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SEXUAL DIMORPHISM AND PARENTAL CARE IN THE YELLOW-WINGED BLACKBIRD (*AGELAIUS THILIUS*)

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Dimorfismo sexual y cuidado parental en el Varillero Ala Amarilla (*Agelaius thilius*).

Key words: Yellow-winged Blackbird, *Agelaius thilius*, sexual size dimorphism, parental care.

INTRODUCTION

Since the pioneering work of Darwin on sexual selection (1871), the traditional explanation for sexually dimorphic traits has been a bias in mating opportunities within and between sexes. Sexual monomorphism is thought to be associated with social monogamy and equally shared parental care by sexes, whereas dimorphism is related to polygynous or polyandrous mating systems and sexual division of parental roles (Lack 1968, Trivers 1972, Andersson 1994). Recently, this view has been enriched by information about the extent and frequency of extra pair copulations and the acknowledgment of frequent differences between social and genetic mating systems of the species (Birkhead & Møller 1992, Owens & Hartley 1998).

Yellow-winged Blackbirds (*Agelaius thilius*) are strongly sexually dichromatic. Males are lustrous black in color with contrasting yellow epaulets, while females are light brown, and their head, nape and back are streaked dark

brown or black. Their sexual dichromatism closely parallels that of Red-winged Blackbirds (*Agelaius phoeniceus*), a strongly polygynous marsh-nesting species, also dimorphic in size: males are 10% larger (tarsus) and 50% heavier (Beletsky 1996) than females. In this species, males show territorial behavior and reduced parental care, males may have multiple females nesting simultaneously in their territory (Searcy & Yasukawa 1995, Beletsky 1996). Given the external similarity in sexual chromatism and marsh-nesting habits, these two species might be expected to possess similar mating characteristics. Yet, the Yellow-winged Blackbird has been described as a size monomorphic (Webster 1992, but see Jaramillo & Burke 1999, and Montalti et al. 2004), strictly monogamous, and with somewhat female-biased food provisioning (Orians 1980).

Lanyon (1994) pointed out that the genus *Agelaius* is polyphyletic and a later work by Johnson & Lanyon (1999) showed that South American *Agelaius*, such as *A. thilius*, are not closely related to North American *Agelaius*,

TABLE 1. Sexual size dimorphism (mean \pm SE) and percentage of sexual dimorphism in a Yellow-winged Blackbirds (*Agelaius thilinus*) population near Otamendi, Buenos Aires province, Argentina.

	Males (N = 20)	Females (N = 16)	t-test <i>P</i>	Dimorphism (%)
Weight (g)	35.2 \pm 0.5	28.2 \pm 0.7	< 0.001	20
Wing (mm)	83.9 \pm 0.4	75.2 \pm 0.7	< 0.001	10
Tail (mm)	69 \pm 0.8	60.8 \pm 1.1	< 0.001	12
Tarsus (mm)	23 \pm 0.2	21.4 \pm 0.2	< 0.001	7
Exp. culmen (mm)	22.3 \pm 0.2	19.3 \pm 0.3	< 0.001	14
Bill height (mm)	7 \pm 0.1	6.4 \pm 0.1	< 0.001	8
Bill width (mm)	5.4 \pm 0.1	5 \pm 0.1	= 0.011	7

such as the Red-winged Blackbird. Based on their conclusion, a recent paper by Lowther et al. (2004) proposed to change Yellow-winged Blackbirds scientific name to *Agelasticus thilinus*. The phylogenetic distance between Yellow-winged Blackbirds and North American *Agelaius* would contribute to explain potential differences in the relationship between sexual dimorphism and mating systems in these icterids.

The objective of this paper is to investigate sexual size dimorphism in Yellow-winged Blackbirds and to characterize the amount and type of parental care provided by each sex.

METHODS

In October 1998, we mist-netted Yellow-winged Blackbirds (20 males, 16 females, sexed only by plumage) near Otamendi, Buenos Aires province, Argentina (34°15'S, 58°50'W). We measured their weight (50 g Pesola scale, \pm 0.5 g), flattened wing and tail length (\pm 1 mm), tarsus length and exposed culmen, bill width and depth (dial caliper, \pm 0.1 mm).

We collected data on parental care from early October to mid December 1998 near Santa Teresita, Buenos Aires province, Argentina (36°32'S, 56°55'W). The study site was a flat and marshy habitat, dominated by totoras (*Scirpus giganteus*) and scattered duraznillos

(*Solanum glaucophyllum*). Data were collected in a colony of 53 nests distributed in an area of approximately 150 x 20 m. The nest density of this colony was similar to that previously found for the species (Massoni & Reboresda 2001). Birds were not color-banded and, because of the nesting density, we could not ascertain the identity of the members of each pair. We refer to mated or single females and males only based on video evidence of nest attendance.

We filmed 20 nests when the nestling were 5 to 8 days old, during a total of 80 h. The recording sessions were from 07:00 to 11:00 h EST. We placed Sony Hi8 XR CCD-TR 940 video cameras within 2 to 3 m of the nests, as dense vegetation prevented from locating them further away. Every nest contained three chicks and no cases of brood reduction were observed during the study. Seven pairs never fed the chicks during the recording sessions, i.e., no data of parental care is provided for those nests. After a severe storm, three additional nests were attended only by males (probably widowers); two of them failed and no data of parental care are provided.

Morphometric data (mean \pm SE) were analyzed with a t-test, after checking for normality of the data. We measured, for each sex, the frequency of feeding, cleaning, and brooding visits to the nest. The contribution of males and females at nests attended by

TABLE 2. Mean number (\pm SE) of feedings, cleanings and broodings at nests attended by pairs of Yellow Winged Blackbird (*Agelaius thilius*) and at nests attended by single females near Santa Teresita, Buenos Aires province, Argentina.

	Mated females (N = 4)	Mated males (N = 4)	Single females (N = 6)	Female vs males (biparental care nests)	Single vs mated females
Feeding (h ⁻¹)	6.7 \pm 1.2	5.9 \pm 1.5	10.5 \pm 1.7	0.72	0.09
Cleaning (h ⁻¹)	2.3 \pm 1.1	2.5 \pm 0.9	5.5 \pm 0.9	1	0.09
Brooding (h ⁻¹)	1.1 \pm 0.7	0	0.1 \pm 0.1	—	0.29

*Wilcoxon matched-pair test.

**Mann-Whitney *U*-test for independent samples.

both sexes (N = 4) was compared with a Wilcoxon matched-pairs test while the parental effort made by single females (N = 6) was compared to the effort made by mated females using the Mann-Whitney *U*-test for independent samples (Zar 1996).

RESULTS

Male Yellow-winged Blackbirds are significantly heavier and bigger than females in all measurements, as revealed by the results of *t*-tests for independent samples. The extent of dimorphism ranged between 7% for tarsus and bill depth and 20% for weight (Table 1).

Males' and females' contributions to parental care in the nest, based on feeding and cleaning visits, were not different, according to the Wilcoxon matched-pair test (Table 2). Although they seemed to work more, single females did not contribute more parental care than mated females. The frequency of feeding and cleaning visits made by single females was nearly twice that of mated females, and yet, the difference was not significant (Table 2).

After a severe storm we found three nests whose nestlings were attended exclusively by males. Through focal observations we determined that one male was indeed alone, and the progress of its nest was followed until the three chicks successfully fledged. We could not ascertain whether the other two males

were widowed or the females were camera-shy. Their nests were depredated and data collected on them were not included in the comparisons.

DISCUSSION

Contrary to Orians (1980) who found that females made more than twice as many feeding visits as males, our results show no difference between male and female parental care. However, nest samples in this study and that of Orians (1980) were small, and the statistical power of parental care comparisons is necessarily low. Therefore, both results have to be considered with caution.

Mating systems are intimately bound to the type of parental care provided by each sex and monogamy is largely associated with equal provisioning of young (Lack 1968, Trivers 1972, Emlen & Oring 1977). Besides, Webster (1992) found that species showing stronger sexual dimorphism were more prone to a polygynous mating system. A clear example of this association is the monogamous Yellow-shouldered Blackbird (*Agelaius xanthomus*) whose males and females, indistinguishable in the field (Jaramillo & Burke 1999), equally share provisioning of young (Post 1981). The opposite example is the polygynous Red-winged Blackbird, sexually dimorphic in color and size and female biased

brood provisioning (Searcy & Yasukawa 1995, Beletsky 1996). In addition to being described as strictly monogamous, Yellow-winged Blackbirds were found nesting in relatively loose colonies with no signs of territoriality (Orians 1980). Instead, we found that this species nest in dense aggregations, up to five nests within a 5-m radius circle (Massoni & Reboreda 2001). Even though this aggregation was much denser than described by Orians (1980), we observed no territorial fights.

According to our data, Yellow-winged Blackbirds are quite size dimorphic. Males were 20% heavier than females, and morphometric characters of males were between 7 and 14% bigger than those of females. These results show a stronger size dimorphism than reported by Jaramillo & Burke (1999), and Montalti et al. (2004). The later authors found significant differences between males and females only in exposed culmen and tarsus, but not in wing chord and tail length. Although less dimorphic than redwings, all our Yellow-winged Blackbirds measurements were consistently and significantly larger in males. This, and their sexual dichromatism, would lead us to expect some level of social polygyny and asymmetric investment of males and females in brood provisioning. We found, however, that males and females seem to share equally their parental activities, with the exception of brooding. Our small sample size might have been too small to reveal potential differences between males and females. We found nests attended by single males, an event consistent with monogamy, but unlikely to occur in polygynous systems, but also nests attended by single females, as may be common in polygynous systems.

Detailed studies on banded individuals aimed to unveil their social and genetic mating system are badly needed to categorize this species. Until then, it continues to be a puzzle.

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