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BREEDING BEHAVIOUR OF THE LINED SEEDEATER (*SPOROPHILA LINEOLA*) IN SOUTHEASTERN BRAZIL

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Resumo. – Biologia reprodutiva do Bigodinho (*Sporophila lineola*) no sudeste do Brasil. – O Bigodinho (*Sporophila lineola*) é uma espécie migratória que habita áreas ricas em gramíneas da América do Sul. Aqui nós apresentamos a primeira descrição detalhada de sua biologia reprodutiva no sudeste do Brasil. Nós analisamos 63 ninhos ativos. A estação reprodutiva foi tardia se comparada com a maioria das aves do sudeste da América do Sul (Novembro a Abril). Os ninhos foram em forma de taça, sendo construídos com raízes de gramíneas que foram fixadas com teias de aranha. Os ovos foram brancos, com manchas e pequenas pintas marrons freqüentemente concentradas no pólo maior. Estes mediram 17.66 ± 0.99 mm de comprimento, 12.61 ± 0.57 mm de largura e pesaram 1.42 ± 0.20 g. O tamanho das ninhadas variou de dois a três ovos ou filhotes. Em alguns ninhos o período de incubação esteve entre os menores já documentados para aves neotropicais (10–12 dias). O período de permanência dos filhotes no ninho foi de 9-13 dias. Somente as fêmeas foram observadas incubando os ovos, tendo investido entre 5 e 60 min incubando por hora. Tanto os machos quanto as fêmeas alimentaram os filhotes. A taxa de sobrevivência dos ninhos durante o período de incubação foi de 70% e durante a fase de ninhegos foi de 56%. A taxa de sucesso geral foi de 40%. Alguns hábitos reprodutivos, como a falta de seletividade com relação às plantas suporte e o uso de raízes de gramíneas exóticas para a construção dos ninhos são características que tornam possível a reprodução desta espécie mesmo em ambientes alterados pelo homem. Por outro lado, novas pesquisas se fazem necessárias para determinar a razão de muitas outras espécies de *Sporophila* estarem desaparecendo de áreas antrópicas.

Abstract. – The Lined Seedeater (*Sporophila lineola*) is a migratory bird that inhabits grassy areas in South America. Here we present the first detailed description of its breeding behaviour in southeastern Brazil. We analyzed 63 active nests. Breeding season was late compared to most southeast South American birds (November to April). Nests were cups built of thin grass roots that were bound together using spider webs. Eggs were white, with light and dark brown spots and blotches that were often concentrated at the large end. They measured 17.66 ± 0.99 mm in length and 12.61 ± 0.57 mm in width, and weighted 1.42 ± 0.20 g. Clutch size varied from two to three eggs or young. In some nests, incubation periods were among the shortest ever documented for Neotropical birds (10–12 days). Nestling stage lasted 9–13 days. Only females were observed incubating the eggs, and they spent from 5 to 60 min incubating/hr. Both males and females fed the young. Nest survival during the incubation stage was 70% and during nestling stage it was 56%. Overall nesting success was 40%. Breeding habits, such as the lack of selectivity for nesting trees (many of which were exotic), and the use of exotic grasses in nest construction (mostly rootlets) are characteristics that allow this species to thrive in human-modified habitats. However, further research is urgently needed to determine why many other *Sporophila* species have been threatened by anthropogenic activities. *Accepted 2 May 2010*.

Key words*:* Lined Seedeater, *Sporophila lineola*, nesting behaviour, parental care, reproductive biology, South America.

INTRODUCTION

The small seed-eating birds of the genus *Sporophila* (Emberizidae) are characteristic elements of South American grassland habitats (Ridgely & Tudor 1994, Sick 1997, Silva 1999). Many of them are stem-gleaning specialists, and at least 18 of the approximately 30 species perform intermediate to long-distance movements accompanying grass phenology (Silva 1999).

The Lined Seedeater (*Sporophila lineola*) is a dichromatic migratory species that performs long distance movements. It inhabits shrubby clearings and other partially open grassy areas, especially near water (Schwartz 1975, Ridgely & Tudor 1994, Silva 1995). There are at least two populations that can be distinguished by voice: one that breeds in the Caatinga region of northeast Brazil between January and June, and migrates to the Llanos region (Venezuela) and Guyana; and another that breeds in southeastern Brazil, Paraguay, and Argentina between December and February, wintering in central and western Amazonia and possibly French Guyana (Silva 1995, Neto & Vasconcelos 2007, Areta & Almirón 2009). Like most seedeater species, the breeding biology of *S. lineola* is poorly documented. Descriptions of nests and eggs or young were provided by Nehrkorn (1899), Hartert & Venturi (1909), Dinelli (1924), Contino (1980), De La Peña (1981, 1996, 2005), Marcondes-Machado (1997), and Di Giácomo (2005). Contino (1980) and Marcondes-Machado (1997) also provided preliminary data on parental care. However, further details were not recorded.

Here we present the first detailed description of the breeding behaviour of *S. lineola*. Information on breeding seasonality, egg characteristics, length of incubation and nestling periods, parental activities, and nest success are reported for a São Paulo State population, southeast Brazil.

METHODS

Study areas. We conducted our study at two different sites of São Paulo state, southeastern Brazil. Study site 1 is composed by the campus of Sorocaba's Engineering University, Sorocaba (23°28'S, 47°25'W), and an adjacent urban park. The campus totals 10.5 ha and presents extensive lawns and gardens, where exotic trees (predominantly *Pinus* sp., *Eucalyptus* sp., *Mangifera* sp., and *Grevillea robusta*) are intercalated with native species typical of the Cerrado. Buildings and streets are widely spaced and cover about 30% of the area. The adjacent park is a 2 ha remaining patch of *sensu strictu* Cerrado habitat. These locations are traversed by two streams and form a patch of partially open vegetation isolated within a densely urbanized area. Study site 2 is an approximately 10 ha marsh fragment localized in the rural region of São Carlos (21°55'S, 47°55'W), where bushy vegetation and grasses predominate with a few scattered taller trees (> 8 m). In both areas, the climate is tropical, with two well-marked seasons: a humid, hot season from October through March (average rainfall 919 mm, and temperatures varying from 15.7 to 32.4ºC) and a dry, cold season from April through September (average rainfall 294 mm, and temperatures varying from 11.4 to 30.6ºC). In both study sites, exotic grass species (such as *Brachiaria* sp., *Panicum maximum*, and *Pennisetum purpureum*) are very common, and seeds are abundant during the wet season.

In area 1, we conducted nest searches systematically from October to May during three breeding seasons (2006/2007, 2007/2008 and 2008/2009). From October to November, the area was visited every day in order to detect the date of arrival of the first immigrants. Nests were searched twice a week by covering the whole area. They were located by following the adult birds in their territories, and they were checked every 1–3 days. In area 2, we performed nest searches during random visits from 1995 to 2008. We used metal calipers accurate to 0.01 mm to measure the nests and eggs, and a spring scale (accuracy 0.1 g) to weigh the eggs. Some nests were collected after we were certain that they would not be reused (i.e., when the female was building another nest) for counting and measuring nest materials.

We measured incubation period from the first day of incubation to the day before hatching. Since focal observations were performed daily during laying stage, we could detect females that began incubation before the set of eggs was complete. Nest contents were checked using a mirror. We never touched or handled the young to avoid any shortening of the nestling period.

To estimate the frequency at which adults brought materials to build the nests, the proportion of time females spent incubating the eggs, as well as the frequency of feeding visits during nestling period, we performed 1 h focal observation sessions every 1–3 days using 8 X 40 binoculars. These observations were always made early in the morning (06:00–09:00 h). Incubation and nestling stages were subdivided into three observation periods: early, middle, and late (Roper & Goldstein 1997), and time spent incubating and the numbers of feeding trips were compared among these periods using Kruskal-Wallis test (*H*). The number of times that female and male fed the young was compared using Mann-Whitney *U*-test (*U*). Statistical tests were performed using the software BioEstat 2.0 (Ayres *et al.* 2000). Descriptive statistics are presented as mean ± SD.

We assumed predation to have occurred when eggs or nestlings younger than fledging age disappeared from a nest (Pletschet & Kelly 1990). We estimated nesting success (probability of survival) for the whole nesting cycle and during incubation and nestling periods separately, using the method of Mayfield (1961). We used mean incubation and nestling period lengths as exponents to calculate the probability of nest success. Egg-laying stage was not considered.

RESULTS

We analyzed 63 active nests, 53 in area 1 and 10 in area 2. In area 1, where searches were performed systematically, we observed the first immigrants on 15 November (2006/2007 season), 19 November (2007/2008 season), and 7 November (2008/2009 season), and males were singing since their arrival. The earliest breeding activities were recorded on 20 December 2006 (incubation), 21 November 2007 (nest in construction), and 29 November 2008 (nest in construction), indicating that nesting activities can start as soon as they arrive in the breeding area. The latest nesting activities (the last young observed in a nest) were recorded on 31 January 2007, 14 April 2008, and 29 March 2009. Thus, breeding seasons ranged from December to January in 2006/2007 (N = 4 nests), from November to April in 2007/2008 (N = 20 nests), and from November to March in 2008/2009 (N = 29 nests). A peak of nesting activities was revealed in January (Fig. 1).

Nests were simple and delicate cups, without a substantial base or lining. They were built of thin grass roots (mostly *Brachiaria* sp.), palm fibers, pine needles, and other flexible vegetal fibers that were bound together using spider web, being yellowish or brown in color. Spider webs were also used to attach the nest borders to the supporting branches. Nest walls were very thin, and the eggs or young could be seen through them (Fig. 2). Nest measurements were: outside diameter 6.53 ± 0.70 cm (range = 5.10–7.82), inside diameter 4.88 ± 0.57 cm (range = 4.06–5.70), outside height 4.25 ± 0.62 cm (range = 3.16–5.24), inside height 3.36 ± 0.43 cm (range = 2.66–

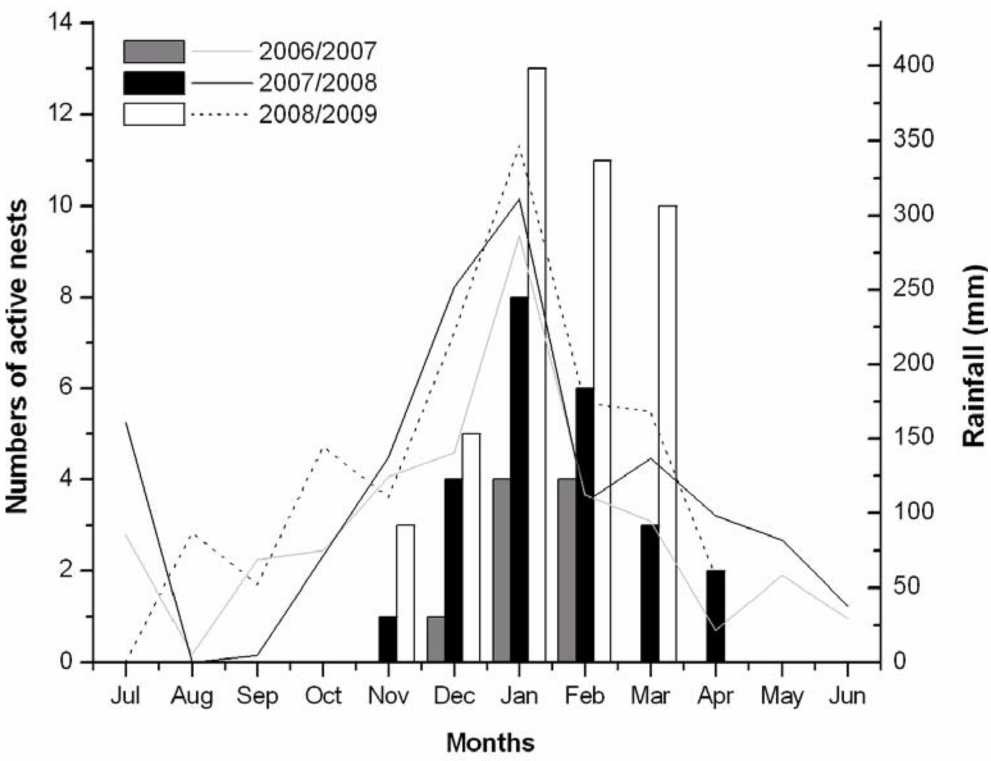

FIG. 1. Numbers of active nests (incubation and nestling stages) of Lined Seedeater (*Sporophila lineola*) and rainfall (mm) throughout three breeding seasons (2006/2007, 2007/2008 and 2008/2009) at Sorocaba, southeast Brazil.

4.24; N = 12), weight 1.9 ± 0.7 g (range = 1.1–3; N = 8) and height above ground 4.72 ± 2.50 m (range = 0.79–11; N = 44). The number of fibers found per nest varied from 119 to 450 (233 ± 117.2; N = 8 nests). Fibers measurements were: length 80.3 ± 47.7 mm (range = 4–272) and width 0.34 ± 0.15 mm (range = 0.1–0.9; N = 682 fibers from three nests). We have recorded 14 different plant species used for nest construction (N = 60 nests), of which 9 were exotic (*Pinus* sp. [N = 38], *Grevillea robusta* [N = 4], *Mangifera* sp. [N = 3], *Citrus* sp. [N = 2], *Litchi* sp. [N = 1], *Prunnus persica* [N = 1], *Punica granatum* [N = 1], *Eriobotrya japonica* [N = 3] *Tecoma stans* [N = 1]), and 5 native (*Gochnatia* sp. [N = 1], *Bauhinia variegata* [N = 2], *Erythroxylum deciduum* [N = 1], *Aspidosperma polyneuron* [N = 1], and *Psidium guajava* [N = 1]). Contino (1980) and Marcondes-Machado (1997) also reported nest construction in *Citrus* spp. plantations.

During 11 h of focal observation at nine different nests, only females participated in nest construction. They brought nest materials on average 5.27 ± 7.32 times/h (range = 0–25). Time gaps between visits were 4.83 ± 7.5 min long (range = 0.53–42.17; N = 49). We could observe that one nest was built in five days.

Eggs were white, with light and dark brown spots and blotches of variable sizes and shape that could be homogeneously distributed or, more frequently, concentrated at the large end (Fig. 2). In some of them, a few

FIG. 2. Nest and eggs of Lined Seedeater (*Sporophila lineola*).

dark brown stripes were also present. Egg measurements (N = 13, from six nests) were: length 17.66 ± 0.99 mm (range = 16.8–20.2); width 12.61 ± 0.57 mm (range = 11.90–14.0) and weight 1.4 ± 0.2 g (range = 1.2–2.0).

Clutch size varied from two (N = 32) to three (N = 10) eggs or young (2.24 ± 0.43). Eggs were invariably laid on consecutive days (N = 19 nests). In 17 nests, incubation started the morning the females laid the last egg, and in two nests it started one day before the egg set was complete. Incubation periods varied within and between nests (N = 13 nests). Within-nest variation was observed in four occasions: in two nests, young hatched after 10 and 11 days of incubation, and in two other nests hatching occurred after 11 and 12 days. For those nests in which within-nest variation was not observed, incubation periods were 10 (N = 2), 11 (N = 5) and 12 days (N = 2). Average incubation period was 10.97 ± 0.68 days (N = 29 eggs from 13 nests). In 57 h of focal observation at 17 different nests, only females were observed incubating. Males never seemed to feed females in the nests, but they usually escorted them during incubation recesses. During this stage, females spent 5–60 min incubating per h (44.38 ± 13.94 min). They left the nests 0–5 times per h (1.18 ± 1.0), and incubation recesses varied from 0.67–25.5 min (9.59 ± 6.73). Average time spent incubating did not vary among early (1^{st}–4^{th} day, N = 18 h at 13 different nests), middle (5^{th}–8^{th} day, N = 13 h at 14 different nests) and late (9^{th}–12^{th} day, N = 13 h at 14 different nests) incubation stages ($H = 0.39$, $P = 0.82$).

Hatching was not synchronous in six of 24 nests (five containing two eggs and one containing three eggs). At hatching, nestlings showed dark red skin and were covered with sparse dark gray down. The bill and swollen flanges were yellow and mouth lining was bright red. Nestling stage lasted 9 to 13 days (11.23 ± 1.18; N = 31 young from 14 different nests). In 46 h of observation at 13 nests, young were fed on average 7.22 ± 4.27 times/h (range = 1–19). Although both males and females fed the young, the participation of the females was significantly greater than that of males. Females fed the young on average 5.83 ± 3.47 times/h (range = 1–14), while males fed them on average 1.35 ± 1.64 times/h (range = 0–5) (U = 215, P = 0.000). The number of feeding trips increased significantly throughout the nestling period (H = 15.4, P = 0.0004) (Fig. 3). Both males and females were observed removing fecal sacs. Except for one nest, fledging was always synchronous (N = 14 nests). Young left the nests with poorly developed feathers and flying weakly. One nestling was infected by two botfly larvae, but it fledged successfully.

In two territories, females were observed incubating a set of eggs and feeding young of a previous brood at the same time, indicating that they can produce at least two broods at the same breeding season. However, of all the 63 nests observed only one was reused. Presumed immature males with female-like plumage were often observed singing and defending territories, and three of them were paired in nests that produced offspring.

Of 41 nests observed, 15 were preyed upon (36 %), one fell down after a heavy storm, and two were abandoned in incubation stage; hence, predation was the major cause of nest failure. Only two infertile eggs were observed, each in a different nest (both in nests containing three eggs). Nest survival during incubation stage was 70% (five predation events and two abandonments in 226 nest days, N = 25 nests) and during nestling stage 56% (nine predation events and one nest that fell down in 202 nest days, N = 24 nests). Overall nesting success, from incubation to fledging, was 40% (428 nest days, N = 33 nests).

DISCUSSION

We found that the breeding season of *S. lineola* in southeast Brazil ranged from middle November to middle April (a period of approximately five months), which is longer than previously believed (December to February; Ridgely & Tudor 1994, Silva 1995, Marcondes-Machado 1997, Sick 1997), probably because nests have not been systematically searched before our work. Similar nesting periods were found for the Double-collared Seedeater (*S. caerulescens*) in southeast Brazil (December to May) (Francisco 2006), and the Rusty-collared Seedeater (*S. collaris*) (November to April) and Tawny-bellied Seedeater (*S. hypoxantha*) (October to March) in Formosa Province, Argentina (Di Giácomo 2005). Potentially, the breeding season of *S. lineola* could be even longer in other regions. For example, in Paraguay this species can be recorded from August to May (Hayes *et al.* 1994), staying much longer in the breeding areas than our study population (November to April). However, detailed studies of reproductive activities are lacking in other parts of the breeding range. Our findings also corroborate the information that seedeaters start breeding two to three months later than most Passeriformes that nest in southeast Brazil (Sick 1997). While many other birds initiate breeding activities in the end of the dry season (September), members of *Sporophila* seem not to start before the arrival of heavy rains in November/December. Areta & Almirón (2009) also documented that the arrival of *S. lineola* in Misiones, Argentina, is late compared to other breeding immigrants. Our data also suggest that nesting activities and breeding season length can vary between years,

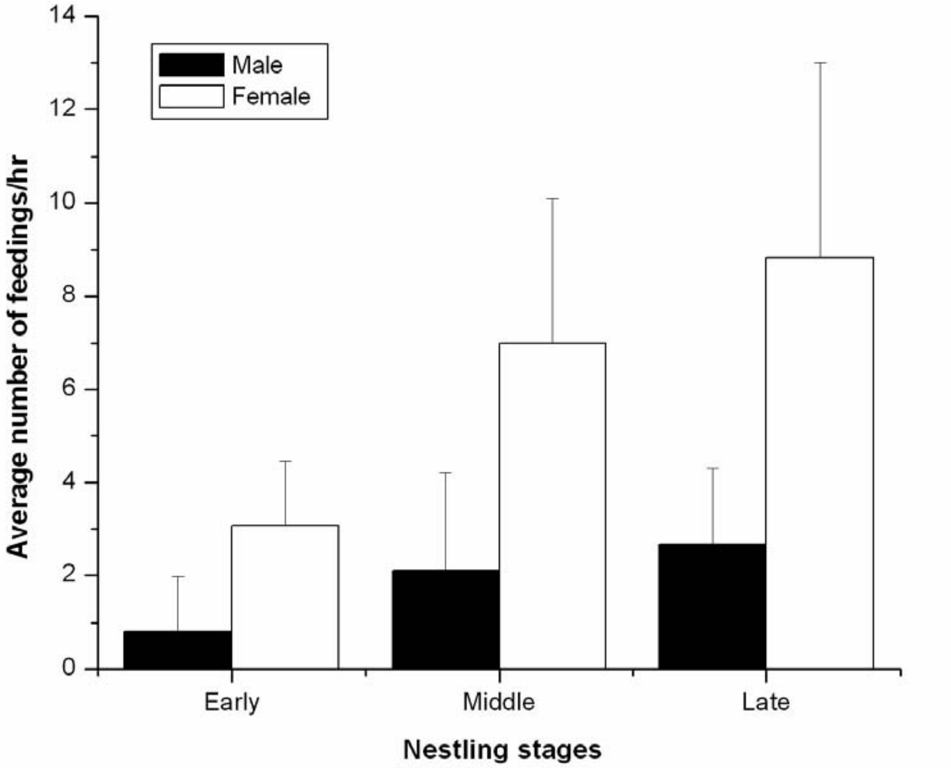

FIG. 3. Average number of feedings/hr in early (1st to 4th day, N = 16 h at 11 different nests), middle (5th to 8th day, N = 11 h at 9 different nests), and late (9th to 12th day, N = 6 h at five different nests) nestling stages in the Lined Seedeater (*Sporophila lineola*).

since in area 1 we found only four nests in 2006/2007 season while in the 2007/2008 and 2008/2009 seasons we found 20 and 29 nests, respectively. We suspect that rainfall can be a major factor leading to these between-year variations. Different studies have demonstrated that annual reproductive output and reproductive seasonality in birds can vary with rainfall, especially due to its correlation with food availability or nest predation rates (Wikelski *et al.* 2000, Morrison & Bolger 2002). Although we did not investigate how rainfall could affect specific parameters related to *S. lineola* reproductive investment (i.e. grass seeds availability), an evidence for this hypothesis is the fact that the 2006/2007 breeding season was much drier than the others, especially after February, when nesting activities seemed to be prematurely interrupted (see Fig. 1).

Nests of *Sporophila* are generally cup-shaped but can vary in many aspects. Like *S. lineola*, other species have been reported to use grass stems, rootlets, and spider web for nest construction (i.e., White-bellied Seedeater *S. leucoptera*, White-collared Seedeater *S. torqueola*, Yellow-bellied Seedeater *S. nigricollis*, *S. collaris*, *S. hypoxantha*, and *S. caerulescens*), although some of them often use additional specific materials (Alderton 1961, Oniki & Willis 1984, Eitniear 1997, Di Giácomo 2005; Francisco 2006, 2009). Thin nest walls that permit eggs or young be seen through them have also been described for *S. caerulescens*, *S. leucoptera*, and *S. nigricollis* (Alderton 1961, Oniki & Willis 1984; Francisco 2006, 2009), but they can be more compact in *S. collaris* and *S. hypoxantha* (Di Giácomo 2005). Regarding to nest placement, some of the better-studied species, such as *S. lineola*, *S. caerulescens*, *S. hypoxantha*, and *S. nigricollis* build their nests in a variety of semi-open habitats (including secondary areas, grasslands, orchards, and backyards) and are generalists in relation to nesting plants (Alderton 1961, Oniki & Willis 1984, Di Giácomo 2005; Francisco 2006, 2009). On the other hand, *S. leucoptera* and *S. collaris* build their nests exclusively in marshes, very close to water (Di Giácomo 2005, Francisco 2009). Indeed, all of 70 nests of *S. collaris* studied by Di Giácomo (2005) were placed in the same plant species (*Cyperus giganteus*). Eggs presenting spots and blotches, more often concentrated at the large end, seem to be the pattern of the group. However, spots and blotches density and color are variable within and between species. Similarly, egg background color varies from white to greenish or bluish green (Alderton 1961, Oniki & Willis 1984, Di Giácomo 2005; Francisco 2006, 2009).

Parental behaviour of *S. lineola* did not differ in relation to other seedeaters. In all species for which data are available, both males and females feed the young but only females incubate (Di Giácomo 2005, Facchinetti *et al.* 2008). Marcondes-Machado (1997) reported that males of *S. lineola* fed the young in only one of four nests analyzed. However, during the present study we observed that males, although at a lower rate, always fed the young. The same was observed for *S. caerulescens* (Francisco 2006), *S. collaris*, and *S. hypoxantha* (Facchinetti *et al.* 2008). Contino (1980) found that males of *S. lineola* fed the females at the nest during incubation in Argentina, but we have never observed it in our study population, suggesting that this behaviour can vary among populations.

Females and immature individuals of *Sporophila* are typically very similar and difficult to distinguish between each other (Ridgely & Tudor 1994, Sick 1997). Yet, female-like plumage retention by sexually mature males has been reported for several species. Delayed plumage maturation have been described for Ruddy-breasted Seedeater (*S. minuta*), Variable Seedeater (*S. aurita*), Dark-throated Seedeater (*S. ruficollis*), Marsh Seedeater (*S. palustris*), and *S. torqueola*, and confirmed cases of strict paedomorphosis (retention of female/immature-like plumage during the whole life) were documented for *S. ruficollis* and Temminck's Seedeater (*S. falcirostris*). Furthermore, at least one taxon, the Capped Seedeater (*S. bouvreuil crypta*), seems to have originated through paedomorphosis, suggesting that it can play a significant role in the evolution of this group of birds (for a review, see Areta 2009 and therein references). Here we reveal the first evidence of female-like plumage retention by *S. lineola*. Our observations of three female-like males paired in nests and sharing parental care with females indicate that they were sexually mature. Although we have not been able to distinguish between delayed plumage maturation and strict paedomorphosis, due to its potential evolutionary significance we suggest that this topic would be worth of investigation and could be accomplished with long-term studies of color-banded individuals.

Incubation and nestling periods of *S. lineola* were among the shortest of Neotropical birds. In the reviews provided by Geffen & Yom-Tov (2000) and Di Giácomo (2005) on the length of incubation periods of Neotropical passerines, only the eggs of Blue-black Grassquit (*Volatinia jacarina*), Red-winged Blackbird (*Agelaius phoeniceus*), Chestnut-capped Blackbird (*A. ruficapillus*), and *S. hypo-*

xantha hatched after 11 days of incubation (3.3% of 120 species analyzed), being the shortest incubation periods found in their surveys. Although the average incubation period of *S. lineola* is also 11 days, in four nests we observed eggs that hatched after an incubation period of only 10 days. Such a short incubation period is typical of northern temperate Passeriformes of the genera *Vermivora*, *Dendroica*, *Plectrophenax*, and *Carduelis* (Geffen & Yom-Tov 2000), and in the Neotropics it has been previously reported only for the Ruddy-quail Dove (*Geotrygon montana*) (Skutch 1945). Within the genus *Sporophila*, incubation periods of 11 days have also been reported for *S. caerulescens* (11–12 days; De La Peña 1996, Francisco 2006) and *S. ruficollis* (11–12 days; De La Peña 2005) while it was 12 days for *S. nigricollis*, Wing-barred Seedeater (*S. americana*) and *S. caerulescens*, 12–13 days for *S. collaris*, and 13 days for *S. torqueola* (Skutch 1945, Gross 1952, Alderton 1961, Ffrench 1965, Di Giácomo 2005, Francisco 2006) .

Although the length of nestling period has been more variable than the length of incubation stage (9–13 days; average = 11.3), in comparison it was relatively short. Of 123 Neotropical passerines surveyed by Geffen and Yom-Tov (2000) and Di Giácomo 2005, only 21 (17%) presented nestling periods varying from 9–11 days. Similar nestling periods were reported for *S. torqueola* (11 days), *S. nigricollis* (8–10 days), *S. americana* (11–13 days), *S. hypoxantha* (9–10 days) and *S. collaris* (9–12 days) (Skutch 1945, Gross 1952, Alderton 1961, Ffrench 1965, Di Giácomo 2005) while for *S. caerulescens* it was a little longer (12–15 days; Francisco 2006).

When compared with other seedeaters, *S. lineola* had on average larger clutch sizes. Two eggs or young seem to be the regular pattern in this genus. For instance, several authors have reported brood sizes as being two or less eggs or young for *S. nigricollis* (N = 9 nests; Alderton 1961, Ffrench 1965), *S. americana* (N = 15, Gross 1952), and *S caerulescens* (N = 41, Francisco 2006), while *S. lineola* often lays three eggs per clutch (24% of the nests). *S. torqueola* seem to be an exception to this rule, since Eitniear (1997) found clutches ranging from 3–4 (average = 3.5; N = 17 nests).

Predation was the major cause of nest failures, as found for many other open-cup nesting Neotropical birds (Oniki 1979, Martin *et al.* 2000, Mezquida & Marone 2002). Overall nest success (40%) was similar to that of other southeast South American passerines inhabiting open habitats, i.e., Fork-tailed Flycatcher (*Tyrannus savanna*) (46%), White-banded Tanager (*Neothraupis fasciata*) (38%), and *S. caerulescens* (36%) (Alves & Cavalcanti 1990, Francisco 2006, Marini *et al.* 2009). The predation rate was higher during nestling stage, which can be related to the greater number of parental visits in this stage (Skutch 1949, 1985) and/or predator attractiveness by begging calls (Haskell 1994, 1999), since 7–8 days old nestlings were audible from about 15 m. A similar result was found for *S. caerulescens* (Francisco 2006).

Due to their melodious songs and beautiful plumages, seedeaters are popular cage birds in many regions of South America. As a result of intense commercial trapping and loss of habitats many species have been locally extirpated, and some are severely threatened (Collar *et al.* 1992, Ridgely & Tudor 1994, Silva 1999). On the other hand, the growing rates of conversion of forested areas into pastures in South America may favor some open habitat grass-dependent species. The range expansion of *S. caerulescens* has been well documented (Sick 1997), and recently, Areta & Almirón (2009) observed a group of *S. lineola* feeding and defending territories in an area previously covered by Atlantic Forest in Argentina, suggesting that this species also could expand its distribution with habitat disturbance. Breeding habits, such as the lack of selectivity for nesting trees (many of which are exotic) and the use of exotic grasses for nest construction (mostly rootlets) may be prerequisites that can thrive this species into human-made habitats. However, further research is urgently needed to determine why many other *Sporophila* species have been severely affected by anthropogenic activities.

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