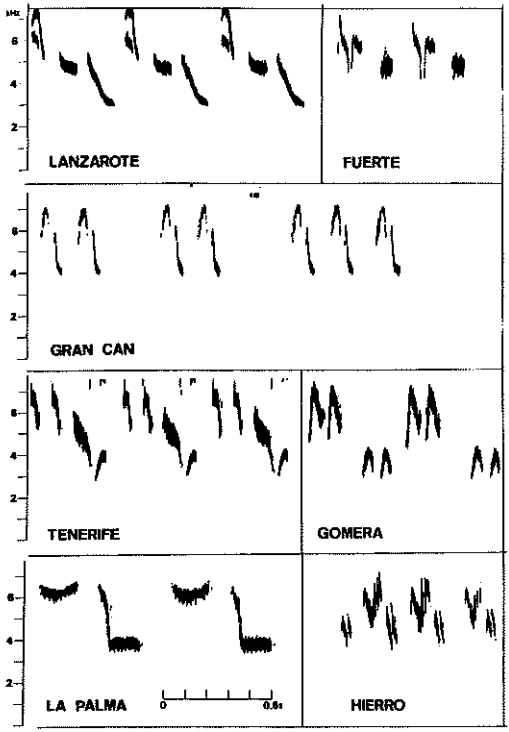

Figure 2. Territorial songs of four Canarian subspecies of *Parus caeruleus -P.c.degener* (Lanzerote, Fuerteventura), *P.c.teneriffae* (Gran Canaria, Tenerife, La Gomera), *P.c.palmensis* (La Palma), and *P.c.ombrosius* (El Hierro).

DISCUSSION

There are two possible interpretations of the results:

1. The differences in territorial songs between the islands are due to the "withdrawal of learning" hypothesis (Becker *et al.* 1980) and the bottleneck theory (Dobzansky & Pavlovsky 1957). This means that a founder population which exists only of a few animals, which shares only a small part of the original populations' songs has colonized the islands and developed its own song repertoire. It needs further investigation to elucidate if there have been several colonization waves from North Africa to the different islands of the Canarian archipelago or if there has been just one influx of colonization from North Africa to one island and to the other islands.

2. The differences in territorial display are results of the adaptations of the various subspecies to the habitats they live in. The structure of bird songs is correlated to the physical parameters of the birds' biotope. This has been proved by investigations on adaptations of bird songs to reed marshes and torrents (Heuwinkel 1982, Martens & Geduldig 1990). This assumption is not easy to confirm because habitats of Canarian blue tits are variable and can not be reduced to a few parameters.

I assume that both possibilities, colonization of the islands with small populations and in addition the vocal adaptation to different biotopes are the reasons for different acoustic displays of the four subspecies of the *teneriffae*-complex of *Parus caeruleus* on the Canary islands.

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