

## RESEARCH NOTE / NOTA CIENTÍFICA

### ENDOPARASITES AS ENVIRONMENTAL QUALITY INDICATORS IN WILD BIRDS IN TINGUÁ BIOLOGICAL RESERVE, RIO DE JANEIRO, BRAZIL

### LOS ENDOPARÁSITOS COMO INDICADORES DE CALIDAD AMBIENTAL EN AVES SILVESTRES EN LA RESERVA BIOLÓGICA DE TINGUÁ, RÍO DE JANEIRO, BRASIL

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#### Abstract

Wild birds are hosts of a variety of parasites. Their migratory behavior increases the dispersion of parasites and consequently the occurrence of diseases in various locations around the world. To identify the parasitological fauna of wild birds in the Tinguá Biological Reserve in Rio de Janeiro state-Brazil, 43 birds belonging to the orders Passeriformes and Columbiformes were captured and stool samples collected. Four birds (9.3%) were positive for parasites. In the fecal samples, trematode eggs of the *Tanaisia* sp and oocysts of coccidia as *Isospora* sp were found. The low parasite prevalence in wild birds found in this study may be an environmental quality indicator, because the reserve is a preserved area that has little human interference. We emphasize also that the use of the technique of collecting stool samples with anal swabs was successful for diagnostic purposes.

**Keywords:** endoparasites - indicator - parasite prevalence - wild birds.

#### Resumo

Aves silvestres são hospedeiras de uma diversidade de parasitos e o comportamento migratório aumenta a dispersão dos parasitos e consequentemente a ocorrência de enfermidades em diversas localidades do mundo. Com o objetivo de conhecer a fauna parasitológica de aves silvestres de uma Reserva Biológica do estado do Rio de Janeiro, 43 aves pertencentes às ordens Passeriformes e Columbiformes foram capturadas e amostras de fezes colhidas. A prevalência parasitária das aves capturadas foi de 9,3% (4/43). Foram encontrados nas amostras de fezes, ovos de trematódeo do gênero *Tanaisia* e oocistos de coccídeos pertencentes ao gênero *Isospora*. A baixa prevalência parasitária em aves silvestres encontrada no presente estudo pode ser um indicador de qualidade ambiental, pois a reserva é uma área conservada que possui pouca interferência humana. Destacamos, também, que o uso da técnica de coleta das fezes através de swab anal, revelou-se eficaz para fins de diagnóstico.

**Palavras-chave:** Aves silvestres - endoparasitas - indicador - prevalência parasitária.

## INTRODUCTION

Wild birds are hosts of a great diversity of parasites and their migratory behavior increases the dispersion of parasites and consequently the occurrence of diseases in various places in the world (Freitas *et al.*, 2002; Reed *et al.*, 2003). Thus, avian endoparasites are of great importance to public health (Costa *et al.*, 2010), and knowledge of the parasitic fauna of birds contributes to prevention and control of parasites. In addition, some parasites, especially fish parasites, can act as biological indicators of environmental contaminants (Overstreet, 1997; Dzika & Wyzlic, 2011). These organisms respond specifically to environmental changes, induced by natural or anthropogenic events (Overstreet, 1997). Thus, the objectives of this study were to verify the occurrence of gastrointestinal parasites in wild birds from the Tinguá Biological Reserve, municipality of Nova Iguaçu, state of Rio de Janeiro, and analyze the parasite prevalence in birds as a biological indicator of environmental quality.

## MATERIAL AND METHODS

### Capture of Birds

Wild birds from the Tinguá Biological Reserve (22 ° 28'-22 ° 39'S and 43 ° 13'-43 ° 34'W), municipality of Nova Iguaçu, state of Rio de Janeiro, were captured during April to June 2012, using mist nets (12 x 2.5 m/mesh 16x16 mm linearly), arranged between the morning and twilight. The birds identified and classified in according with Sigrist (2007) and CBRO (2009). The capture and release carried out by permission of the Biodiversity Information System (SISBIO 16753-1/2009).

The sampled of feces were collected by using sterile swabs introduced into rectum of each bird and were maintained in test tubes containing 2% formaldehyde until the coproparasitological (De Carli, 1994).

### Collection of feces and coproparasitological examination

In the laboratory, fecal samples processed by the technique of centrifugal flotation in sucrose solution. Slides prepared from fecal samples analyzed under an optical microscope for verification and identification of parasitic (Figueiredo *et al.*, 1984) oocysts and helminths eggs (Soulsby, 1987).

## RESULTS AND DISCUSSION

Forty-three birds (43) belonging to the orders Columbiformes and Passeriformes were captured, of which 90.7% were Passeriformes. Table 1 presents the number of species captured and the percentage of positive individuals, representing 9.3% (4 birds). In the fecal samples from *Tangara sayaca* (Linnaeus, 1766) were found eggs of the trematode *Tanaisia* sp. Oocysts of coccidia of the genus *Isospora* were identified in the feces of *Sporophila cearulensis*, *Jacarina volatinia* and *Columbina talpacot* (Table 1). The prevalence of parasitism by coccidia (6.3%) was higher than the prevalence of helminths (2.3%).

The parasitic prevalence in this study was low, according to Marietto-Gonçalves *et al.* (2009), with 2.4% of parasitism in wild birds, and Freitas *et al.* (2002), who highlight the existence of a smaller parasitic prevalence in free-living birds when compared with captive animals, because these last are constantly in contact with contaminated environments. However, our outcomes were contrasting to results observed by Costa *et al.* (2010). They found a parasitic prevalence of 82.66% in wild birds captured on the campus of the Federal Rural University of Rio de Janeiro (RJ-UFRRJ-Seropédica). This campus is subject to strong anthropic pressure. Thus, we can associate the increase in the parasitic fauna with the preservation conditions of the capture site. Oocysts of coccidia were the forms most found in the positive samples. This result is in accordance with Marietto-Gonçalves *et al.* (2009) and Costa *et al.* (2010).

Environmental conditions stand out among the innumerable factors that make birds vulnerable hosts to parasitic intestinal diseases (Freitas *et*

**Table 1.** Wild birds captured in the municipality of Nova Iguaçu, Rio de Janeiro-Brasil and the prevalence of parasitism.

Classification of birds	Species	Number Bird Captured /Parasitized birds	Parasites species	Prevalence (%)
<b>Passeriformes</b>				
Dendrocolapitidae	<i>Dendrocincla fuliginosa</i>	1/0		0
Dendrocolaptidae	<i>Lepdocolaptes longirostres</i>	4/0		0
Thraupidae	<i>Tangara sayaca</i>	1/1	<i>Tanaisia</i> sp.	100
Thraupidae	<i>Tangara palmarum</i>	6/0		0
Thraupidae	<i>Thlypopsis sordida</i>	3/0		0
Thraupidae	<i>Dacnis cayana</i>	2/0		0
Emberizidae	<i>Sporophila cearulensis</i>	5/1	<i>Isospora</i> sp.	20
Emberizidae	<i>Sporophila sp</i>	1/0		0
Emberizidae	<i>Volatinia jacarina</i>	4/1	<i>Isospora</i> sp.	25
Coerebidae	<i>Coereba flaveola</i>	2/0		0
Tyrannidae	<i>Elaenia flavogaster</i>	4/0		0
Tyrannidae	<i>Pitangus sulphuratus</i>	5/0		0
Tyrannidae	<i>Elaenia flavogaster</i>	1/0		0
<b>Columbiformes</b>				
Columbidae	<i>Columbina talpacoti</i>	4/1	<i>Isospora</i> sp.	25
Total		43/4		9,3

**Table 2.** Comparison of parasite prevalence between Passeriformes and Columbiformes orders, the present study and the data found by Marietto-Gonçalves *et al.* (2009) e Costa *et al.* (2010).

Bird classification	Present study*	Marietto-Gonçalves <i>et al.</i> (2009)*	Costa <i>et al.</i> (2010)*
Passeriformes	(39/3/7.7%)	(207/0/0%)	(69/ 57/82.66%)
Columbiformes	(4/1/25%)	(1/0/0%)	(5/4/82.60%)

\* The numerical values refer to the number of birds captured / number of parasitized birds/ parasite prevalence.

*al.*, 2002; Costa *et al.*, 2010). Biological and environmental indicators are sensitive to environmental changes and significant changes in the number of individuals and in populations can be used as an alert of deteriorating environmental conditions (Mackenzie *et al.*, 1995). Thus, we observed that the relationship between parasitic prevalence in wild birds and the conditions of the environment can be a factor predisposing them to parasitism. Costa *et al.* (2010) found a high rate of parasitism in birds from disturbed field and pasture areas as

consequence of urbanization (UFRRJ campus), while Marietto-Gonçalves *et al.* (2009) found the free-living birds from areas with good conservation status had low parasite prevalence (Table 2). Our results are in accordance with these previous findings, because the capture area is a biological reserve.

Overstreet (1997) mentioned that the data about parasitic prevalence and average infection intensity allied to knowledge of the biology of parasites might provide a telescopic view of

environmental conditions. This association is widely used to verify the quality of aquatic environments, where the occurrence or absence of fish populations and their parasites can be an indicator of environmental condition (Dzika & Wyllic, 2010).

Therefore, the parasitic prevalence of wild bird endoparasites can be a useful tool to indicate the environmental quality of a particular area or environment. Researches considering endoparasites of wild birds as bioindicators are scarce in the literature, so further research is of great importance to provide information about the structure of communities within an ecosystem.

Lastly, we emphasize that the technique of collecting fecal samples with anal swabs was effective to obtain sufficient material for diagnosis and assessment of parasitism. Furthermore, the technique is fast and less stressful for the animal, since the bird does not have to be contained to eliminate feces.

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