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Low prevalence of haematozoa in Trumpeter finches *Bucanetes githagineus* from south-eastern Spain: additional support for a restricted distribution of blood parasites in arid lands

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Abstract

We have investigated the prevalence of avian haematozoa in Trumpeter finches at two localities situated in arid habitats. This study reports the first record of infection for this bird species. Two out of 58 individuals were infected by *Leucocytozoon* sp. We discuss several hypotheses accounting for low parasitemia in arid bird species.

Keywords: Arid land; Blood parasites; *Bucanetes githagineus*; Prevalence; Vector

1. Introduction

Prevalence and intensity of blood parasites are known to vary in space. Understanding such variation is important to highlight patterns of host–parasite associations and coevolution. Despite increasing interest in spatio-temporal variation in avian blood parasitemias (see, for instance, Bennett et al., 1995; Tella et al., 1999) the sources of variability are still poorly known. Absence of basic information on the epidemiology of haematozoa is obviously impeding holistic studies aimed to obtain overall patterns of rates of parasitism by haematozoa. Recent work has provided a noticeable amount of studies reporting pathogenicity in

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birds living in natural environments (Clayton and Moore, 1997). However, information from some types of habitats, like arid areas, is much scarcer than that available for birds inhabiting other regions, like temperate areas (see, for instance, Møller, 1997).

The aim of this study is to investigate the prevalence of avian haematozoa in the Trumpeter finch *Bucanetes githagineus*. This fringillid inhabits deserts and semi-deserts and breeds in southern Spain, which is in fact the northern border of its range (Cramp and Perrins, 1994).

2. Materials and method

2.1. Study species

The trumpeter finch is a fringillid associated with arid habitats and hot climates. A northward expansion from its breeding grounds in North Africa resulted in increasing records in southern Spain during the 1960s. Breeding was recorded for the first time in 1971 in Almería province (south-eastern Spain) (García, 1972; Cramp and Perrins, 1994). The species should be considered as resident in south-eastern Spain, with a fraction of the population moving in winter from the breeding grounds inland to the coast (Manrique, 1993).

2.2. Data collection

Blood was collected from the brachial vein of Trumpeter finches captured during the period 15 July to 27 September 2002 in two study areas (Granada and Almería provinces, south-eastern Spain) 120 km apart. We sampled 27 adult breeding birds and 31 juveniles. Adults were sexed (11 males, 15 females, one undetermined) following Svensson (1992). Unfortunately, we were unable to sex juveniles at this time of the year. Thirty-four birds (25 adults and nine juveniles) were trapped in Almería and 24 birds (two adults and 22 juveniles) in Granada. Blood was smeared immediately, air dried, and fixed with absolute ethanol. All smears were stained with Giemsa. A $\times 200$ lens was used to look for extra-cellular parasites in one half of each smear. Intracellular stages of haematozoa were sought at $\times 400$ but, in contrast to the usual method (see, for instance, Merino and Potti, 1995), we scanned the whole smear following the recommendations of Cooper and Anwar (2001). The oil immersion objective was used when a possible parasite was sought at $\times 400$.

3. Results

Only an adult female trapped in Almería and a juvenile captured in Granada province were infested, prevalence being therefore very low (two out of 58 individuals, which represents 3.45% of the sample). In both cases the haematozoa

found was *Leucocytozoon* sp. and the intensity of infection was extremely low (<1/10,000 erythrocytes).

4. Discussion

To our knowledge there is just one previous work that has searched for blood parasites in this species. Yakunin and Zhazyltaev (1977) reported no blood parasites in Trumpeter finches captured in Kazakhstan, at the easternmost limit of the species distribution. Therefore, this study reports the first record of haematozoa parasitizing Trumpeter finches. We did not identify the parasite to the species level but three *Leucocytozoon* species (*L. dutoiti*, *L. majoris* and *L. dubreuilli*) have been recorded infesting passerines, all of them with low host specificity (Bennett et al., 1982; Valkiunas, 1997).

Cooper and Anwar (2001) warned against negative findings during parasitological examination of blood of birds. In contrast to the common method (e.g. Merino and Potti, 1995) we examined the whole surface of the smears and therefore we are confident of the low prevalence found in this study.

Our finding agrees with others reporting absence or low prevalence of blood parasites in arid regions for a variety of bird species (see, for instance, Bennett et al., 1992; Little and Earlé, 1995; Tella et al., 1999). This seems to be also true for ectoparasites (see Moyer et al., 2002), what suggests that a low parasite pressure in arid areas can be a general trend.

Various hypotheses may account for the lack of avian haematozoa either in species or sites: (i) insufficient time for the co-evolution of host, vectors and parasite to have occurred (Earlé and Underhill, 1993), (ii) birds inhabiting arid habitats may have a natural resistance to blood parasites or, the other way round, species with poor immunocompetence may be selected for, or limited to, open habitats in which the prevalence of haematozoa is low (Tella et al., 1999), (iii) absence of suitable vectors in some habitats (Earlé and Underhill, 1993; Merino et al., 1997), (iv) low density of the host could account for absence of parasitemia (Rytkönen et al., 1996).

Testing hypotheses (i) and (ii) would require a considerable amount of information on many host and parasite species from arid areas. Unfortunately, such information is very limited to date. The third hypothesis is being favoured by recent studies. Abiotic factors can cause substantial variation in parasite pressure among host populations (Tella et al., 1999; Moyer et al., 2002). Bennett et al. (1995) showed the role of ecologically diverse conditions in determining the composition, transmission and prevalence of a blood parasite fauna, presumably through their effect on vector composition and population density. Recently, Sol et al. (2000) found that geographical prevalence of *Haemoproteus columbae* in feral pigeons *Columba livia* was actually due to differences in vector exposure. The absence of suitable habitat for vectors of common avian haematozoa in harsh environments like arid areas and polar regions (Laird, 1961; Merino et al., 1997) has been suggested as the reason for absence of parasitemia in those areas. Common vectors of *Leucocytozoon* spp. are black flies (Family: Simulidae), which require clean, flowing

water for breeding (Little and Earlé, 1995). These requirements are difficult to accomplish in arid and semi-arid environments. Finally, it seems to us that low density of the host is unlikely to be the reason of the low parasitemia found in our Trumpeter finch population as breeding density in our area can be high and pairs usually nest short distances apart (Cramp and Perrins, 1994; pers. obs.).

We suggest that, in order to discern between the hypotheses explaining absence of parasitemia in arid habitats, sampling for haematozoa of other species typical of this habitat is needed.

Since this is the first record of infection for Trumpeter finches, infected samples were deposited in the collection of the Museo Nacional de Ciencias Naturales (Madrid, Spain) (reference numbers MNCN 35.01/9 and MNCN 35.01/10).

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