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Breeding biology of Laughing Falcon *Herpetotheres cachinnans* (Linnaeus, 1758) (Falconidae) in southeastern Brazil

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RESUMO: Biologia reprodutiva de acauã *Herpetotheres cachinnans* (Linnaeus, 1758) (Falconidae), no Sudeste do Brasil. *Herpetotheres cachinnans,* conhecido popularmente como Acauã, é um falconídeo neotropical que habita áreas abertas, bordas de mata e de rios e cerrado. Devido à carência de informações detalhadas sobre a biologia desta espécie para o Brasil, objetivou-se, neste estudo, caracterizar os aspectos sobre sua biologia reprodutiva e alimentar. O trabalho foi desenvolvido na fazenda Cauáia, município de Matozinhos, MG. A fazenda abriga uma reserva de aproximadamente 500 hectares de floresta estacional semidecidual em transição para o cerrado, inclusa na área de proteção ambiental da APA CARSTE de Lagoa Santa, MG. Os estudos iniciaram em setembro de 2005, quando uma fêmea de Acauã alçou vôo de uma fenda de um paredão calcário, de aproximadamente 30 m de altura. Foram utilizados materiais de escalada para acessar o local e confirmar a presença do ninho. No primeiro dia de visita deparamo-nos com um ninhego com poucos dias de vida, no centro do ninho. A ave mediu 11,4 cm (comprimento total) e seu corpo era recoberto por uma plumagem branca-creme com uma máscara preta que ia da região perioftalmica até a nucal. O ninhego foi acompanhado semanalmente e abandonou o ninho com aproximadamente 50 dias após o nascimento. Foram encontrados no ninho restos de aves, de mamíferos e uma grande quantidade de restos de répteis. Os aspectos relacionados à biologia das aves de rapina neotropicais são pouco estudados e a carência de informações sobre a biologia reprodutiva, comportamental e alimentar, impossibilitam assim um maior embasamento para estabelecer metas para a conservação da espécie.

PALAVRAS-CHAVE: *Herpetotheres cachinnans,* acauã, falconídeo, biologia reprodutiva, biologia alimentar, ninhego, Cauáia, sudeste brasileiro.

ABSTRACT: The Laughing Falcon *Herpetotheres cachinnans* is a Neotropical raptor that inhabits open areas, river margins, wood edges and open pastures. There is a lack of detailed information about the biology of this species in Brazil. The aim of this study was to characterize the breeding and feeding biology of the Laughing Falcon in the Cauáia farm, Matozinhos, Minas Gerais, Brazil. The farm has a reserve of 500 hectares of forests, whose phytogeography is characterized by half-deciduous bushes, in transition to *Cerrado,* and belongs to the environmental protection area of APA CARSTE of LAGOA SANTA. The study started in September 2005, when a female Laughing Falcon was seen flying from a crevice in a calcareous wall of approximately 30 m of height. We used climbing materials to access the site and confirmed the existence of a nest. In the first visit we found a 11.4 cm-long, recently hatched / young nestling whose body was covered with a cream-white plumage with a black mask in the periophtalmic region until the neck. The nestling was examined weekly and left the nest approximately 50 days after hatching. Remains of reptiles, and to a lesser extent, birds and mammals, were found in the nest. Biological data on Neotropical raptors are scarce and this study improves our basic understanding of the natural history of the Laughing Falcon.

KEYWORDS: *Herpetotheres cachinnans,* Laughing Falcon, raptor, breeding biology, feeding biology, nestling, Cauáia, southeastern Brazil.

The Laughing Falcon *(Herpetotheres cachinnans)* inhabits open areas and forest edges, open pastures and river margins. It occurs in southern Mexico, eastern Bolivia, Brazil, northern Argentina and Paraguay. In Brazil, it lives in open areas and in the *Cerrado* (Sick 1997 and Ferguson-Lees *et al.* 2001). *H. cachinnans* is common and occupies an extensive area of the neotropical region (del Hoyo *et al.* 1992). It can be observed in pairs perched on the highest trees (Wetmore 1926, Sick 1997, and Ferguson-Lees *et al.* 2001). The species is listed in CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) in Appendix II as Not Threatened.

Individuals of both genders are fairly similar, showing sexual dimorphism in body size; females are generally larger (weighing 20% more) and have longer tails than those of males.

A common belief, which dates from the 18th century, is that the Laughing Falcon is an ominous bird because of

its cry (Nomura, 2005), and some Brazilian rural dwellers in Brazil say that when it sings at dusk it is about to take the soul of the ill ones.

Laughing Falcons feed on lizards, birds, insects and rodents (Ferguson-Lees *et al.* 2001). According to Sick (1997), they feed mainly on reptiles and are efficient hunters of both harmless and poisonous snakes. A study in Guatemala found 20 species of snakes preyed by the Laughing Falcon, of which 30% were arboreal and 59% terrestrial (Sheffler *et al.* 1944).

Laughing Falcons make their nests in dead or live trees, in tree forks or in cliff cavities at heights that range from 3 to 30 m (Sick 1997, Ferguson-Lees *et al.* 2001). The species not use any material to construct the nest. The incubatory chamber has only soil. The female lays only one or two eggs of white coloration with a great amount of medium-sized dark brown spots measuring approximately 56.5 x 45.6 mm (Wolfe 1954, Skutch 1998, Ferguson-Lees *et al.* 2001). Only the female hatches but both genders hold parental care (Skutch 1998). Detailed information on the breeding and feeding biology of this species is rare in the literature and in Brazil is not available at the moment.

This study aimed to characterize the breeding biology of *H. cachinnans* according to its phases, nesting site, the nestling and its development, and its diet.

STUDY AREA

The study was conducted in a private reserve belonging to a farm complex (CAUAIA Farm), located in the city of Matozinhos, Minas Gerais. The farm has approximately 900 hectares, and it is included in the environmental protection area of APA CARSTE of Lagoa Santa, MG (19°28'S, 44°02'W). The climate is predominantly savannah-like with dry winter. Average annual rainfall is 1328,7 mm and annual temperatures vary from 15.6°C to 28.2°C. Altitude varies from 600 to 650 m (INMET 2005).

Phytogeographical dominance is characterized by half-deciduous bushes, in transition to *Cerrado,* present in some parts of the reserve. Calcareous bulks are characteristic of the region, appearing in diverse points inside the preserved area. The forest is surrounded by pastures and plantations. The area contains a forest area of approximately 500 hectares.

METHODS

The nest was monitored weekly through visual observation in order to characterize the development of the nestling as well its feeding. Photographic registers were made with a CANON EOS 300 D camera and zoom lenses 28-80 mm. The observations were made using 20 x 50 mm binoculars from a distance that made possible the observation of the species behavior without causing disturbances (50 meters of the nest, behind the bushes). We used a 50 m rope and climbing equipment to descend to the nest. The latter was measured with the aid of a tape measure. The height of the calcareous wall and of the nest was localized using a GPS. The nestling was removed from the nest and taken to the base of the calcareous wall where it was measured using calipers to the nearest 0.05 mm and weighed using a 5 kg digital scale. The development of the nestling was followed on a weekly basis and its diet evaluated by analyzing pellets and food remains within the nest area. We also analyzed some aspects of the behavior of the nestling and the adults of *H. cachinnans* during the whole breeding period.

RESULTS AND DISCUSSION

In September 2005, one of the adults of *H. cachinnans* flew from a crevice situated in a 30 meter-high calcareous wall. The individual was a female that was flying over the place with frequent vocalizations. Nearby, the male also started to vocalize with a characteristic alert voice. During our presence, the pair was also flying and vocalizing over the nest area. The nest was found at 15 meters from the calcareous wall base and was 49.5 cm deep and 43.0 cm wide. The entrance to the nest measured 27.5 cm of height with 43.0 cm of breadth, and had two chambers, a greater one, anteriorly located, and a smaller one with a greater height, posteriorly located.

In the first visit to the nest we found a newborn nestling at the center and above some feathers and soil. Its total length was 11.39 cm. Its body was covered with a cream-white plumage with a black colored mask from the periophtalmic region down to the neck. The eyes were dark brown and the beak was black. Cere and legs were of a dark yellow color. On the first days of life the nestling had its body covered with feathers of a cream-white color (Fig. 1). The coloration of the nestling was similar to that of its parents.

The development of the nestling (total length, weight, wing measures) was monitored on the dates listed in Table 1.

When scared, the nestling vocalized a sequence of alert calls similar to its parents' alert vocalization. It also tried to hide in the deep chamber of the nest, and threaded its head and body in a superior crack, trying to hide itself. The adults tried to intimidate us in the nest area, with flights and very loquacious vocalizations. This type of behavior was observed on the first visit on the nest. After some visits, the adults only vocalized during the first minutes (1-5 approximately) and then moved away, vocalizing only when the nestling emitted an alert call.

TABLE 1: Information on the development of a *H. cachinnans* nestling.

Date	Days	Total length (cm)*	Weight (g)	Left wing (cm)	Right wing (cm)	Observations
09/09/2005	< 08	11.39	—	—	—	Nestling few days after hatching.
16/09/2005	08	15.07	—	8.98	8.95	
23/09/2005	15	20.2	367	13.08	13.89	
30/09/2005	22	25.5	472	19.9	17.9	Primary remiges and rectrices quills started to appear.
07/10/2005	29	29.9	539	24.0	26.0	Beginning of the changes of body plumes to feathers.
14/10/2005	36	35.0	609	29.1	28.01	
21/10/2005	43	37.9	685	32.4	34.1	
25/10/2005	47	38.6	617	34.3	33.3	
28/10/2005	50	39.0	639	—	—	Nestling well developed, few days to leave the nest
02/11/2005	—	—	—	—	—	The nestling was not present in the nest anymore

* Total length – From beak to tail feathers.

We further observed that the male arrived with preys and delivered them to the female, which took them into the nest, confirming the reports of Skutch (1998). The capture of preys was almost always the role of the male, which most of the time absented himself from the nest area or was in the outskirts searching for prey. The male only appeared with the presence of intruders or when the nestling or the female emitted an alert call. Food was delivered in a single bowl to the nestling. Parental assistance for eating was not observed. We confirmed that very large parts of birds and serpents were present in the nest (Fig. 3). We also observed that the amount of prey delivered to the nestling decreased with its development. This was probably used as a strategy to stimulate the nestling to leave the nest.

The nestling had some parasites such as larvas of the *Rhinophoridae* family on its wings and head (neck, frontal and occipital region) and flies *(Muscidae)* walked on its body. Bees in the nostrils that apparently helped keep then clean. Portions of reptiles, like the rattle snakes *(Crotalus durissus),* and one false coral snake *(Oxyrhopus guibei),* and a leg of a barn owl *(Tyto alba)* were encountered in the nest (Fig. 3). The carcasses were found fresh or dried. The serpents were always beheaded or with the head jammed. Analysis of the content of the pellets (Fig. 4) and the nest material (soil) revealed the presence of: 1) jaw bones of a large vesper mouse *(Callomys callosus);* 2) fur of tapeti

FIGURE 1: Nestling of Laughing Falcon, on September 16 in the nest. Photo: Gustav Specht.

FIGURE 2: The nestling on October 21, with approximately 43 days of life and a few days before it left the nest. Photo: Gustav Specht.

rabbit *(Sylvilagus brasiliensis)* (Fig. 5); 3) feathers of a cliff flycatcher *(Hirundinea ferruginea);* 4) preys, vertebrae and scales of snakes; and 5) the rattle of a rattle snake *(Crotalus durissus)* (Fig. 6). Of the collected pellets, 70% were composed of scales of reptiles and bones of reptiles and mammals, and 30% were composed of fur and bones of mammals, grass and feathers. We found in the nest soil from nest, 20 egg rind fragments that were of white coloration with great amount of dark medium brown spots confirming the egg description of Wolfe (1954).

As shown by the food remains and pellets collected at the nest, *H. cachinnans* feeds on birds, mammals and mainly reptiles. *H. cachinnans* preys on poisonous snakes, such as the true coral snake (Sick 1997). We did not find any samples of true coral snakes, but only the presence of rattle snake prey *(Crotalus durissus)* and preys of poisonous snakes. The presence of birds within the food remains of the Laughing Falcon is an important finding, given that in the other studies (Wetmore 1926, Sheffler *et al.* 1944, Wolfe 1954, Valdez 1996, Skutch 1998) the occurrence of this kind of prey is very rare.

On October 25 the nestling was removed from the nest and marked with leg band of CEMAVE (National center of Research for Conservation of the Wild Birds); size T (11 mm).

On several instances (October 28), the nestling was seen exercising its flight muscles at the border of the nest or in a lateral crack. It abandoned the nest with approximately 50 days of life, weighing 639 g, measuring approximately 39 cm total length. A few days later on, it was spotted around its parents' nest area.

Regarding interspecific relationships, a pair of American kestrels *(Falco sparverius)* was seen attacking the two adult *H. cachinnans,* when the latter were flying over the nest area of the former. We also identified the presence of other nests cavities in the same calcareous wall of the blue-fronted parrot *(Amazona aestiva),* American kestrels *(Falco sparverius),* chopi black bird *(Gnorimopsar chopi)* and a cliff flycatcher *(Hirundinea ferruginea).* A barn owl *(Tyto alba)* was in a cave nearby the nest, as were some black vultures *(Coragyps atratus).*

FIGURE 3: Preys encountered were False coral snake *(Oxyrhopus guibei)* (1), rattle snake *(Crotalus durissus)* (2), and leg of a barn owl *(Tyto alba)* (3). Photo: Gustav Specht.

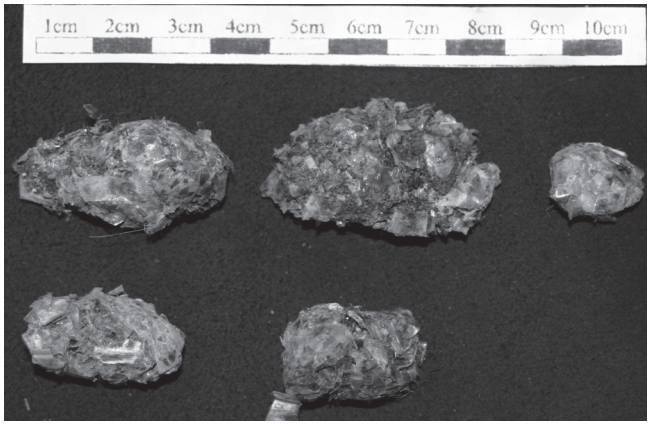

FIGURE 4: Pellets were composed of scales of reptiles and bones of reptiles and mammals. Photo: Gustav Specht.

FIGURE 5: Pellets were composed of fur of Tapeti Rabbit *(Sylvilagus brasiliensis).* Photo: Gustav Specht.

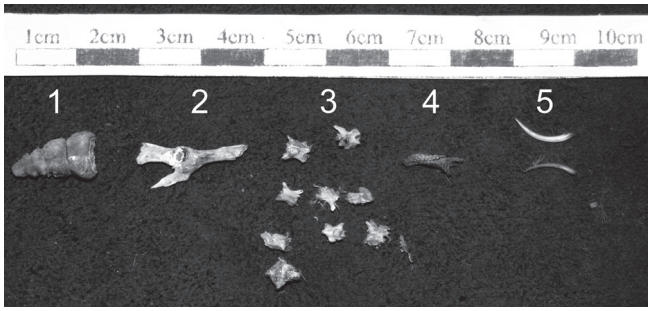

FIGURE 6: The contents of the nest material (soil): Rattle of a rattle snake *(Crotalus durissus)* (1), pelvis (2) and the jaw (4) of a large vesper mouse *(Callomys callosus),* and vertebrae (3) and preys of snake (5). Photo: Gustav Specht.

This study provides new data on the natural history of the Laughing Falcon in Brazil, and complements previous reports of breeding and feeding biology of Laughing Falcon (Wetmore 1926, Sheffler *et al.* 1944, Wolfe 1954, Sick 1997, Valdez 1996, Skutch 1998, and Ferguson-Lees *et al.* 2001). Such data may be useful for conservation strategies of this species, especially regarding its breeding behavior.

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