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SHORT-COMMUNICATION

Stomach contents of some poorly known Brazilian birds with focus on species from the Caatinga biome

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ABSTRACT: Studies on feeding biology comprise one of the most basic knowledge about natural history of birds. Here, we report detailed descriptions of the stomach contents of 12 species (*Eupsittula cactorum*, *Neomorphus geoffroyi*, *Picumnus pygmaeus*, *Synallaxis hellmayri*, *Megaxenops parnaguae*, *Myrmorchilus strigilatus*, *Hylopezus ochroleucus*, *Herpsilochmus sellowi*, *Formicivora serrana*, *Scytalopus speluncae*, *Arremon franciscanus* and *Lanio pileatus*). Most species are from the Caatinga biome and many have none or vague information about their diet. We report consumption of soil from termite nest by *E. cactorum*, almost exclusively arachnids including large spiders for *N. g. dulcis*, a diverse composition of arthropods for *S. speluncae*, and the unrecorded importance of Isoptera for *F. serrana*. Finally, we briefly discuss the importance of some items such as Isoptera, Formicidae, Coleoptera and Lepidoptera larvae in the diet of most birds from the Caatinga biome.

KEY-WORDS: arthropod, aves, diet, endemic species, feeding biology, semi-arid environments.

"It is still little the number of works that report stomach contents of Brazilian birds" (Schubart *et al.* 1965). Fifty years later and this quote is still current. It is true that significant progress has been done. Durães & Marini (2005), Lopes *et al.* (2005) and Manhães *et al.* (2010) described the stomach contents of several Atlantic forest birds, including some endemic species. Kupriyanov *et al.* (2012) investigated the diets of Amazonian woodcreepers, Aguiar & Coltro-Júnior (2008) focused on Thamnophilidae, Grallariidae and Formicariidae, while other authors approached one or few species and their ecology (*e.g.* Gomes *et al.* 2001, Vasconcelos *et al.* 2007, Buainain *et al.* 2015). However, most of those studies focused on Atlantic Forest species and/or were based on regurgitation or fecal samples collected in the field.

In the meantime, even though the Brazilian spirits collections have grown significantly and are now more complete than they were 50 years ago, studies on detailed descriptions of stomach contents of birds using anatomical collections are scarce. Besides the traditional papers of Moojen *et al.* (1941) and Hempel (1949), and more recently of Ballarini *et al.* (2013), not much was published on this subject. Whereas many specimens are housed in Brazilian anatomical collections, there is still several bird species whose diets are completely or poorly known, especially the ones from Caatinga and Cerrado biomes.

Studies on feeding biology comprise one of the most basic knowledge about the natural history of birds, which in turn is essential information for conservation of species. Even though new methods and technologies allow us to explore new aspects of the biology of birds, such basic knowledge of many species still remains unknown. In order to expand and provide new information on the diet of Brazilian birds we give detailed descriptions of the stomach contents of species based entirely on material housed in Brazilian scientific collections. Most of these species are from the Caatinga biome, one of the least studied biome in Brazil, and many so far have their diet currently unknown.

We examined the stomach contents of 113 specimens of 12 species housed at the Museu Nacional, Universidade Federal do Rio de Janeiro (MN) and Museu Paraense Emilio Goeldi (MPEG). Most material was collected in a fragment of shrubby Caatinga Forest at the municipality of São Félix do Coribe, Bahia state (13°20'3.19"S; 43°48'24.12"W), near Corrente River, a tributary of São Francisco River (middle region of São Francisco). Other localities and detailed description of the stomach contents examined are listed on Appendix I.

Stomachs were extracted from the abdominal cavity, dissected and stored in 70% ethanol. Contents were placed on a Petri dish, examined with a *Leica ES2* stereo microscope and stored under the same collection number as carcasses. Fragments of arthropods were identified

by N.B., with assistance of specialized bibliography (Borror *et al.* 1989, Costa *et al.* 2006, Rafael *et al.* 2012), comparison with material from entomological and arachnids collections of the Universidade Federal do Rio de Janeiro, consultations with experts and comparisons with illustrations of fragments presented in other studies (Ralph *et al.* 1985, Chapman & Rosenberg 1991, Gomes *et al.* 2001, Manhães *et al.* 2010). Fragments were grouped and counted by morphological similarity estimating the minimum number of individuals (items) belonging to the same prey type in a sample. Seeds were counted individually and measured with a *BTS Digital Caliper* (150 x 0.01 mm) when not damaged. For each prey type, relative abundance (number of items of a prey type divided by the total number of items, in percentage), relative occurrence (number of samples in which a prey type occur divided by the total number of samples, in percentage) and average prey type/sample (total items of a prey type divided by the total number of samples), were calculated for each taxon and are shown in Table 1 and 2.

TABLE 1. Diet indexes calculated for the taxa examined. Items per sample/(relative abundance/relative occurrence) of each prey type. Less representative categories were grouped as "others" and are shown in Appendix I.

	N. geoffroyi **(n = 2)**	***P. pygmaeus*** **(n = 11)**	***S. hellmayri*** **(n = 13)**	***M. parnaguae*** **(n = 23)**	***M. strigilatus*** **(n = 9)**	***H. sellowi*** **(n = 18)**
Lepidoptera (larvae)	0.5 (1.6%/50%)	1.5 (1.8%/18.1%)	2.7 (2.7%/46.1%)	1.9 (3.8%/47.8%)	0.1 (0.1%/11.1%)	2.3 (15.7%/50%)
Coleoptera	4 (12.7%/100%)	1 (1.2%/63.7%)	1.9 (1.9%/64.6%)	2 (4%/87%)	2.4 (2.5%/88.9%)	4.2 (28.1%/100%)
Formicidae	3 (9.5%/50%)	3.6 (4.5%/90.9%)	5.8 (5.9%/76.9%)	5.2 (10.1%/82.6%)	36.9 (38.2%/100%)	4.7 (31.8%/61.1%)
Isoptera	1 (3.2%/50%)	72.1 (88.4%/100%)	81.9 (82.4%/84.6%)	38.9 (76.1%/91.3%)	55.8 (57.8%/100%)	0.4 (3%/11.1%)
Orthoptera	6 (19%/100%)	0	0.3 (0.3%/30.8%)	1.7 (3.2%/65.2%)	0.1 (0.1%/11.1%)	0.6 (4.1%/50%)
Vegetal material	0	0	6 (6%/100%)	0.9 (1.7%/4.4%)	0	0.8 (5.2%/5.6%)
Hemiptera	0.5 (1.6%/50%)	0.2 (0.2%/18.1%)	0.1 (0.1%/7.7%)	0.1 (0.1%/4.4%)	0	1.3 (9%/61.1%)
Araneae	14 (44.4%/50%)	0	0.4 (0.4%/23.1%)	0.1 (0.2%/8.7%)	0	0.2 (1.1%/11.1%)
Coleoptera (larvae)	0	3.1 (3.8%/72.7%)	0.2 (0.2%/23.1%)	0.2 (0.3%/17.4%)	0.1 (0.1%/11.1%)	0
Chilopoda	1.5 (4.8%/100%)	0	0	0.1 (0.1%/4.4%)	0	0
Opiliones	1 (3.2%/50%)	0	0	0	0	0
Others	0	0.1 (0.1%/9.1%)	0.2 (0.2%/15.3%)	0.2 (0.3%/13%)	0.3 0.3%/33.3%)	0.3 (1.9%/27.8%)

Eupsittula cactorum (Kuhl, 1820) (n = 2): stomachs contained only crushed seeds and stones. Information agrees with Barros & Marcondes-Machado (2000) and Ballarini *et al.* (2013) on the predominance of seeds. Unlike previous studies, no latex, fruit pulp or flowers were detected in our samples. Some dark brownish hard fragments, which looked like pieces of termite nests (Isoptera), were recorded. Barros & Marcondes-Machado (2000) observed the species carving termite nests, where they looked for food and built their nest. However, no termite was found inside the stomachs analyzed. A recent study showed that geophagic behavior by Yellow-chevroned Parakeet *Brotogeris chiriri* (Vieillot, 1818), particularly the ingestion of soil from termites nest, is related to supplementation of minerals and organic matter (essential for physiological functions), and also to bind toxins present on fruits consumed by the species (Costa-Pereira *et al.* 2015). Further observations are needed to clarify if consumption of soil from termites nest by *E. cactorum* is accidental (during nest carving) or if the species present geophagic behavior similar to other Psittacidae.

Neomorphus geoffroyi (Temminck, 1820) (n = 2): one individual corresponds to the subspecies *N. g. dulcis* and the other to *N. g. amazonicus.* The stomach of the former contained almost exclusively arachnids. Items recorded were Araneae (spiders), mostly Ctenidae (*Ctenus medius* Keyserling, 1891, *C. ornatus* (Keyserling, 1877), *C.*

TABLE 2. Diet indexes calculated for the taxa examined. Items per sample/(relative abundance/relative occurrence) of each prey type. Less representative categories were grouped as "others" and are shown in Appendix I.

	H. ochroleucus **(n = 3)**	***F. serrana*** **(n = 17)**	***S. speluncae*** **(n = 5)**	***A. franciscanus*** **(n = 1)**	***C. pileatus*** **(n = 7)**
Lepidoptera (larvae)	1 (0.4%/33.3%)	0.8 (4.8%/58.8%)	0.4 (1.9%/40%)	2 (4.2%/100%)	1.3 (3.7%/57%)
Coleoptera	5 (5.3%/100%)	4.5 (27.8%/76.5%)	2.8 (13.2%/100%)	3 (6.3%/100%)	1.7 (4.9%/86%)
Formicidae	10 (10.5%/100%)	2.6 (16.1%/76.5%)	9.8 (46.2%/100%)	3 (6.3%/100%)	18.9 (53.9%/86%)
Isoptera	75 (78.9%/100%)	4.4 (27.1%/47.1%)	2 (9.4%/60%)	6 (12.5%/100%)	10 (28.6%/57%)
Orthoptera	0.7 (0.7%/33.3%)	1.2 (7.7%/88.2%)	0.6 (2.8%/60%)	0	0.1 (0.4%/14%)
Vegetal material	0.3 (0.4%/33.3%)	0.7 (4.4%/17.7%)	0.2 (0.9%/20%)	34 (70.8%/100%)	3 (8.6%/57%)
Hemiptera	0.3 (0.4%/33.3%)	0.4 (2.2%/29.4%)	2.2 (10.3%/80%)	0	0
Araneae	0.7 (0.7%/66.6%)	0.8 (5.1%/52.9%)	0.4 (1.9%/40%)	0	0
Coleoptera (larvae)	0.7 (0.7%/33.3%)	4.5 (1.1%/11.8%)	0.4 (1.9%/40%)	0	0
Chilopoda	0.3 (0.4%/33.3%)	0.1 (0.4%/5.9%)	0	0	0
Opiliones	0	0	1.4 (6.6%/20%)	0	0
Others	1.7 (1.8%/33.3%)	0.5 (3.3%/23.5%)	1 (4.7%/40%)	0	0

vehemens Keyserling, 1891, *Isoctenus foliiferus* (Bertkau, 1880), but also Coriinidae (*Corinna* sp.), Salticidae and Theraphosidae; Opiliones (Gonyleptidae: *Metagonyleptes calcar* Roewer, 1913); Chilopoda (centipede), including a 140 mm piece; Orthoptera, mostly Gryllidae (crickets), but also Acrididae (grasshoppers); and Coleoptera (beetles). Three hard and membranous egg-shaped items, which are possibly seeds, were registered. Sick (1953) and Schubart *et al.* (1965) examined five specimens of *N. g. dulcis* from Linhares, Espírito Santo state (locality close to our specimen) and reported similar results, except for the absence of Araneae, which was the main item found in our study. Food items identified by those authors include Orthoptera (Acrididae and Gryllidae), Blattaria (cockroaches), Opiliones (Gonyleptidae), Formicidae (ants), Coleoptera and Chilopoda (110 mm long).

Stomach contents of *N. g. amazonicus* differed from the ones of *N. g. dulcis* especially by the absence of Araneae and Opiliones. It consists mostly of Formicidae (not army ants, *Ecyton* sp.), Coleoptera, Orthoptera (Acrididae), but also Isoptera, Lepidoptera larvae (caterpillars), Hemiptera (Heteroptera, true bugs), and Chilopoda. Pelzeln (1871) examined two specimens from Pará state (*N. g. amazonicus*) and reported a big spider (Araneae), rests of Coleoptera and Orthoptera (Acrididae), and a hard membranous egg-shaped item, which he supposed to be a lizard egg. Schubart *et al.* (1965) reported Orthoptera, Blattaria, Hemiptera and Coleoptera in one specimen from Maranhão state (*N. g. amazonicus*).

Picumnus pygmaeus (Lichtenstein, 1823) (n = 11): stomachs had absolute predominance of Isoptera, followed by Coleoptera larvae (mostly Buprestidae), Formicidae and Coleoptera. Other less representative items recorded were Hemiptera and Pseudoscorpiones. Stomachs collected during the rainy season contained Lepidoptera larvae. Schubart *et al.* (1965) reported six Coleoptera larvae ("probably Elateridae") in one specimen from Rio Mearim (Maranhão state).

Synallaxis hellmayri Reiser, 1905 (n = 13): stomachs contained predominantly Isoptera, followed by Formicidae (mostly apterous, but also winged forms), seeds and Coleoptera (Curculionidae and others unidentified). Some of the less representative items were Orthoptera (mostly Gryllidae, but also Acrididae); Araneae (*Ctenus* sp.); Coleoptera larvae; Hemiptera and adult Lepidoptera. Samples collected during the rainy season in November (n = 2) had, among other insects, many Lepidoptera larvae. The majority of the Isoptera identified were apterous (worker and soldier castes), but some winged forms were also detected. Seeds were

found in all samples, usually with some pulp/vegetable flesh. Three different morphotypes were identified (5.96 x 3.65 mm; 4.25 x 2.67 mm; 3.29 x 1.25 mm). Succulent plant parts with smooth surface and stomata, which are possibly epidermis of cactuses or bromeliads, were occasionally recorded. Whitney & Pacheco (1994) described an individual of *S. hellmayri* foraging in a bromeliad, sometimes tapping directly on the leaves of the plant, while Teixeira (1992) reported the use of branches and spines of the Xique-xique cactus (*Pilocereus gounellei* (A. Weber ex K. Schum.) Bly. ex Rowl)) in the nest of the species. It is likely that plant parts found in our samples were accidentally ingested during foraging or nest construction. A large amount of soil/sand was found in all stomachs. This finding agrees with descriptions of Whitney & Pacheco (1994), who observed individuals ingesting small spiders and orthopterans, while foraging directly on the ground. Teixeira (1992) reported: *"captures small spiders and insects (Coleoptera, Orthoptera, etc.), sometimes ingesting non-identified seeds, according to examined stomach contents".*

Megaxenops parnaguae Reiser, 1905 (n = 23): stomachs contained predominantly Isoptera (mostly apterous, but also a few winged individuals), followed by Formicidae, Orthoptera (mostly Gryllidae, but also Acrididae) and Coleoptera (Nitidulidae, Carabidae and others unidentified). One stomach collected during the dry season contained 20 seeds of the same morphotype (5.65 x 1.26 mm), and another one contained 21 ant pupae (Formicidae). Less representative items recorded were Araneae, Chilopoda, Hymenoptera (non Formicidae), Hemiptera, Coleoptera larvae (Buprestidae and others unidentified), Neuroptera larvae and Odonata. Specimens collected during the rainy season (n = 7) had lower proportion of Isoptera and Orthoptera and higher proportion of Lepidoptera larvae, when compared to specimens collected during the dry season. Several pieces of bark were found inside stomachs. This information is in agreement with observation by Teixeira *et al.* (1989) and Whitney & Pacheco (1994), who described individuals tapping on bark, while looking for wood miner or borer arthropods. Teixeira *et al.* (1989) reported the stomach contents of one specimen containing Formicidae, Coleoptera (Scarabaeidae), Lepidoptera larvae and many Araneae (*Ctenus* sp. *Micrathena* sp. and *Phoneutria* sp.), "*but no typical endophytic arthropod*". Our samples differ from this study by the clear predominance of Isoptera and presence of Orthoptera and wood miner/borer arthropods (*e. g.* some Coleoptera larvae). Although Kirwan *et al.* (2001) observed individuals investigating a termite nest, the consumption of those insects, which are the predominant food resource of the species found according to our study, is a novelty.

Myrmorchilus strigilatus (Wied, 1831) (n = 9): stomachs contained predominantly Isoptera and Formicidae, followed by Coleoptera. Other items found were Lepidoptera, adults and larvae, Chilopoda, Orthoptera, Hymenoptera and Pseudoscorpiones. One specimen collected during the rainy season had six Lepidoptera larvae, but also a large amount of the other three main items in its stomach. Remsen *et al.* (1988) mentioned that "all stomachs contents contained insects", but did not mention specific taxa or life stages, while Bodrati (2012) recorded male adults feeding "larvae" to their nestlings.

Hylopezus ochroleucus (Wied, 1831) (n = 3): stomachs contained predominantly Isoptera (apterous form), followed by Formicidae and Coleoptera (Scarabaeidae and others unidentified). Less representative items registered were Hemiptera, Araneae, Scorpiones, Orthoptera, Diplopoda, Coleoptera, Lepidoptera larvae and Neuroptera larvae.

Herpsilochmus sellowi Whitney & Pacheco, 2000 (n = 18): stomachs contained mainly Coleoptera and Formicidae, followed by Hemiptera (Auchenorrhyncha), Orthoptera and seeds. Less representative items were Isoptera, Pseudoscorpiones, Gastropoda, Araneae and adult Lepidoptera. Specimens collected during the rainy season had a large amount of Lepidoptera larvae. Schubart *et al.* (1965) reported Orthoptera, Hemiptera and Coleoptera (small Curculionidae) in two specimens from the isolated populations of Serra do Cachimbo, Pará State.

Formicivora serrana Hellmayr, 1929 (n =17): stomach contents were fairly diverse. Most stomachs contained Coleoptera (Curculionidae, Cerambycidae and others unidentified), Isoptera, Formicidae, Orthoptera (Gryllidae), Araneae, Lepidoptera larvae and seeds. Other items recorded were Hemiptera, Hymenoptera, Coleoptera larvae, Blattaria, Pseudoscorpiones and Chilopoda. Specimens from the mountainous and Restinga populations had similar diet. The former consumed less Coleoptera and Isoptera, and more Orthoptera. Chaves & Alves (2013) analyzed fecal samples from Restinga populations and obtained similar results, except for Isoptera, one of the most consumed items recorded in our study, which was not registered by those authors.

Scytalopus speluncae (Ménétriès, 1835) (n = 5): Formicidae and Coleoptera were predominant and present in all samples. However, several other arthropods, mostly ground insects from the leaf litter substrate, were registered: Hemiptera, Isoptera, Opiliones, Diptera, Lepidoptera larvae, Coleoptera larvae, Araneae, Dermaptera, Acari and Hymenoptera.

Arremon franciscanus Raposo, 1997 (n = 2): one stomach was empty, while the other one contained mainly seeds, but also Isoptera, Formicidae (apterous),

Lepidoptera larvae and Coleoptera. Stomach contents were similar to the ones of other closely related *Arremon* species, such as *A. taciturnus*, *A. semitorquatus*, and *A. flavirostris* (Schubart *et al.* 1965).

Lanio pileatus (Wied, 1821) (n = 7): stomach contents consisted mainly of Formicidae, Isoptera and seeds. Other items registered were Coleoptera, Orthoptera and Lepidoptera larvae. Stomachs contained several small stones, supposedly to crush seeds, sediment (sand) and also small leaf fragments. Schubart *et al.* (1965) reported fragments of insects and small Gramineae seeds.

Remarks on the diet of Caatinga bird species

Almost all of the Caatinga species examined had a major predominance of Isoptera, Formicidae and Coleoptera in their stomachs. This same pattern was recorded for the Silvery-Cheeked Antshrike *Sakesphorus cristatus* (Wied, 1831), which is an endemic species of the Caatinga biome (Buainain *et al.* 2015). While Formicidae and Coleoptera are frequently abundant prey types in diet studies of Neotropical birds (Gomes *et al.* 2001, Lopes *et al.* 2005, Aguiar & Coltro-Júnior 2008), Isoptera is not commonly reported in such large quantities and frequency. Nevertheless, previous studies show that these insects are important resources for vertebrates in other arid/semi-arid environments (Advani 1982, Poulin *et al.* 1994, Griffiths & Christian 1996, Gibson 2001, Cabral *et al.* 2006, Hardy & Crnkovic 2006). On the other hand, Formicidae, which is commonly reported as an important food item for birds, are crucial resources for Caatinga birds. In this biome, ants are able to maintain or increase their populations and activity during the dry season, while other insects tend to decrease them (Vasconcellos *et al.* 2010, Nunes *et al.* 2011, Medeiros *et al.* 2012). The large consumption of Lepidoptera larvae, in opposition to the lower importance of other items in several of the species examined in this study possibly follows the same pattern observed in *S. cristatus* (Buainain *et al.* 2015).

Overall, results presented here extend the importance of the main prey type discussed by Buainain *et al.* (2015) to other bird species from a variety of taxonomic group. However, further studies in other localities are needed to verify if the same pattern is observed in birds from other Caatinga areas or, alternatively, the same important prey are important only in the study area.

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APPENDIX I

Qualitative and quantitative descriptions of all samples examined. Abbreviations of prey types: Acari (Aca.), Araneae (Ara.), Blattaria (Bla.), Chilopoda (Chi.), Coleoptera (Col.), Dermaptera (Der.), Diplopoda (Dip.), Diptera (Dipt.), Formicidae (For.), Gastropoda (Gas.), Hemiptera (Hem.), Hymenoptera (Hym.), Lepidoptera (Lep.), Isoptera (Iso.), Neuroptera (Neu.), Odonata (Odo.), Opiliones (Opi.), Orthoptera (Ort.), Pseudoscorpione (Pse.), Scorpiones (Sco.).

Psittacidae - *Aratinga cactorum* (Cactus Parakeet), São Félix do Coribe, Bahia/XI-2010 = MNA 8180: soil fragments, seeds or fruit pulp fragments, stones; Inhuporanga, Ceará/III-1990 = MNA 6809: soil fragments, seeds or fruit pulp fragments, stones.

Cuculidae - *Neomorphus geoffroyi* (Rufous-vented Ground-cuckoo), REBIO de Sooterama, Espírito Santo = I-2007, MNA 5536: 28 Ara., 2 Opi., 8 Ort., 2 Chi., 2 Col.; Floresta da Companhia Vale do Rio Doce (CVRD), Buricicupu, Maranhão/IX-1985 = MPEG A5607: 4 Ort., 1 Chi., 6 Col., 6 For., 1 Hem., 1 Lep. larva, 2 Iso.

Picidae - *Picumnus pygmaeus* (Spotted Piculet), São Félix do Coribe, Bahia/IV-2010 = MNA 5330: 71 Iso., 5 For., 1 Col., MNA 5339: 65 Iso., 2 For., 2 Col., 22 Col. larvae, 1 Hem., MNA 5346: 156 Iso., 5 For., 2 Col., 1 Col. larvae, MNA 5347: 232 Iso., 4 For., MNA 5351: 87 Iso., 5 For., 1 Col., 1 Col. larva, 1 Hem., 1 Pse., MNA 6500: 94 Iso., 4 For., 5 Col. larvae, MNA 6501: 53 Iso., 1 For., 2 Col., MNA 6547: 25 Iso., 3 For., 3 Col., 1 Col. larvae; São Félix do Coribe, Bahia/XI-2010 = MNA 7443: 4 Iso., 9 For., 1 Col., 1 Lep. larvae, MNA 7683: 2 Iso., 1 Col. larvae, 15 Lep. larvae, MNA 7684: 5 Iso., 2 For., 1 Col., 1 Col. larvae

Furnariidae - *Megaxenops parnaguae* (Great Xenops), São Félix do Coribe, Bahia/IV-2010 = MNA 5238: 44 Iso., 7 For., 2 Col., 1 Col. larvae, 3 Ort., MNA 5263: 13 Iso., 9 For., 2 Col., 2 Ort., MNA 5269: 65 Iso., 9 For., 3 Col., 3 Ort., MNA 6300: 214 Iso., 3 For., 1 Col., 2 Ort., MNA 6426: 16 Iso., 2 For., 4 Col., 1 Ort., MNA 6503: 43 Iso., 1 Hym., 6 Ort., MNA 6526: 9 Iso., 5 For., 3 Col., 4 Lep. larvae, 2 Ort.**,** MNA 6537: 6 Iso., 2 For., 1 Col., 1 Lep. larvae, 2 Ort., 1 Ara, 1 Chi., 20 seeds, MNA 6541: 2 Iso., 4 For., 3 Col., 1 Hem., 3 Ort., MNA 6705: 288 Iso., 31 For. (21 pupae), 4 Col., 1 Ara., MNA 6708: 10 Iso., 2 For., 2 Col., 1 Ort., MNA 6714: 43 Iso., 3 For., 3 Col., 1 Lep. larvae, 3 Ort.; São Félix do Coribe, Bahia/XI-2010 = MNA 7027: 4 Iso., 2 For., 1 Col., 2 Lep. larvae, MNA 7029: 1 Iso., 1 For., 1 Col., 1 Lep. larvae, 1 Odo.**,** MNA 7041: 58 Iso., 1 Hym., 1 Col. larvae, 9 Lep. larvae, 1 Neu., MNA 7031: 12 Iso., 6 Col., 11 Lep. larvae, 1 Ort., MNA 7038: 3 Iso., 4 For., 2 Col., 4 Lep. larvae**,** MNA 7042: 1 For., 1 Col., 4 Lep. larvae, MNA 7400: 2 Col., 6 Lep. larvae; São Félix do Coribe, Bahia/IV-2011 = MNA 7201: 11 Iso., 7 For., 3 Col., 4 Ort.**,** MNA 7202: 5 Iso., 4 For., 2 Col., 1 Col. larvae, 3 Ort.**,** MNA 7263: 2 Iso., 7 For.**,** MNA 7403: 45 Iso., 16 For., 1 Col., 1 Col. larvae, 1 Lep. larvea, 2 Ort.

Synallaxis hellmayri (Red-shouldered Spinetail), São Félix do Coribe, Bahia/IV-2010 = MNA 5201: 79 Iso., 3 For., 1 Col., 5 seeds, MNA 5271: 88 Iso., 10 For., 1 Col., 1 Col. larvae, 7 seeds, MNA 5365: 78 Iso., 4 For., 5 Col., 3 Lep. larvae, 6 seeds, MNA 5376: 224 Iso., 2 Col., 1 Lep. larvae, 2 Ara., 1 seed, MNA 6446: 2 For., 1 Lep. larvae, 1 Hem., 1 Ort., 1 seed, MNA 6492: 60 Iso., 5 For., 4 Col., 8 seeds, MNA 6495: 159 Iso., 10 For., 2 Col., 1 Lep., 22 seeds, MNA 6718: 35 Iso., 32 For., 1 Col., 1 Lep. larvae, 6 seeds, MNA 6719: 220 Iso., 6 For., 2 Col., 1 Col. larvae, 1 Ort., 1 Ara., 5 seeds, MNA 7256: 66 Iso., 3 For., 5 Col., 4 seeds, MNA 7260: 48 Iso., 1 For., 1 Col., 9 seeds; São Félix do Coribe, Bahia/XI-2010 = MNA 7505: 8 Iso., 13 Lep. larva, 1 Ort., 4 seeds. MNA 7506: 1 Col., 1 Col. larva, 16 Lep. larvae, 1 Ort., 2 Ara., 1 Neu. larva 1 seed.

Thamnophilidae - *Formicivora serrana* (Serra Antwren), Santana do Deserto, Minas Gerais/II-2014 = MN 50577: 1 Ort., MN 50580: 1 Lep. larva, 1 Hem., 4 Col., 3 Ort., 2 For.; Viçosa, Minas Gerais/III-2014 = MN 50578: 1 Lep. larva, 1 Hem., 1 Col., 2 Ort., 1 Pse., MN 50582: 4 Col., 1 Ort., 1 Ara., 1 seed, 4 Hym., MN 50587: 1 Lep. larva, 4 Col., 1 Ort., 4 For.; Ipatinga, Minas Gerais/III-2014 = MN 50581: 1 Lep. larva, 1 Col. larva, 1 Col., 3 Ort., 4 Ara., 10 For., 1 Iso., 10 seeds, MN 50584: 1 Ort., 1 Ara., 1 For., 14 Iso., 1 Pse., 1 seed, MN 50588: 1 Ort., 1 Ara., 2 For.; Praia de Tucuns, Armação dos Búzios, Rio de Janeiro/III-2014 = MN 50579: 1 Lep. larva, 5 Col., 2 Ara., 1 For., 1 Iso.**,** MN 50582: 1 Lep. larva, 1 Hem., 3 Col., 2 Ort., 3 For., MN 50583: 1 Lep. larva, 1 Ort.; Ilha de Cabo Frio, Arraial do Cabo, Rio de Janeiro/I-2015 = MN 50136: 1 Lep. larva, 7 Col., 1 Ort., 2 For., 21 Iso.**,** MN 50138: 7 Col., 1 Ort., 1 Ara., 5 For., 2 Iso., 1 Chi.**,** MN 50139: 2 Lep. larva, 1 Hem., 16 Col., 1 Ort., 3 For., 8 Iso., MN 50140: 3 Lep. larvae, 2 Col. larva, 3 Col., 1 Ort., 2 Ara., 5 For., 23 Iso., 1 Hym., 2 Bla., MN 50141: 6 Col., 1 Ort., 1 Ara., 5 For., 4 Iso., MN 50142: 2 Hem., 15 Col., 1 Ara., 1 For.

Myrmorchilus strigilatus (Stripe-backed Antbird), São Félix do Coribe, Bahia/IV-2010 = MNA 5247: 10 Iso., 6 For., 1 Col., MNA 5248: 11 Iso., 36 For., MNA 5261: 51 Iso., 25 For., 2 Col., 1 Lep. larva, MNA 5276: 148 Iso., 7 For., 4 Col., MNA 5313: 9 Iso., 11 For., 1 Col., MNA 5318: 64 Iso., 137 For., 3 Col., 1 Pse.; São Félix do Coribe, Bahia/XI-2010 = MNA 7259: 35 Iso., 9 For., 2 Col., 6 Lep. larvae, 1 Chi., 1 Ort.; São Félix do Coribe, Bahia/IV-2011 = MNA 6900: 117 Iso., 60 For., 6 Col., 1 Hym., MNA 7261: 57 Iso., 41 For., 3 Col., 1 Lep.

Herpsilochmus sellowi (Caatinga Antwren), São Félix do Coribe, Bahia/IV-2010 = MNA 6483: 6 Col., 1 Ort., 5 For., 1 Lep., MNA 6484: 3 Col., 2 Ort., MNA 6485: 1 Hem., 5 Col., 8 For., MNA 6512: 1 Col., MNA 6514: 6 Col., 1 Ort., 6 For., MNA 6518: 1 Col., 1 Ort., 1 For., MNA 6521: 1 Lep. larva, 1 Hem., 4 Col., 2 Ort., 6 For., MNA 6523: 8 Col., 1 For., 14 seeds, MNA 6532: 1 Lep. larva, 2 Hem., 4 Col., 1 Ort., 5 For., MNA 6546: 1 Hem., 5 Col., 1 Ort., 1 Hym.; São Félix do Coribe, Bahia/XI-2010 = MNA 8481: 3 Lep. larvae, 6 Hem., 1 Gas., 5 Col., 1 Ort., MNA 8483: 8 Lep. larvae, 3 Hem., 10 Col., 1 Ara., 1 For., 1 Lep., MNA 8484: 2 Lep. larvae, 1 Hem., 3 Col., MNA 8485: 8 Lep. larvae, 1 Hem., 2 Col., 2 Ara., 2 For., MNA 8487: 4 Lep. larvae, 3 Hem., 2 Col., 1 Ort., 1 Iso., MNA 8489: 4 Lep. larvae, 2 Hem., 1 Col., MNA 8493: 11 Lep. larvae, 3 Hem., 4 Col., 3 For., 1 Pse.; São Félix do Coribe, Bahia/IV-2011 = MNA 6734: 5 Col., 47 For., 7 Iso.

Grallariidae - *Hylopezus ochroleucus* (White-browed Antpitta), São Félix do Coribe, Bahia/IV-2011 = MNA 7262: 26 Iso., 17 For., 4 Col., 1 Chi., MNA 7504: 30 Iso., 8 For., 7 Col., 2 Col. larvae, 1 Hem., 1 Ara., 1 seed; Catolândia, Bahia/VI-2013 = MNA 50315: 169 Iso., 8 For., 1 Neu. larva, 1 Dip., 1 Lep. larva, 3 Sco., 2 Ort., 4 Col., 1 Ara.

Rhinocryptidae - *Scytalopus speluncae* (Mouse-coloured Tapaculo), RPPN Santa Bárbara do Caraça, Santa Bárbara, Minas Gerais/III-2008 = MNA 4310: 28 For., 1 Iso., 7 Hem., 2 Col., 1 Ort., 1 Lep. larva, 1 Col. larva., 1 Ara., 1 Der., 1 Hym, 1 veg. material (Bryophyta), MNA 4311: 1 For., 1 Hem., 2 Col., 1 Ort., MNA 4312: 16 For., 6 Iso., 2 Hem., 3 Col., 1 Ort., MNA 4554: 1 For., 4 Col., 1 Ara., 1 Aca., 2 Dipt.; RPPN Santa Bárbara do Caraça, Santa Bárbara, Minas Gerais/VI-2008 = MNA 4555: 3 For., 3 Iso., 1 Hem., 3 Col., 1 Lep. larva, 1 Col. larva, 7 Opi.

Emberizidae - *Coryphospingus pileatus* (Pileated Finch), São Félix do Coribe, Bahia/IV-2010 = MNA 5207: 13 For., 1 Lep. larva, 10 seeds, MNA 5259: 16 Iso., 52 For., 3 Col., 2 seeds, stones, sand, MNA 5331: 49 Iso., 13 For., 1 Lep. larva, 2 Col., 5 seeds, MNA 5340: 35 For., 1 Col., 4 seeds, stones, MNA 5363: 2 Iso., 17 For., 1 Lep. larva, 1 Col., stones; São Félix do Coribe, Bahia/XI-2010 = MNA 3482: 3 Iso., 2 For., 1 Ort., 2 Col., stones, sand, leaf fragments, MNA 8190: 6 Lep. larvae, 3 Col.

Passerellidae - *Arremon franciscanus* (São Francisco Sparrow), Caetité, Bahia/II-2009 = MNA 8252: 6 Iso., 3 For., 2 Lep. larvae, 3 Col., 34 seeds; São Felix do Coribe, Bahia/iv-2010, MNA 5315: empty.