

NATURAL HISTORY NOTES ON THE PALE-THROATED SERRA-FINCH (*EMBERNAGRA LONGICAUDA*) IN EASTERN BRAZIL

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Resumo. – **Notas de história natural sobre o Tibirro-rupestre (*Embernagra longicauda*) no leste do Brasil.** – O Tibirro-rupestre (*Embernagra longicauda*) é restrito às serras e chapadas do leste do Brasil e quase nada se conhece sobre sua história de vida. Nós apresentamos, pela primeira vez, descrições detalhadas de seu ninho, ovos, ninhegos, dieta, padrão de muda, massa corporal e habitat. O ninho é um cesto grande apoiado pela base e construído principalmente com folhas e colmos de capins. A espécie é onívora, sendo sua dieta composta predominantemente por artrópodes e frutos carnosos, com menor representatividade de sementes secas. Uma muda completa ocorre entre março–abril, após o período reprodutivo. Com relação a seu estado de conservação, o Tibirro-rupestre pode ser classificado como fora de risco.

Abstract. – The Pale-throated Serra-finch (*Embernagra longicauda*) is restricted to the mountains and plateaus of eastern Brazil and almost nothing is known about its life history. Here, we present for the first time detailed descriptions of its nest, eggs, nestlings, diet, molt pattern, body mass, and habitat. The nest is a large cup supported from its bottom and constructed mainly with grass culms and leaves. The species is omnivorous, its diet is composed predominantly of arthropods and fleshy fruits, with a small component of dry seeds. A complete molt occurs during March–April, after the reproductive season. The conservation status of the Pale-throated Serra-finch may be classified as lower risk – least concern. *Accepted 27 October 2009.*

Key words: *Embernagra longicauda*, Pale-throated Serra-finch, nest, egg, molt, diet, body mass, Brazil.

INTRODUCTION

The Pale-throated Serra-finch (*Embernagra longicauda*) was described based on two specimens from South America (unspecified locality) (Strickland 1844, Benson 1999), and was only rediscovered more than one century later (O'Brien 1968). Subsequently, several authors found this species to be surprisingly common in the state of Minas Gerais, southeastern Brazil, particularly in

the mountain tops of the Espinhaço Range (Carnevali 1982, Mattos & Sick 1985). Further studies also revealed isolated populations along the Rio Doce river basin (Machado *et al.* 1998, Vasconcelos 2000, Alves *et al.* 2009) and in the Serra do Caparaó highlands (Vasconcelos 2003, 2008, Vasconcelos *et al.* 2003).

The biology of the Pale-throated Serra-finch is still poorly known, and just some anecdotal information on its habitat (Mattos

& Sick 1985, Vasconcelos 2000, 2001) and behavior (Freitas & Rodrigues 2008) were already reported. Also, a brief nest description (Mattos & Sick 1985) and nestling and juvenile descriptions (Vasconcelos & Silva 2003, Freitas *et al.* 2009) were published. Aiming to fill this gap, we present, for the first time, a detailed description of nests, eggs, nestlings, diet, molt, and body mass of the Pale-throated Serra-finch, also presenting some information on habitat use and conservation of this species.

STUDY SITES AND METHODS

Field observations were conducted principally in the Serra do Rola Moça State Park (hereafter PESRM), municipality of Nova Lima, Minas Gerais, southeastern Brazil (20°03'S, 44°00'W, between 1300 and 1500 m a.s.l.). The PESRM harbors an area of almost 4000 ha in the transition zone between the Cerrado and the Atlantic forest. The sampled site is composed by a peculiar kind of vegetation growing over iron ore rich soils, locally known as “canga”, which can be subdivided in two types (Rizzini 1997, Vincent 2004): 1) “canga couraçada”, restricted to the mountain tops, is a continuous and compact layer of iron ore, partially covered by rupestrian herbs and shrubs. This vegetation is especially rich in Velloziaceae, terrestrial Bromeliaceae and Orchidaceae; 2) “canga nodular”, occurs on the mountain slopes, where the iron ore outcrop is very fragmented, and grasses dominate the landscape, with only small shrubs, especially “canelas-de-ema” (*Vellozia* spp., Velloziaceae).

Climate is highly seasonal, receiving around 1350 and 1700 mm of annual rains, mainly restricted between November and March. Winter is exceptionally dry. Mean temperatures range from 9–37°C (Mutuca and Catarina Meteorological Stations, unpubl.).

Fieldwork in PESRM was non-systematic and conducted during a study of the biology of the Gray-backed Tachuri (*Polystictus superciliaris*) (Hoffmann 2006, Hoffmann *et al.* 2007). Aiming to precise the reproductive period of the Pale-throated Serra-finch, we closely inspected 46 skins of this species collected in the state of Minas Gerais and housed in the ornithological collection of the Department of Zoology of the Universidade Federal de Minas Gerais (DZUFMG), Belo Horizonte, Brazil, looking for molt and gonad conditions. Although limited, this is by far the largest series of this species in the world.

We analyzed the stomach contents of 20 specimens collected in Minas Gerais and from which their carcasses have been preserved in alcohol. Eighteen specimens are housed in DZUFMG and two, in the Museu de História Natural de Taubaté (MHNT), Taubaté, Brazil. Methods used for stomach contents examination follow Lopes *et al.* (2005a). Foraging behavior is described from non systematic, qualitative field observations. Additional field observations were also conducted in other mountains and plateaus along Espinhaço Range (states of Minas Gerais and Bahia) and in the Serra do Caparaó (in the boundaries of the states of Espírito Santo and Minas Gerais).

RESULTS

Nests, eggs, and nestlings. The Pale-throated Serra-finch becomes very secretive when breeding and activities, such as nest construction and rearing youngs are generally not performed in the presence of an observer. It is common to observe adult birds carrying food or nest material on its bill for long periods after what birds leave it on the ground without feeding the young or constructing their nest. This kind of behavior turns nest location a difficult task.

We found two nests with nestlings and one with eggs in PESRM. All nests were large cups supported from its bottom and structurally very simple. The external surface was composed by thicker leaves of grasses, while the inner chamber was represented by thinner culms of grasses. Nests were not lined or ornated on its exterior by any material.

Nest # 1 was found on 19 November 2005, and was constructed in a small shrub, in the transitional zone between the “canga nodular” and the “canga couraçada”. The nest was 60 cm above ground, measuring (in mm): external diameter 130, internal diameter 95, height 100, and depth 65. This nest harbored two nestlings covered with long, grayish downy plumage and with closed eyes. They were highly parasitized by botfly larvae, and about 90 flies emerged from the nest after its collection. In spite of an average of 45 larvae per nestling, they successfully left the nest on 1 December 2005.

Nest # 2 was found on 2 December 2005, constructed well hidden in a grass bush, in the “canga nodular”. The nest was 30 cm above ground, measuring: 145, 82, 90, and 63 (in the same order as above). It was constructed mainly with culms and entire leaves of *Paspalum scalare* (Poaceae), one of the commonest grasses in the study area. The nest harbored two nestlings with opened eyes, completely covered with pin feathers on back (Fig. 1). These nestlings left the nest on 7 December 2005.

Nest # 3 was found on 18 November 2008, c. 50 cm above ground, among branches of a shrub of *Mimosa calodendron* (Leguminosae) in the “canga couraçada”. This nest could not be measured but it contained two eggs measuring (in mm): 25.0 x 18.9 and 25.6 x 18.9. These eggs were clear pinkish with blotches varying between dark and clear reddish-brown with sparse black blotches, heaviest around their larger ends (Fig. 2). This

nest was found damaged without eggs on 25 November 2008.

In addition to the nests found, we obtained breeding records for five other pairs in the PESRM: 1) adult carrying food on its bill on 21 and 24 October 2005. On 1 December 2005, probably the same individual was observed feeding two juveniles; 2) adult carrying food on its bill on 26 October 2005; 3) adult carrying nest material on 27 October 2005; 4) adult carrying nest material on several occasions between 19 November and 2 and 5 December 2005; 5) adult feeding juvenile on 19 December 2005; 6) adult vocalizing nearby a juvenile on 25 December 2008.

A juvenile (DZUFMG 3326) was also collected at Campina do Bananal (16°51'S, 43°02'W), municipality of Botumirim, on 25 January 2002. Two females (DZUFMG 4590 and 4591) collected in Serra do Mascate (20°27'S, 43°55'W), municipality of Congonhas, on 14 November 2005, and two females (DZUFMG 5157 and 5158) collected in Retiro das Pedras (20°05'S, 43°59'W), municipality of Nova Lima, on 13 January 2006, presented brood patches. Annual variation in testicle size of 24 males deposited in DZUFMG indicates that breeding starts in September, extending until February–March (Fig. 3).

Diet. The Pale-throated Serra-finch hops on the ground gleaning its prey from substrate. It also explores small shrubs, gleaning fruits and arthropods from leaves and twigs. Higher perches (above 2 m) are generally used only for singing. This species is omnivorous, ingesting mainly arthropods and fleshy fruits, with a small component of dry seeds (Fig. 4). Formicidae, Isoptera, and Coleoptera were commonly ingested, corresponding to 96% of the arthropods consumed. Arthropods size ranged between 2–35 mm, but were generally below 15 mm. Melastomataceae and Solanaceae were the most commonly fleshy fruits



FIG. 1. Nest # 2 of Pale-throated Serra-finch (*Embernagra longicauda*) with two nestlings with opened eyes and fairly developed plumage.

ingested (Fig. 4), with seeds generally measuring below 2.5 mm.

During our non-systematic field observations, we recorded the Pale-throated Serra-finch ingesting seeds with aril of *Clusia arrudae* (Clusiaceae), pulp of *Myrcia* sp. (Myrtaceae), *Leandra australis*, and *Miconia* sp. (Melastomataceae), and seeds of *Sebastiania hispida* (Euphorbiaceae). Despite the relatively small size of the fruits of *L. australis* (8 mm diameter) and *Myrcia* sp. (9 x 5 mm), these fruits were mandibulated and only the fruit pulp was ingested. The peel of *L. australis* and the seeds of *Myrcia* sp. were discarded. The green-

ish fruits of *S. hispida* were also mandibulated and only the seeds were ingested.

Molt. A complete molt occurs during March–April, after the end of the breeding season. Molt begins with the contour feathers, ending with the flight ones. Fresh plumage birds are normally observed between April–July, after what clear signs of wearing out could be easily detected. After September, with the beginning of the reproductive season, a quickly plumage wearing out could be observed. Plumages of specimens from January to March are generally in deplorable conditions.



FIG. 2. Nest # 3 of Pale-throated Serra-finch (*Embernagra longicauda*) with two eggs (in detail in right bottom).

Body mass. Labels of specimens deposited in DZUFMG indicate a mean body mass of 41.3 ± 3.0 g (range 37.5–46.0, $n = 14$) for adult males and of 39.4 ± 3.6 SD (range between 35.0–45.0, $n = 7$) for adult females.

Habitat. The Pale-throated Serra-finch uses a large variety of habitats. In the Espinhaço Range, this species inhabits the “campos rupestres” (quartzite or iron ore rock outcrops covered with rupestrine herbs and shrubs, rich in endemic species, see Giulietti *et al.* 1997). In the Serra do Caparaó ($20^{\circ}25'S$, $41^{\circ}48'W$) it inhabits the “campos de altitude” (granite and gneiss rock outcrops covered by herbs and grasses, generally with *Chusquea* bamboo stands). In plateaus of northeastern

Minas Gerais (along the Jequitinhonha river basin) and southern Bahia, in Caetité region ($14^{\circ}19'S$, $42^{\circ}32'W$), it was observed in a kind of open and dry shrubby “cerrado” vegetation, locally known as “gerais”, with several scattered dwarf palms. Altitudinal range of this species is between 760 m a.s.l., in the Fazenda Bocaina ($19^{\circ}59'S$, $43^{\circ}28'W$), and 2400 m a.s.l. in the Serra do Caparaó.

DISCUSSION

Nests, eggs, and nestlings. Mattos & Sick (1985) described the nest of the Pale-throated Serra-finch as a cup (“meia tigela”), where two chicks are reared. Although very simple, this description is in accordingly to our findings.

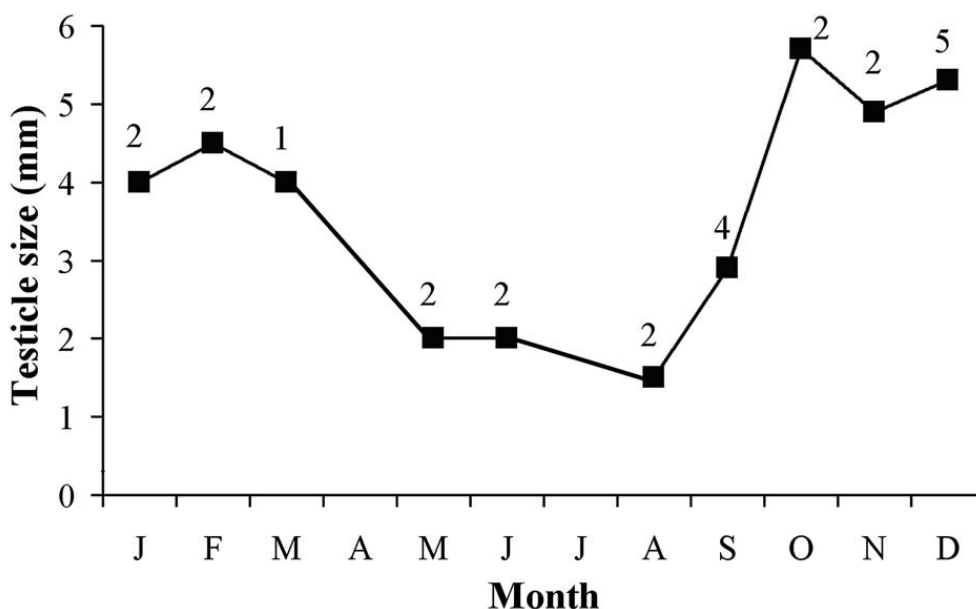


FIG. 3. Annual variation in mean testicle size of Pale-throated Serra-finch (*Embernagra longicauda*) inferred from labels of 24 adult males collected in the state of Minas Gerais and deposited in DZUFMG. Numbers indicate sample sizes.

Nests of the Pale-throated Serra-finch can be classified as low cup/base, following the classification of Simon & Pacheco (2005). The nests we found were also very similar to those of the Great Pampa-finch (*Embernagra platenisi*) described by de la Peña (1987), including nest material, shape, size, and supporting (see also photographs of nests of the Great Pampa-finch depicted in Azpiroz [2003] and Buzzetti & Silva [2005]). Similar descriptions of the nest of the Great Pampa-finch were also mentioned by Ihering (1900) and Euler (1900), but bird's identification was questioned by the authors.

Eggs of the Pale-throated Serra-finch are similar to those of the Great Pampa-finch as described elsewhere (Smyth 1928, de la Peña 1987, Buzzetti & Silva 2005). Although we only recorded a clutch size of two eggs, clutches of three (de la Peña 1987, Buzzetti & Silva 2005) or four (Azpiroz 2003) eggs may

occur, as observed for the Great Pampa-finch.

Nests are also similar, although larger, than those of the Wedge-tailed Grass Finch (*Emberizoides herbicola*) (Ihering 1902) and the Lesser Grass Finch (*E. ypiranganus*) (Di Giacomo 1998), probably a genus closely related to *Embernagra* (Eisenmann & Short 1982). In addition, juveniles of *Embernagra* resemble adults of *Emberizoides* (Eisenmann & Short 1982, Vasconcelos & Silva 2003, Freitas *et al.* 2009).

Reproduction of the Pale-throated Serra-finch during the last and first months of the year (rainy season) was also reported by others (Mattos & Sick 1985, Freitas & Rodrigues 2008, Freitas *et al.* 2009). Juveniles were also observed between December–January in the Serra do Cipó National Park (19°15'S, 43°31'W), Minas Gerais state (Freitas & Rodrigues 2008, Freitas *et al.* 2009). These

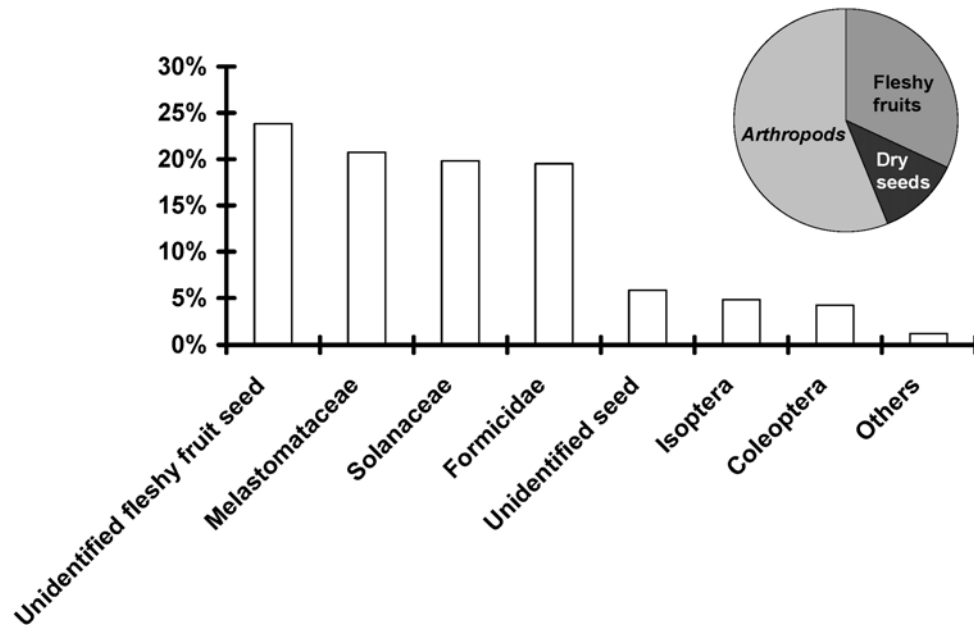


FIG. 4. Diet of the Pale-throated Serra-finch (*Embernagra longicauda*). Data from 20 stomach contents of specimens collected in Minas Gerais state, Brazil, and deposited in DZUFMG and MHNT. Histogram represents the percentage of food items (n = 914). Circle represents volume (%) of food items in the diet.

authors also captured females holding brood patches in November–December (Freitas *et al.* 2009).

Botfly larvae parasitism is a common problem faced by Neotropical birds (Couri 1999, Teixeira 1999). In central Brazilian Cerrado, the very low reproductive success experienced by the Chapada Flycatcher (*Suiriri islerorum*) may be in part attributable to botfly larvae parasitism (Lopes & Marini 2005). Nestlings of the Chapada Flycatcher parasitized with about 40 larvae died, and the same fate was experienced by nestlings of the Southern Scrub-flycatcher (*Sublegatus modestus*) parasitized with 55 larvae (Lopes & Marini 2005). Similarly, in the study area, the Gray-backed Tachuri (*Polystictus superciliosus*) also experienced losses due to this kind of parasitism (Hoffmann 2006). On the other hand, nests of the Campo Suiriri (*Suiriri affinis*) parasitized with a mean of 24 larvae per nest-

ling experienced no loss (Lopes & Marini 2005). The survivorship of highly infested nestlings of the Pale-throated Serra-finch may be in part attributable to its larger size in comparison to the Tyrannidae species mentioned above (the largest Tyrannidae species cited is the Campo Suiriri with c. 22 g). Pale-throated Serra-finch was also recorded as host of the Ixodid tick *Amblyomma cajennense* (Rojas *et al.* 1999), but the data is too anecdotal to allow any conclusion about the impact of this kind of parasitism.

Diet. Freitas & Rodrigues (2008) mentioned insects, fruits, and flowers as food items of the Pale-throated Serra-finch. The high consumption of Formicidae and Coleoptera is a common pattern among Neotropical birds, but the consumption of Isoptera is generally low (Schubart *et al.* 1965, Poulin *et al.* 1994, Lopes *et al.* 2005a). The high incidence of

Isoptera in our sample was highly biased by the ingestion of 39 termites by a single individual. Melastomaceae fruits are of outstanding importance for frugivorous birds in the Neotropics (Snow 1981), and although not so commonly eaten, Solanaceae fruits were also recorded in the diet of the Great Pampa-finch (Beltzer 1990).

The diet of the Pale-throated Serra-finch presented marked differences when compared with the diet of the Great Pampa-finch. While dry seeds are an important item in the diet of the Great Pampa-finch (Beltzer 1990, Montalti *et al.* 2005), arthropods and fleshy fruits represent the bulk of the Pale-throated Serra-finch diet.

Although small vertebrates seems to be at least occasionally eaten by the Great Pampa-finch, with records of predation on fishes, frogs, and lizards (Zotta 1940, Schubart *et al.* 1965, Beltzer 1990) we found no evidences of vertebrate predation by the Pale-throated Serra-finch. In a recent review, Lopes *et al.* (2005b), found that predation on vertebrates by Neotropical passerines is an uncommon event, especially in the family Emberizidae, for which they recorded only two other species preying on vertebrates.

Molt. The molt pattern of the Pale-throated Serra-finch from the Espinhaço Range is according to that observed in south-central Brazil (Piratelli *et al.* 2000, Marini & Durães 2001), with a peak in February–March, also coinciding with the end of the breeding season.

Body mass. This study presents the first published record of body mass for the Pale-throated Serra-finch (see Oniki 1980, Cavalcanti & Marini 1993, Marini *et al.* 1997, Dunning 2007, Faria & Paula 2008). The Pale-throated Serra-finch is lighter than the Great Pampa-finch, but heavier than grass finches of the genus *Emberizoides* (Dunning 2007).

Habitat. Ridgely & Tudor (1989) described the habitat of this species as “dry savannas and fields with scattered palms and ground bromeliads, mainly in high plateau country and *serras*”. Previously published papers (Carnevali 1982, Mattos & Sick 1985, Vasconcelos *et al.* 1999) and our own field observations revealed that this species is more commonly associated with rock outcrops in the “campos rupestres”. Nevertheless, in northeastern Minas Gerais and in southern Bahia this species was recorded in dry savannas with no rock outcrops (“gerais”). Ridgely & Tudor (1989) and Stotz *et al.* (1996) mentioned altitudinal limits of the Pale-throated Serra-finch as between 700–1300 m a.s.l. This upper altitudinal limit is much lower than the 2000–2400 m a.s.l. recorded in the Serra do Caraça (Vasconcelos 2001, Vasconcelos & Melo-Júnior 2001) and Serra do Caparaó (Vasconcelos 2003, Vasconcelos *et al.* 2003). We have never recorded this species below 760 m a.s.l. (see Vasconcelos 2000).

According to Willis & Oniki (1991), the Pale-throated Serra-finch “is replaced at higher elevations eastward (Serra do Caparaó) and southward (Itatiaia) by larger *E. platensis*”. Sick (1997) also mentioned that the replacement of the Great Pampa-finch by the Pale-throated Serra-finch at higher altitudes along the Espinhaço Range represents a competitive exclusion between two sibling species. Our field experience and the available literature (Carnevali 1982, Mattos & Sick 1985, Beltzer 1990, Willis & Oniki 1991, Machado *et al.* 1998, Vasconcelos 2000, 2001, 2003, Montalti *et al.* 2005) do not support this hypothesis. The Great Pampa-finch is a species closely tied to marshes, while the Pale-throated Serra-finch is restricted to dry and rocky habitats.

Conservation. The Pale-throated Serra-finch is locally very common along the Espinhaço Range, and a conservative estimate of its

range covers an area of c. 200,000 km². This species seems to be tolerant to habitat disturbance, existing evidences that it is expanding its range in deforested areas (Machado *et al.* 1998, Vasconcelos 2000). Furthermore, there are records of this species in several conservation units, such as: Chapada Diamantina, Serra do Cipó, and Serra do Caparaó National Parks; Morro do Chapéu, Grão Mogol, Serra do Cabral, Pico do Itambé, Rio Preto, Serra do Rola Moça, and Itacolomi State Parks; Mangabeiras and Paredão da Serra do Curral Municipal Parks; and Caraça Private Reserve (Machado *et al.* 1998, Vasconcelos 2001, 2009, Vasconcelos *et al.* 2003). This reinforces the IUCN status “lower risk - least concern,” previously proposed by Machado *et al.* (1998).

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REFERENCES

- Alves, A. C. F., M. F. Vasconcelos, & A. Loures-Ribeiro. 2009. Novo registro de *Embernagra longicauda* na Serra do Jacroá, leste de Minas Gerais, reforça a hipótese de conexões paleoecológicas entre as montanhas do sudeste do Brasil. *Atual. Ornitol.* 148: 10–11.
- Azpiroz, A. B. 2003. Aves del Uruguay: lista e introducción a su biología y conservación. Aves Uruguay - GUPECA, Montevideo, Uruguay.
- Beltzer, A. H. 1990. Biología alimentaria del Verdon Comun *Embernagra platensis* (Aves: Emberizidae) en el valle aluvial del río Paraná medio, Argentina. *Ornitol. Neotrop.* 1: 25–30.
- Benson, C. W. 1999. Type specimens of bird skins in the University Museum of Zoology, Cambridge, United Kingdom. Occasional Publication, No. 4, British Ornithologists’ Club, Tring, UK.
- Buzzetti, D., & S. Silva. 2005. Berços da vida: ninhos de aves brasileiras. Terceiro Nome, São Paulo, Brazil.
- Carnevali, N. 1982. *Embernagra longicauda* Strikiland [sic], 1844; sua ocorrência em Minas Gerais - Brasil (Aves, Fringillidae). *Lundiana* 2: 85–88.
- Cavalcanti, R. B., & M. Á. Marini. 1993. Body masses of birds of the Cerrado region, Brazil. *Bull. Br. Ornithol. Club* 113: 209–212.
- Couri, M. S. 1999. Myiasis caused by obligatory parasites. Ia. *Philornis* Meinert (Muscidae). Pp. 51–70 in Guimarães, J. H., & N. Papavero (eds.). Myiasis in man and animals in the Neotropical Region - Bibliographic Database. Editora Plêiade, São Paulo, Brazil.
- de la Peña, M. R. 1987. Nidos y huevos de las aves Argentinas. Santa Fe, Argentina.
- Di Giacomo, A. G. 1998. Descripción del nido y huevos de *Emberizoides ypirangus*, y presencia de la especie en Formosa, Argentina. *Hornero* 15: 51–52.
- Dunning, J. B., Jr. 2007. CRC Handbook of avian body masses. 2nd ed. CRC Press, Boca Raton, Florida.
- Eisenmann, E., & L. L. Short. 1982. Systematics of the avian genus *Emberizoides* (Emberizidae). *Amer. Mus. Novit.* 2740: 1–21.
- Euler, C. 1900. Descrição de ninhos e ovos das aves do Brasil. *Rev. Mus. Paulista* 4: 9–148.
- Faria, I. P., & W. S. Paula. 2008. Body masses of birds from Atlantic forest region, southeastern Brazil. *Ornitol. Neotrop.* 19: 599–606.
- Freitas, G. H. S., & M. Rodrigues. 2008. Canário-rabudo *Embernagra longicauda*: uma ave típica das montanhas do leste do Brasil. *Atual. Ornitol.* 141: 20–21.

- Freitas, G. H. S., M. F. Vasconcelos, & M. Rodrigues. 2009. Aspectos reprodutivos e comentários adicionais sobre o jovem do rabo-mole-da-serra (*Embernagra longicauda*) na Serra do Cipó, Minas Gerais. *Atual. Ornitol.* 147: 8–9.
- Giulietti, A. M., J. R. Pirani, & R. M. Harley. 1997. Espinhaço Range region, eastern Brazil. Pp. 397–404 in Davis, S. D., V. H. Heywood, O. Herrera-MacBryde, J. Villa-Lobos, & A. C. Hamilton (eds.). *Centres of plant diversity: a guide and strategy for their conservation*. Volume 3. Information Press, Oxford, UK.
- Hoffmann, D. 2006. Forrageamento, dieta, área de vida, biologia reprodutiva e sucesso reprodutivo de *Polystictus superciliaris* Wied, 1831 [sic] (Aves, Tyrannidae) no sudeste do Brasil. M.Sc. thesis, Univ. Federal de Minas Gerais, Belo Horizonte, Brazil.
- Hoffmann, D., M. F. Vasconcelos, L. E. Lopes, & M. Rodrigues. 2007. Comportamento de forrageamento e dieta de *Polystictus superciliaris* (Aves, Tyrannidae) no sudeste do Brasil. *Iheringia Sér. Zool.* 97: 296–300.
- Ihering, H. 1900. Catálogo crítico-comparativo dos ninhos e ovos das aves do Brasil. *Rev. Mus. Paulista* 4: 191–300.
- Ihering, H. 1902. Contribuição para o conhecimento da Ornithologia de São Paulo. *Rev. Mus. Paulista* 5: 261–303.
- Lopes, L. E., & M. Â. Marini. 2005. Low reproductive success of Campo Suiriri (*Suiriri affinis*) and Chapada Flycatcher (*S. islerorum*) in the central Brazilian Cerrado. *Bird Conserv. Int.* 15: 337–346.
- Lopes, L. E., A. M. Fernandes, & M. Â. Marini. 2005a. Diet of some Atlantic forest birds. *Rev. Bras. Ornitol.* 13: 95–103.
- Lopes, L. E., A. M. Fernandes, & M. Â. Marini. 2005b. Predation on vertebrates by Neotropical passerine birds. *Lundiana* 6: 57–66.
- Machado, R. B., S. E. Rigueira, & L. V. Lins. 1998. Expansão geográfica do canário-rabudo (*Embernagra longicauda* - Aves, Emberizidae) em Minas Gerais. *Ararajuba* 6: 42–45.
- Marini, M. Â., & R. Durães. 2001. Annual pattern of molt and reproductive activity of passerines in south-central Brazil. *Condor* 115: 767–775.
- Marini, M. Â., J. C. Motta-Júnior, L. A. S. Vasconcelos, & R. B. Cavalcanti. 1997. Avian body masses from the Cerrado region of Central Brazil. *Ornitol. Neotrop.* 8: 93–99.
- Mattos, G. T., & H. Sick. 1985. Sobre a distribuição e a ecologia de duas espécies crípticas: *Embernagra longicauda* Strickland, 1844, e *Embernagra plantesis*, (Gmelin, 1789). *Emberizidae*, Aves. *Rev. Bras. Biol.* 45: 201–206.
- Montalti, D., L. M. Ferman, A. R. Camperi, G. E. Soave, A. M. Arambarri, & C. A. Darrieu. 2005. Winter diet of Great Pampa-finches *Embernagra platensis* in Guaminí Lagoon, Argentina. *Acta Ornithol.* 40: 79–82.
- O'Brien, C. E. 1968. Rediscovery of *Embernagra longicauda* Strickland. *Auk* 85: 323.
- Oniki, Y. 1980. Weights and cloacal temperatures of some birds of Minas Gerais, Brazil. *Rev. Bras. Biol.* 40: 1–4.
- Piratelli, A. J., M. A. C. Siqueira, & L. O. Marcondes-Machado. 2000. Reprodução e muda de penas em aves de sub-bosque na região leste do Mato Grosso do Sul. *Ararajuba* 8: 99–107.
- Poulin, B., G. Lefebvre, & R. McNeil. 1994. Diets of land birds from northeastern Venezuela. *Condor* 96: 354–367.
- Ridgely, R. S., & G. Tudor. 1989. *The birds of South America*. Volume 1. Univ. Texas Press, Austin, Texas.
- Rizzini, C. T. 1997. *Tratado de fitogeografia do Brasil*. Âmbito Cultural Edições, Rio de Janeiro, Brazil.
- Rojas, R., M. Â. Marini, & M. T. Z. Coutinho. 1999. Wild birds as hosts of *Amblyomma cajennense* (Fabricius, 1787) (Acari: Ixodidae). *Mem. Inst. Oswaldo Cruz* 94: 315–322.
- Schubart, O., Á. C. Aguirre, & H. Sick. 1965. Contribuição para o conhecimento da alimentação das aves brasileiras. *Arq. Zool. S. Paulo* 12: 95–249.
- Sick, H. 1997. *Ornitologia Brasileira*. Nova Fronteira, Rio de Janeiro, Brazil.
- Simon, J. E., & S. Pacheco. 2005. On the standardization of nest descriptions of Neotropical birds. *Rev. Bras. Ornitol.* 13: 7–18.
- Smyth, C. H. 1928. Descripción de una colección de huevos de aves argentinas, II. *Hornero* 4: 125–152.
- Snow, D. W. 1981. Tropical frugivorous birds and their food plants: a world survey. *Biotropica* 13: 1–14.

- Stotz, D. F., J. W. Fitzpatrick, T. A. Parker III, & D. K. Moskovits. 1996. Neotropical birds: ecology and conservation. Univ. of Chicago Press, Chicago, Illinois.
- Strickland, H. E. 1844. Descriptions of several new or imperfectly-defined genera and species of birds. *Ann. Mag. Nat. Hist.* 13: 409–421.
- Teixeira, D. M. 1999. Myiasis caused by obligatory parasites. Ib. General observations on the biology of species of the genus *Philornis* Meinert, 1890 (Diptera, Muscidae). Pp. 71–96 in Guimarães, J. H., & N. Papavero (eds.). Myiasis in man and animals in the Neotropical Region - Bibliographic Database. Editora Plêiade, São Paulo, Brazil.
- Vasconcelos, M. F. 2000. Ocorrência simpátrica de *Emberizoides herbicola*, *Embernagra platensis* e *Embernagra longicauda* (Passeriformes: Emberizidae) na região da Serra do Caraça, Minas Gerais. *Melopsittacus* 3: 3–5.
- Vasconcelos, M. F. 2001. Pale-throated Serra-finch *Embernagra longicauda*. *Cotinga* 16: 110–112.
- Vasconcelos, M. F. 2003. A avifauna dos campos de altitude da Serra do Caparaó, estados de Minas Gerais e Espírito Santo, Brasil. *Cotinga* 19: 40–48.
- Vasconcelos, M. F. 2008. Mountaintop endemism in eastern Brazil: why some bird species from campos rupestres of the Espinhaço Range are not endemic to the Cerrado region? *Rev. Bras. Ornitol.* 16: 348–362.
- Vasconcelos, M. F. 2009. Avifauna dos campos rupestres e dos campos de altitude do leste do Brasil: levantamento, padrões de distribuição geográfica, endemismo e conservação. Ph.D. thesis, Univ. Federal de Minas Gerais, Belo Horizonte, Brazil.
- Vasconcelos, M. F., & T. A. Melo-Júnior. 2001. An ornithological survey of Serra do Caraça, Minas Gerais, Brazil. *Cotinga* 15: 21–31.
- Vasconcelos, M. F., & J. A. Silva. 2003. Descrição do jovem de Tibirru-rupestre *Embernagra longicauda*. *Cotinga* 20: 21–23.
- Vasconcelos, M. F., M. Maldonado-Coelho, & R. Durães. 1999. Notas sobre algumas espécies de aves ameaçadas e pouco conhecidas da porção meridional da Cadeia do Espinhaço, Minas Gerais. *Melopsittacus* 2: 44–50.
- Vasconcelos, M. F., M. Maldonado-Coelho, & D. R. C. Buzzetti. 2003. Range extension for the Gray-backed Tachuri (*Polystictus superciliosus*) and the Pale-throated Serra-finch (*Embernagra longicauda*) with a revision on their geographic distribution. *Ornitol. Neotrop.* 14: 477–489.
- Vincent, R. C. 2004. Florística, fitossociologia e relações entre a vegetação e o solo em áreas de campos ferruginosos no Quadrilátero Ferrífero, Minas Gerais. Ph.D. thesis, Univ. de São Paulo, São Paulo, Brazil.
- Willis, E. O., & Y. Oniki. 1991. Avifaunal transects across the open zones of northern Minas Gerais, Brazil. *Ararajuba* 2: 41–58.
- Zotta, A. 1940. Lista sobre el contenido estomacal de las aves Argentinas. *Hornero* 7: 402–411.

