Diet of some Atlantic Forest birds

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ABSTRACT. The diet of many neotropical birds is unknown and these data are essential for the development of conservation strategies. Here we describe the diet of 88 Atlantic Forest bird species, from 326 individuals whose stomach contents were obtained by regurgitation by the use of tartar emetic. Stomach contents were examined in the laboratory under a stereomicroscope. Insects were grouped by Order and other arthropods by Class. Seeds were counted, measured, and identified to family level when possible. The main arthropods in the diet were Coleoptera and Hymenoptera (Formicidae). Seeds ingested were mostly small (< 1.5 mm). New diet studies for neotropical birds are strongly recommended.

KEY WORDS: birds, diet, Atlantic Forest, neotropical, tartar emetic.

The knowledge about the diet of Brazilian birds is exiguous. Even though such kind of data is essential for the understanding of a species’ natural history and to the development of conservation strategies for it (Bartholomew 1986), long and descriptive diet studies are nowadays hardly ever published. Until quite recently, there were only three studies that examined in details the diet of a large number of tree species (e.g. Francisco and Galetti 2001, Valente 2001, Zimmermann 2001), occasional observations of some “curiosities” (e.g. Ghizoni Jr. et al. 2000, Andrade et al. 2001), diet description of one or a few species (e.g. Marini and Cavalcanti 1998, Gomes et al. 2001, Mallet-Rodrigues et al. 2001), or the stomach content analysis of birds collected for other purposes (e.g. Pacheco and Gonzaga 1995, Simon and Pacheco 1996). The result is that almost 40 years after the publication of the very important paper of Schubart et al. (1965), we had advanced very little on the comprehension of the diet of Brazilian birds. Believing that a detailed knowledge about a species’ diet is essential for its conservation, we present stomach content data for 88 bird species from the southeast Brazilian Atlantic Forest.

STUDY AREAS AND METHODS

We sampled nine large Atlantic Forest fragments (more than 1000 ha) from the Minas Gerais State, southeastern Brazil (table 1). Some small fragments (less than 30 ha) nearby those large ones were also sampled. Birds were mist-netted and the stomach contents obtained through oral administration of a solution of potassium antimony tartrate (1.2%), in a dosage of 0.8 ml per 100 g body mass (Durães and Marini 2003). Birds captured during the first hour of the day did not received any treatment, being immediately

In the Neotropics, other important works are those of Marelli (1919), Aravena (1927, 1928), Zotta (1932, 1934, 1936, 1940) and Olrog (1956), who have examined the stomach contents of several birds from Argentina, many of them also occurring in Brazil. Studies conducted in Costa Rica (Sherry 1984) and Venezuela (Poulin et al. 1994a), should also be noted. Nevertheless, these studies, with the exception of those of Poulin et al. (1994a) and Durães and Marini (2005), were performed through specimens collected for museums, resulting in a lack of large samples for each species, turning difficult or even precluding broader conclusions.
released, avoiding the administration of the tartar emetic on individuals that had not enough time to feed. This simple procedure reduces significantly the risk of death caused by the tartar emetic (Durães and Marini 2003). We administered the tartar emetic to individuals captured until two hours before sunset, thus permitting that individuals had enough time to recover from capture and even feed before dusk.

After the administration of the tartar emetic, birds were settled in a carton box lined with absorbent paper and stayed there until they regurgitated or for a maximum period of 20 minutes. The occurrence of regurgitation could be easily verified through the increase in the level of activity of the bird, which suddenly became agitated. Stomach contents obtained were conserved in a 70% ethanol solution and examined in the laboratory under a stereomicroscope.

Arthropods found were examined through well-illustrated textbooks in entomology as Peterson (1962), Borror et al. (1989), and CSIRO (1991). We also used for comparison arthropod fragments mounted on clear microscope slides, as well as a reference collection composed by arthropods conserved in alcohol as proposed by Rosenberg and Cooper (1990). In many occasions we were forced to consult experienced entomologists. Once identified, arthropod fragments were counted and grouped in orders (insects) or classes (other arthropods). The only exception was the Formicidae, which, because of its easiness of identification and its abundance in the diet of birds, were split in a separate class. Larvae where also split from adult insects. We estimated the minimum number of preys ingested. For many of the insect eggs observed in the samples corresponded in morphology to that of adult insects observed in the stomach of the same bird. However, we must stress that bird predation upon insect eggs occurs in natural conditions, as demonstrated by the observation of insect eggs parasitized by microhymenopteran, a kind of parasitism that only occurs after oviposition (Borror et al. 1989).

Seeds were counted and grouped in morphotypes, because the small period of sampling in each area precluded the assemblage of a reference collection, fundamental to the identification of many plant species (Rosenberg and Cooper 1990).

**RESULTS AND DISCUSSION**

We examined 326 stomach contents from 88 bird species, identifying 4,970 food items. The results of these analyses are presented in the Appendix. Once we did not perform a rigid control of the regurgitation success during the initial stage of data collection, it was not possible to determine the efficiency of the methodology for all individuals treated. However, a control performed with 175 individuals revealed a regurgitation success of identifiable material of 60.5% and a mortality of 2.3%. The efficiency obtained with the methodology was very inferior to the 88% obtained by Poulin et al. (1994b), the 82% by Mallet-Rodrigues et al. (1997) and the 70% by Durães and Marini (2003). The mortality, however, was lower than the 10% obtained by Durães and Marini (2003), similar to the 2% obtained by Poulin et al. (1994b) and the 2.6% obtained by Mallet-Rodrigues (1997).

Three threatened species (Collar et al. 1992, IBAMA 2003) had their diet studied, one for the first time (Rhopornis ardesiacus) and two (Dysithamnus plumbeus and Synallaxis cinerea) had only anecdotal information available in the literature (Schubart et al. 1965, Collar et al. 1992, Pacheco and Gonzalez 1995). Six other species studied here (Conopophaga lineata, Thamnophilus caerulescens, Xiphorhynchus fuscus, Automolus leucophthalmus, Sclerurus scansion, and Platyrinchus mystaceus) have also one or more subspecies classified as threatened by IBAMA (2003).

Figure 1 provides us an idea about the proportion of each food item observed in the diet of Passerines. The high consumption of Formicidae and Coleoptera by birds is not surprisingly, being also reported in previous studies (Poulin et
The great number of Stratiomyidae larvae (Diptera) ingested by four *R. ardesiacus* specimens captured in June 2001 (40.7 ± 12.5 larvae per stomach) must be highlighted. The two specimens collected by Rômulo Ribon and Marcos Maldonado-Coelho in April 2000 (IBAMA, collection permit number 11392/99) that had their stomach contents analyzed here also ingested Stratiomyidae larvae, but in a small quantity (four and three larvae ingested). Formicidae and Coleoptera here also ingested Stratiomyidae larvae, but in a small quantity. The tartar emetic proved to be an efficient method in sample gathering and safe to the birds, being an ethical and philosophical alternative to specimens’ collection. On the other hand, stomach content analysis of specimens collected for museum preparations are strongly recommended, independently of the collection purpose. The publication of such studies should be encouraged, because this is the only way to supplant the large gap observed today in our knowledge about the diet of neotropical birds.

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REFERENCES


APPENDIX

Food items observed in 326 stomach contents of 88 species of Atlantic Forest birds. Taxonomy of species and families follows the Brazilian Ornithological Records Committee (CBRO 2005). For each sample analyzed we presented first the initials of the area where it was collected as follows: Reserva Particular do Patrimônio Natural Mata do Sossego (RPPNMS), Mata do Jambreiro (MJ), Reserva Biológica da Mata Escura (ME), Parque Estadual da Serra do Brigadeiro (PESB), Parque Estadual do Rio Doce (PERD), Grande Mata de São Bartolomeu (GMSB), Fazenda Santana (FS), Reserva Privada do Patrimônio Natural Feliciano Miguel Abdala (RPPNFMAD), and Fazenda Pirapitinga (FP).

The indicates that the sample was collected in the small fragment adjacent to the main one. The name of each prey groups was abbreviated in the following way: Ephemeroptera (Eph.), Odonata (Odo.), Phasmida (Pha.), Orthoptera (Ort.), Mantodea (Man.), Blattaria (Bla.), Isopoda (Iso.), Dermaptera (Der.), Psocoptera (Pso.), Mallophaga (Mal.), Hemiptera (Hem.), Homoptera (Hom.), Neuroptera (Neu.), Coleoptera (Col.), Diptera (Dipt.), Trichoptera (Tri.), Lepidoptera (Lep.), Hymenoptera (Hym.), Formicidae (For.), Araneae (Ara.), Scorpiones (Sco.), Pseudoscorpiones (Pse.), Opiliones (Opi.), Acari (Aca.), Diplodopoda (Dipl.), Chilopoda (Chi.), Gastropoda (Gas.). Unidentified arthropod fragments, although commonly observed, are only mentioned when no single arthropod group could be identified. By the same way, fruit pulp, is only mentioned when no single seed was found.

**FAMILY COLUMBIIDAE**

*Leptotila rufaxilla* (Grey-fronted Dove)
SD = Hem. 2, Col. 3, Lep. 1, For. 1, Ara. 1.

**FAMILY CUCULIDAE**

*Tapera naevia* (Striped Cuckoo)
SD = Ort. 1, Man. 1, Hem. 2, Hom. 7.

**FAMILY GALBULIDAE**

*Galbula ruficauda* (Rufous-tailed Jacamar)
SD = Pha. 1, Hem. 1, Lep. 1, Hym. 3, For. 1, Ara. 3.

**FAMILY BUCCONIDAE**

*Pycnonotus sinensis* (Scaled Antbird)
SD = Col. 3, Lep. 1, For. 1.

**FAMILY PICIDAE**

*Picumnus cirratus* (White-barred Piculet)
ME = Col. 1, Hym. 1, For. 1.

**FAMILY THAMNOPHILIDAE**

*Drynaphila ferruginea* (Ferruginous Antbird)
ME = Col. 1, Lep. 1, For. 1.

**Drynaphila ocraoptyla** (Ochre-rumped Antbird)
ME = Col. 1, Lep. 1, For. 1, Ara. 1.

**Drynaphila squamata** (Scaled Antbird)
ME = Col. 1, Lep. 1, For. 1, Ara. 1.

**Dysithamnus mentalis** (Plain Antvireo)
SD = Dipt. larva 1, Lep. 1, For. 1, Ara. 1.

**Dysithamnus plumbbeus** (Plumbeous Antvireo)
ME = Col. 1, Lep. 1, For. 1, Ara. 1.

**Myrmeciza americana** (White-bibbed Antbird)
ME = Col. 1, Lep. 1, For. 1, Ara. 1.

**Pyrgilena leuconota** (White-shouldered Fire-eye)
ME = Hem. 1, Lep. 1, For. 1, Ara. 1.

**Rhopornis ardesiacus** (Slender Antbird)
SD = Hem. 1, Lep. 1, For. 1, Ara. 1.

**Nonnula rubecula** (Rusty-breasted Nunlet)
FP = Hom. 1, Col. 2, Dipt. 1, For. 4, Ara. 2.

**Rhodopis serroelegua** (White-tailed Nunlet)
ME = Col. 1, Lep. 1, For. 1, Ara. 1.

**Veniliornis maculifrons** (Yellow-eared Woodpecker)
ME = Col. 1, Lep. 1, For. 1, Ara. 1.

**Veniliornis passerinus** (Little Woodpecker)
ME = Col. 1, Lep. 1, For. 1, Ara. 1.
**FAMILY CONOPHAGIDAE**

*Thamnophilus ambiguus* (Sooretama Slaty-Antshrike)

PERD = Ort. 1, Hem. 2, Col. 2, Ara. 2.

PERD = Pha. 1, Iso. 7, Hem. 1, Col. 2, Ara. 1.

PERD = Col. 1, Hym. 1, Ara. 1.

SDf = Hom. 3, Lep. 1, Lep. larva 6, Ara. 1.

**Thamnophilus caerulescens** (Variable Antshrike)

MJ = Bla. ootheca 1, Hom. 1, Col. 3, Dipt. 1, Lep. 1, Hym. 1, Ara. 1.

MJf = Col. 1, For. 22.

ME = Bla. ootheca 1, Hom. 1, Col. 3, Dipt. 1, Lep. 1, Hym. 1, Ara. 1.

ME = Col. 2, Dipl. 1.

SD = Bla. ootheca 1, oot. Man. 1, Man. 1, Hem. 1, Col. 2, Lep. 1, For. 1, Solanum sp. seed (3.2 mm) 1.

SD = Bla. ootheca 1, Hem. 3, Col. 2, Lep. 1, For. 2.

SD = Bla. ootheca 1, For. 3, Dipl. 1.

SD = Col. 1.

SD = Ort. 1, Col. 1, Dipt. 1, Dipl. 1

SD = Col. 1, Gas. 1.

SD = Col. 1, Lep. larva 5, Ara. 1, Dipt. 1, Gas. 1.

SD = Col. 2.

SD = Iso. 1, Hom. 1, Col. 1, Lep. larva 3.

SD = Col. 1, Lep. larva 1.

SD = Hom. 1, Lep. larva 1, Dipl. 1.

SD = Hom. 2, Col. 1.

SD = Col. 1.

**FAMILY DENDROPTERIDAE**

*Conopophaga lineata* (Rufous Gnateater)

GMSB = Hem. 1, Col. 2, Lep. larva 9, For. 1, Opi. 1.

ME = Col. 1, For. 20, Ara. 1.

MJ = Neu. larva 1, Col. 7, Lep. 1, Lep. larva 1, For. 19, Ara. 1.

MJ = Col. 2, Lep. 1, For. 12, Ara. 1, Pse. 1.

MJ = Col. 1, For. 11.

MJ = Hem. 1, Col. 1, Lep. 1, For. 27.

MJ = Col. 1, For. 15.

MJ = For. 11, seed (4 mm) 2.

MJ = Col. 3, Col. larva 1, For. 30, Ara. 2, Sco. 1, Opi. 1.

MJ = Hem. 1, Col. 2, Hym. 1, For. 22, Ara. 1.

MJ = Hem. 1, Col. 1, For. 42, Ara. 1.

MJ = For. 11, Ara. 1.

MJ = Hem. 1, Col. 1, For. 18, Pse. 2.

PESB = Col. 2, For. 2.

PESB = Col. 2, For. 8.

PESB = Col. 1, For. 1.

FAMILY SCLERURIDAE

*Sclerurus scansor* (Rufous-breasted Leaf-tosser)

ME = Ara. 1.

FAMILY DENDROCOLAPTIDAE

*Camptorhamphus falcularius* (Black-billed Scythebill)

ME = Ort. 1, Hem. 1, Col. 2, For. 5, Ara. 1, Sco. 1, Dipl. 1.

**Dendrocincla turdina** (Thrush-like Woodcreeper)

ME = Lep. 1, Hym. 1.

**Lepidocolaptes squamatus** (Scaled Woodcreeper)

RPPNFMAf = Col. 3, For. 10.

RPPNFMAf = Col. 6, Lep. 1, For. 3.

**Sittasomus griseicapillus** (Olivaceous Woodcreeper)

GMSB = Bla. ootheca 4, Hem. 4, Col. 6, Lep. 1, Lep. larva 1, Hym. 2, For. 32, Opi. 1, Dipl. 1.

SD = Col. 2, Lep. larva 6, Ara. 1, Dipl. 1.

SD = Bla. ootheca 1, Hem. 1, Col. 3, Pse. 1, Chi. 1.

SD = Col. 1.

SD = Col. 1, Lep. larva 5, Ara. 1, Dipt. 1, Gas. 1.

SD = Col. 2.

SD = Iso. 1, Hom. 1, Col. 1, Lep. larva 3.

SD = Col. 1, Lep. larva 1.

SD = Hom. 1, Lep. larva 1, Dipt. 1.

SD = Hom. 2, Col. 1.

SD = Col. 1.

**FAMILY FURNARIIDAE**

*Anabazenops fuscus* (White-collared Foliage-gleaner)

GMSB = Hem. 1, Col. 2, Lep. 1, Ara. 1.

ME = Col. 1, For. 20, Ara. 1.

MJ = Neu. larva 1, Col. 7, Lep. 1, Lep. larva 1, For. 19, Ara. 1.

MJ = Col. 2, Lep. 1, For. 12, Ara. 1, Pse. 1.

MJ = Col. 1, For. 11.

MJ = Hem. 1, Col. 1, Lep. 1, For. 27.

MJ = Col. 1, For. 15.

MJ = For. 11, seed (4 mm) 2.

MJ = Col. 3, Col. larva 1, For. 30, Ara. 2, Sco. 1, Opi. 1.

MJ = Hem. 1, Col. 2, Hym. 1, For. 22, Ara. 1.

MJ = Hem. 1, Col. 1, For. 42, Ara. 1.

MJ = For. 11, Ara. 1.

MJ = Hem. 1, Col. 1, For. 18, Pse. 2.

PESB = Col. 2, For. 2.

PESB = Col. 2, For. 8.

PESB = Col. 1, For. 1.

**Automolus leucophthalmus** (White-eyed Foliage-gleaner)

ME = Col. 1, For. 1.

**Perdicula leucopus** (Pale-legged Hornero)

ME = Col. 1, For. 1.

**Furnarius leucopus** (Pale-legged Hornero)

ME = Col. 1, For. 1.

**Sittasomus griseicapillus** (Olivaceous Woodcreeper)

RPPNFMAf = Col. 6, Lep. 1, For. 3.

**Sittasomus griseicapillus** (Olivaceous Woodcreeper)

GMSB = Bla. ootheca 4, Hem. 4, Col. 6, Lep. 1, Lep. larva 1, Hym. 2, For. 32, Opi. 1, Dipl. 1.

SD = Col. 2, Lep. larva 6, Ara. 1, Dipl. 1.

SD = Bla. ootheca 1, Hem. 1, Col. 3, Pse. 1, Chi. 1.

SD = Col. 2, Lep. larva 2, Ara. 1, Pse. 1, Dipl. 2.

SD = Bla. ootheca 1, Col. 1, Ara. 1, Dipl. 1, Chi. 1.

**FAMILY Furnariidae**

*Anabazenops fuscus* (White-collared Foliage-gleaner)

ME = Hom. 1, Hem. 1, Col. 3, Dipt. larva 1, Lep. larva 2, Ara. 5, Dipl. 1

SD = Col. 2, Lep. larva 6, Ara. 1, Dipl. 1.

SD = Bla. ootheca 1, Hem. 1, Col. 3, Pse. 1, Chi. 1.

SD = Col. 2, Lep. larva 2, Ara. 1, Pse. 1, Dipl. 2.

SD = Bla. ootheca 1, Col. 1, Ara. 1, Dipl. 1, Chi. 1.

**FAMILY Furnariidae**

*Anabazenops fuscus* (White-collared Foliage-gleaner)

ME = Hom. 1, Hem. 1, Col. 3, Dipt. larva 1, Lep. larva 2, Ara. 5, Dipl. 1

SD = Col. 2, Lep. larva 6, Ara. 1, Dipl. 1.

SD = Bla. ootheca 1, Hem. 1, Col. 3, Pse. 1, Chi. 1.

SD = Col. 2, Lep. larva 2, Ara. 1, Pse. 1, Dipl. 2.

SD = Bla. ootheca 1, Col. 1, Ara. 1, Dipl. 1, Chi. 1.

**FAMILY Furnariidae**

*Anabazenops fuscus* (White-collared Foliage-gleaner)

ME = Hom. 1, Hem. 1, Col. 3, Dipt. larva 1, Lep. larva 2, Ara. 5, Dipl. 1

SD = Col. 2, Lep. larva 6, Ara. 1, Dipl. 1.

SD = Bla. ootheca 1, Hem. 1, Col. 3, Pse. 1, Chi. 1.

SD = Col. 2, Lep. larva 2, Ara. 1, Pse. 1, Dipl. 2.

SD = Bla. ootheca 1, Col. 1, Ara. 1, Dipl. 1, Chi. 1.
SDf = Hom. 1, Col. 3, Lep. larva 1, For. 2, Opi. 1.
SDf = Col. 11, For. 2.

**Lochmias nematura** (Sharp-tailed Streamcreeper)
MJ = Col. 3, Col. larva 1, Dipt. 3, Lep. 1, Lep. larva 1, For. 7, Ara. 1, Anura 1.
RPPNMS = Bla. ootheca 2, Hem. 1, Col. 4, Dipt. larva 2, For. 1, Pse. 1, Gas. 2.
RPPNMS = Hem. 1, Col. 31, For. 1, seed (2.2 mm) 3.

**Philydor lichtensteini** (Ochre-breasted Foliage-gleaner)
ME = Mal. 8, Hem. 1, Col. 3, For. 9, Ara. 1.

**Philydor rufum** (Buff-fronted Foliage-gleaner)
MJ = Bla. ootheca 1, Hem. 2, Hom. 1, Col. 4, Lep. 1, Ara. 1.

**Synallaxis cinerea** (Bahia Spinetail)
ME = Bla. ootheca 2, Hem. 1, Col. 4, Hym. 1, For. 1, Ara. 1, unident. insect pupa 1.

**Synallaxis frontalis** (Sooty-fronted Spinetail)
SDf = Hom. 1, Col. 3, Lep. 1, Lep. larva 2.
SDf = Col. 3.

**Synallaxis ruficapilla** (Rufous-capped Spinetail)
PESB = Bla. ootheca 1, Col. 5.

**Syndactyla rufosuperciliata** (Buff-browed Foliage-gleaner)
MJ = Col. 1, For. 8, Ara. 4, Aca. 6.
MJ = For. 35, Ara. 1.
MJ = Col. 1, For. 3.

**FAMILY TYRANNIDAE**

**Attila rufus** (Grey-hooded Attila)
PESB = Bla. ootheca 1, Ara. 1.
RPPNMS = Col. 1, Lep. 1, Ara. 1.

**Casiornis fuscus** (Ash-throated Casiornis)
MEf = Col. 1, Lep. 1.
MEf = Hom. 3, Col. 1, Dipt. 1, Lep. 1, Hym. 1.
SDf = Hom. 1, Col. 1, Ara. 1, Gas. 1.
SDf = Hom. 3.

**Cnemotriccus fuscatus** (Fuscous Flycatcher)
MEf = Col. 4, Lep. larva 7, For. 1.

**Corythophis delalandii** (Southern Antpipit)
FP = Bla. 1, Pso. 1, Hem. 1, Hom. 3, Col. 12, Dipt. 5, Lep. larva 4, Hem. 1, Ara. 6.
GMSB = Hem. 5, Hom. 1, Col. 2, Hym. 1, Ara. 1.

**Lathrotriccus euleri** (Euler’s Flycatcher)
GMSB = Hem. 1, Col. 4, Hym. 1, For. 1.
PESB = Col. 10.
SD = For. 1.
SD = Hom. 2, Col. 2, Dipt. 1, Dipl. 1.
SD = Hem. 2, Col. 1, Dipt. 6, Lep. 1, Hym. 1.
SD = Col. 2, Lep. 1, Hym. 1, For. 5.

**Leptopogon amaurocephalus** (Sepia-capped Flycatcher)
ME = Col. 1, Ara. 1.
RPPNFMa = Hem. 1, Col. 1, Ara. 1.
RPPNFMa = Hem. 1, Ara. 1.

**Myiobius flaviventris** (Grey-hooded Flycatcher)
MJ = Ara. 1.
RPPNMS = Ara. 1, fruit pulp.
RPPNMS = fruit pulp.

**Myiarchus ferox** (Short-crested Flycatcher)
PESB = Lep. 1.
RPPNFMa = Hem. 1, Hom. 1, Col. 1, Hym. 1.

**Myiarchus swainsoni** (Swainson’s Flycatcher)
RPPNFMa = Odo. 2, Col. 1, Dipt. 4, seed (8 mm) 2.

**Myiarchus tuberculifer** (Dusky-capped Flycatcher)
SDf = Hom. 2, Col. 2.
SDf = Hom. 1.

**Myiarchus tyrannulus** (Brown-crested Flycatcher)
SD = Hom. 3, Lep. larva 4, Ara. 1.
SD = Hom. 1.
SD = Lep. 1, For. 2.
SD = Hom. 4, Col. 1, Lep. 1.
SD = Hom. 1, Col. 1.

**Myiodyastes maculatus** (Streaked Flycatcher)
PESB = Hem. 6, Col. 4, For. 12.

**Myiopagis caniceps** (Grey Elaenia)
RPPNFMa = Hom. 1, Col. 1, Hym. 1.
RPPNFMa = Col. 3.

**Myiopagis viridicata** (Greenish Elaenia)
ME = Lep. larva 3.

**Myiozetetes similis** (Social Flycatcher)
PERD = Melastomataceae seed (0.7mm) 34, seed (2 mm) 36.

**Pitangus sulphuratus** (Great Kiskadee)
RPPNFMa = Lep. 1, banana pulp.
SD = Hom. 1.
SD = Hom. 12.
SD = Hom. 9.

**Platyrinchus mystaceus** (White-throated Spadebill)
ME = Bla. ootheca 12, Pha. 1, Col. 2, Lep. 1, Hym. 1.
ME = Col. 6, For. 1.

**Tolmomyias flaviventris** (Yellow-breasted Flycatcher)
ME = Bla. ootheca 12, Pha. 1, Col. 2, Lep. 1, Hym. 1.
ME = Col. 6, For. 1.

**Tolmomyias sulphurescens** (Yellow-olive Flycatcher)
FP = Hem. 1, Hom. 1, Col. 6, For. 1.
MJ = Lep. larva 3.
MJ = For. 3.
RPPNFMa’ = Col. 1.
RPPNFMa’ = Col. 4, Lep. 1.

**Tyrannus melancholicus** (Tropical Kingbird)
SD = Hom. 12, Col. 3, Hym. 2.
FAMILY PIPRIDAE

Antilophia galeata (Helmeted Manakin)
MJ = seed (3.5 mm) 1.

Chiroxiphia caudata (Swallow-tailed Manakin)
ME = Ara. 1, seed (3 mm) 1.
RPPNMS = Melastomataceae seed (1 mm) 125, seed (1.2 mm) 3, seed (3.5 mm) 1.

Manacus manacus (White-bearded Manakin)
PERD = seed (6 mm) 2.
RPPNFMA = Lep. larva 1, Melastomataceae seed (1 mm) 3, seed (7.5 mm) 3.
RRPNMSf = Hem. 1, Col. 3, Lep. 1, For. 4, Ara. 1.

FAMILY TITYRIDAE

Pachyramphus polychopterus (White-winged Becard)

Schiffornis virescens (Greenish Manakin)
ME = Lep. 1, Lep. larva 2, seed (2.5 mm) 9.

FAMILY VIREONIDAE

Cylindricalis gujanensis (Rufous-browed Peppershrike)
MJ = Ara. 1.

Hylophilus amaurocephalus (Grey-eyed Greenlet)
PESBf = Hem. 1.

FAMILY TROGLODYTIDAE

Thryothorus genibarbis (Moustached Wren)
RPPNFMA = Bla. ootheca 1, Col. 1, Lep. 1, For. 2, Ara. 1.

Thraupis sayaca (Sayaca Tanager)
RPPNMSf = Arthrop. frags., Melastomataceae seed (1 mm) 1. 17.

Trichothraupis melanops (Black-goggled Tanager)
ME = Col. 1, Hym. 1, banana pulp.

Thraupis sayaca (Sayaca Tanager)
RPPNMSf = Hym. 2, Ara. 1, seed (2.2 mm) 1, banana pulp.
RPPNMSf = Hym. 1, Melastomataceae seed (1.2 mm) 36, banana pulp.
RPPNMSf = Banana pulp.
RPPNMSf = Hym. 1, banana pulp.

Tangara desmaresti (Brassy-breasted Tanager)
RPPNMSf = Banana pulp.
RPPNMSf = Hym. 1, banana pulp.

Tangara cayana (Burnished-buff Tanager)
ME = Col. 1, Hym. 1, For. 1, seed (4.5 mm) 1.

FAMILY THRAUPIDAE

Habia rubica (Red-crowned Ant-Tanager)
PERD = Col. 1, Gas. 1, fruit pulp.

Nemosia pileata (Hooded Tanager)
SD = Hom. 1, Col. 3, Lep. larva 2.

Tachyphonus coronatus (Ruby-crowned Tanager)
GMSB = Ara. 1, seed (2 mm) 7.

Tangara cayana (Burnished-buff Tanager)
RPPNMSf = Arthrop. frags., seed (1.2 mm) 9, Cecropia glaziovii seed (2 mm) 4.

Tangara desmaresti (Brassy-breasted Tanager)
RPPNMSf = Melastomataceae seed (1 mm) 117.

Thraupis sayaca (Sayaca Tanager)
RPPNMSf = Hym. 2, Ara. 1, seed (2.2 mm) 1, banana pulp.
RPPNMSf = Hym. 1, Melastomataceae seed (1.2 mm) 36, banana pulp.
RPPNMSf = Banana pulp.

Trichothraupis melanops (Black-goggled Tanager)
ME = Col. 1, Hym. 1, For. 6, Melastomataceae seed (1 mm) 81.
ME = Lep. 1, Hym. 5, Melastomataceae seed (1 mm) 23.
ME = Bia. ootheca 1, Hom. 1, Col. 2, Lep. 1, Hym. 2, Ara. 1, seed (4.5 mm) 1.

Thraupis sayaca (Sayaca Tanager)
RPPNMSf = Hym. 2, Ara. 1, seed (2.8 mm) 8.

Tangara cayana (Burnished-buff Tanager)
ME = Col. 1, Hym. 1, For. 1, seed (4.5 mm) 1.

Tyrannus sayaca (Sayaca Tanager)
RPPNMSf = Hym. 5, For. 1.

Tangara desmaresti (Brassy-breasted Tanager)
RPPNMSf = Col. 1, seed (2 mm) 3.
RPPNMSf = Arthrop. frags., seed (2 mm) 8.
RPPNMSf = Col. 1.

RPPNMSf = Col. 1.
RPPNMSf = Col. 3, Hym. 1.

RPPNMSf = Col. 3, Hym. 1, Gas. 1.
RPPNMSf = Arthrop. frags., Melastomataceae seed (1 mm) 12, seed (4 mm) 3.
RPPNMSf = Hom. 1, Col. 1, Hym. 1, seed (3 mm) 15.
RPPNMSf = Col. 1, Hym. 1, Melastomataceae seed (1 mm) 61, seed (1.5 mm) 2, seed (2 mm) 1.
Diet of some Atlantic Forest birds

**FAMILY EMBERIZIDAE**

*Coryphospingus pileatus* (Grey Pileated-Finch)
- MEf = Arthrop. frags., dry seed (1.5 mm) 4.
- MEf = Hom. 1, Col. 1, For. 1, dry seed (1.8 mm) 15.

*Haplospizaunicolor* (Uniform Finch)
- PESBf = For. 2.
- PESBf = For. 1, dry seed frags.

**FAMILY CARDINALIDAE**

*Saltator maximus* (Buff-throated Saltator)
- PERDf = Arthrop. frags.

*Saltator similis* (Green-winged Saltator)
- RPPNMSf = Col. 1, Melastomataceae seed (1 mm) 7.

**FAMILY PARULIDAE**

*Basileuterus culicivorus* (Golden-crowed Warbler)
- ME = Bla. ootheca 1, Hem. 1, Col. 5, Lep. 1, Hym. 2, For. 2.
- PESBf = Bla. ootheca 1, Col. 3.
- RPPNFMA = Col. 1, Hym. 3, Ara. 2.

*Basileuterus hypoleucus* (White-bellied Warbler)
- MJf = Hom. 1, Col. 4, Hym. 1, For. 9.

*Basileuterus flaveolus* (Flavescent Warbler)
- FP = Ort. 3, Hem. 1, Hom. 5, Col. 3, Dipt. 5, Lep. 9, Hym. 1, For. 1, Ara. 9.
- FP = Iso. 8, Hom. 1, Dipt. 2, Lep. 1, Ara. 1.
- FPf = Hom. 1, Col. 1, Lep. 1.
- MEf = Col. 1, Lep. 1, Hym. 2, For. 4, Ara. 1.

*Basileuterus leucoblepharus* (White-rimmed Warbler)
- MJf = Col. 6, Hym. 2, For. 26.
- MJf = Col. 5, For. 45.

**FAMILY FRINGILLIDAE**

*Euphoniapectoralis* (Chestnut-bellied Euphonia)
- MJ = Hym. 1, For. 1, Melastomataceae seed (1 mm) 62, seed (1 mm) 9, seed (2.5 mm) 8, seed (4 mm) 15, seed (5 mm) 1.