METAZOAN PARASITES OF WEAKFISH, *Cynoscion guatucupa* AND *Macrodon ancylodon* (OSTEICHTHYES: SCIAENIDAE), FROM THE COASTAL ZONE OF THE STATE OF RIO DE JANEIRO, BRAZIL

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ABSTRACT:- SABAS, C.S.S.; LUQUE, J.L. **Metazoan parasites of weakfish, *Cynoscion guatucupa* and *Macrodon ancylodon* (Osteichthyes: Sciaenidae), from the coastal zone of the State of Rio de Janeiro, Brazil.** [Metazoários parasitos das pescadas, *Cynoscion guatucupa* e *Macrodon ancylodon* (Osteichthyes: Sciaenidae), do litoral do Estado do Rio de Janeiro, Brasil]. *Revista Brasileira de Parasitologia Veterinária*, v. 12, n. 4, p. 171-178, 2003. Departamento de Parasitologia Animal, Universidade Federal Rural do Rio de Janeiro, Caixa Postal 74.508, Seropédica, RJ 23851-970, Brazil. E-mail: jlluque@ufrrj.br

Seventy-four specimens of *Cynoscion guatucupa* (Cuvier, 1930) and 35 of *Macrodon ancylodon* (Bloch and Schneider, 1801) (Osteichthyes: Sciaenidae) collected from Pedra de Guaratiba (23°01'S, 43°38'W), State of Rio de Janeiro, Brazil, from March 2002 to March 2003 were necropsied to determinate their communities of metazoan parasites and to study quantitatively the components and structure of their parasite communities. Seventeen species of metazoan parasites were collected from *C. guatucupa* and fourteen from *M. ancylodon*. For both fish species the larval nematode *Hysterothylacium* sp. was the species more prevalent and abundant. In *C. guatucupa*, eight species have abundance correlated with the host total length an other four species showed correlation with both, prevalence and abundance. Three pairs of ectoparasite species were associated, and was observed correlation between five pairs of larval helminths species. In *M. ancylodon*, host's total length was significantly correlated with prevalence for three species and with abundance only for one species. Statistical associations or covariations among the parasite species of *M. ancylodon* were not observed. The host sex did not influence parasite prevalence or abundance of any species in the two fish species. The parasite fauna of *C. guatucupa* and *M. ancylodon* are related and composed by generalist species mainly. Similar results were recorded for other Sciaenids from the same locality. The predominance of endoparasite species might be explained by the two sciaenid species feeding habits. *Cynoscion guatucupa* and *M. ancylodon* showed a parasite community little-ordered and with scarce quantitative evidences of interspecific associations.

KEY WORDS: parasite ecology, *Cynoscion guatucupa*, *Macrodon ancylodon*, Sciaenidae, Brazil.

RESUMO

Setenta e quatro espécimes de *Cynoscion guatucupa* (Cuvier, 1930) e trinta e cinco de *Macrodon ancylodon* (Bloch; Schneider, 1801) (Osteichthyes: Sciaenidae) coletados em Pedra de Guaratiba (23°01'S, 43°38'W), Estado do Rio de Janeiro, Brasil, entre março de 2002 e março de 2003 foram necropsiados para estudar quantitativamente os componentes e a estrutura das suas comunidades parasitárias. Dezessete espécies de metazoários foram coletadas de *C. guatucupa* e 14 de *M. ancylodon*. Nas duas espécies de hospedeiros a larva do nematóide *Hysterothylacium* sp. foi a espécie mais prevalente e abundante. Em *C. guatucupa*, oito espécies apresentaram abundância parasitária correlacionada com o comprimento total do hospedeiro e outras quatro mostraram correlação com a prevalência e a abundância. Três pares de espécies de ectoparasitos estavam associadas e nas larvas de helmintos foi observada correlação entre cinco pares de espécies. Em *M. ancylodon*, o comprimento total do hospedeiro foi positivamente correlacionado com a prevalência para

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três espécies e com a abundância para apenas uma espécie. Associações ou covariações entre as espécies de parasitos de *M. ancylodon* não foram observadas. O sexo do hospedeiro não influenciou na prevalência e abundância parasitárias em ambos hospedeiros. As faunas parasitárias de *C. guatucupa* e *M. ancylodon* são similares e estão compostas principalmente por espécies generalistas. Resultados similares foram registrados para outros Sciaenídeos da região. A predominância de espécies de endoparasitos pode ser explicada devido aos hábitos alimentares das duas espécies de Sciaenídeos. *Cynoscion guatucupa* e *M. ancylodon* mostraram uma comunidade parasitária pouco ordenada e com escassas evidências de associações interespecíficas.

PALAVRAS-CHAVE: ecologia parasitária, Cynoscion guatucupa, *Macrodon ancylodon*, Sciaenidae, Brazil.

INTRODUCTION

Sciaenid species are the most important component of the demersal fish community in the coastal waters of South-eastern and Southern Brazil (SOARES; VAZZOLER, 2001). *Cynoscion guatucupa* (Cuvier, 1930) (= *C. striatus*) and *Macrodon ancylodon* (Bloch; Schneider, 1801) are demersal Sciaenid fish with known geographical distribution from Venezuela to Argentina (MENEZES; FIGUEREDO, 1980). Inhabiting coastal waters, at depths higher than 60m where it can be found through the year (VAZZOLER, 1975; HAIMOVICI et al., 1996; ROCHA; ROSSI-WONGTSCHOWSKI, 1998). Like other sciaenids, they are found in mangrooves, bays, and stuaries during the spawning season (CASSIA, 1986; CORDO, 1986; LOPEZ-CAZORLA, 2000). Both, *C. guatucupa* and *M. ancylodon* feeding predominantly fishes and crustaceans (VAZZOLER, 1975; LOPEZ-CAZORLA, 1996; SANTOS et al., 2003).

Although the commercial importance of the Weakfish species, records of metazoan parasites of *C. guatucupa* and *M. ancylodon* from Brazil are scarce: Rego et al. (1974), Carvajal and Rego (1983) (Cestoda) (for *C. guatucupa*), and Kohn (1962) (Trematoda) and Oliveira (1985) (Cestoda) (for *M. ancylodon*). Records of parasites in other species of *Cynoscion* from Brazil were made by Mendes (1944), Rego et al. (1974), Amato (1983a, b), Kohn and Cohen (1996) and Domingues and Boeger (2003). Some records of parasites of *C. guatucupa* from Argentina were made by Martorelli (1992), Timi and Etchegoin (1996) and Santos et al. (2002). Recently, Timi (2003) used *C. guatucupa* as model for an study of habitat selection of the copepod *Lernanthropus cynoscicola* from Argentina.

Several ecological studies about parasites infracommunities of Sciaenid marine fishes from Brazil were recently published by Pereira and Neves (1993), Cezar and Amato (1998), Chaves and Luque (1999), Luque and Oliva (1999), Alves and Luque (2001), Pereira et al. (2002) and Luque et al. (2003). In this report, pursuing with our ecological studies on parasite communities of Neotropical Sciaenid fishes, we studied the metazoan parasite communities of *C. guatucupa* and *M. ancylodon* from the coastal zone of the State of Rio de Janeiro, at the component and infracommunity levels.

MATERIALS AND METHODS

From March 2002 to March 2003, 74 specimens of *C. guatucupa* and 35 of *M. ancylodon* were necropsied. The fishes were collected from Pedra de Guaratiba, State of the Rio de Janeiro, Brazil (21-23ºS, 41-45ºW) by fishermen and identified according to Menezes and Figueredo (1980), they measured 23-48 cm (mean=32.8±7.8 cm) (*C. guatucupa*) and 26-36 cm (mean=30.4±2.5 cm) (*M. ancylodon*), in total length. The average total length of male specimens of *C. guatucupa* was 30.2±6.6 cm, (n=22) and female was 33.8±8.0 cm, (n=52), and in *M. ancylodon* male specimens measured 31.0±2.8 cm, (n=10) and female was 30.1±2.4 cm, (n=25). The total length of male and female specimens in both fish species were not significantly diferent (t= -1.853, P=0.068) and (t=0.903, P=0.373), respectively.

The analysis included only parasite species with prevalence greater than 10%. Spearman's rank correlation coefficient (r_s) was calculated to determine possibles correlations between the total length of hosts and abundance of parasites. Pearson's correlation coefficient (r) was used as an indication of the relationship between the host's total length and the prevalence of parasites, with previous arcsine transformation of the prevalence data (ZAR, 1996). The effect of sex on abundance and prevalence of parasites was tested using the Z normal aproximation to the Mann-Whitney test and Chi-square test, respectively. The frequence of dominance and the relative dominance of each parasite was calculated according to Rohde et al. (1995). The possible interespecific associacion between concurrent species was determinated using Chi-square test. Spearman's rank correlation coefficient was used to determinate possible interspecific covariation among the abundance of concurrent species. The parasite infracommunities of *C. guatucupa* were separated into three groups, ectoparasites, adult endoparasites and larval stages of endoparasites (larval helminths). In *M. ancylodon*, parasites infracommunities were separated into adult endoparasite and larval helminths; ectoparasites were not included in this analysis because only one species (*C. jamaicensis*) showed prevalence higher than 10%. Ecological terminology follows Bush et al. (1997). Statistical significance level was evaluated at $P< 0.05$.

Voucher specimens of helminths and copepods parasites were deposited in the Coleção Helmintológica do Instituto Oswaldo Cruz (CHIOC), Rio de Janeiro, Brazil.

RESULTS

Component communities

Cynoscion guatucupa: Seventeen species of metazoan parasites were collected (Table 1). The majority of the parasite specimens collected were nematodes (42.8% of total parasite specimens) with three species, followed by monogeneans

Table 1. Prevalence, intensity, mean intensity, mean abundance, and site of infection of the metazoan parasites of *Cynoscion guatucupa* from the coastal zone of the State of Rio de Janeiro, Brazil.

Parasites	Prevalence	Intensity (%)	Mean Intensity	Mean Abundance	Site of infection
Aspidogastrea					
Lobatostoma ringens CHIOC 36353	4.0	1-2	1.6 ± 0.47	<0.1	Intestine
Digenea					
Lecithochirium microstomum CHIOC 36355	32.4	1-15	4.3 ± 3.5	1.4 ± 2.8	Intestine
Opecoeloides polynemi CHIOC 36362	9.4	1-4	2.3 ± 1.4	0.2 ± 0.8	Intestine
Parahemiurus merus CHIOC 36357	51.3	1-44	8.9 ± 11.5	4.6 ± 9.4	Intestine
Pleorchis americanus CHIOC 36360	1.3	-	1	<0.1	Intestine
Prosorhynchus osakii CHIOC 36358	29.7	1-46	12.1 ± 15.5	3.6 ± 10.0	Intestine
Monogenea					
Cynoscionicola jamaicensis CHIOC 36366	25.6	1-30	3.4 ± 2.3	1.3 ± 4.0	Gills
Diplectanum squamatum CHIOC 36355	63.5	1-130	44.7 ± 30.1	28.4 ± 32.2	Gills
Hargicotyle louisianensis CHIOC 36369	20.3	1-2	1.1 ± 0.3	0.1 ± 0.4	Gills
Cestoda					
Nybelinia sp. CHIOC 36370	10.8	-	1	0.1 ± 0.3	Mesenteries
Progrillotia dollfusi CHIOC 36372	54.0	1-16	5.0 ± 4.5	2.7 ± 4.2	Mesenteries
Acanthocephala					
Corynosoma australe CHIOC 36375	31.1	1-26	5.3 ± 6.3	1.6 ± 4.2	Mesenteries
Nematoda					
Cucullanus sp. CHIOC 35270	10.8	1-6	2.7 ± 1.5	0.3 ± 1.0	Intestine
Hysterothylacium sp. CHIOC 35271	83.8	1-600	39.2 ± 82.7	32.8 ± 77.0	Mesenteries
Terranova sp. CHIOC 35274	14.8	1-2	1.3 ± 0.5	0.2 ± 0.5	Mesenteries
Crustacea					
Caligus sp. CHIOC 35275	4.0	-	1	<0.1	Gills
Lernanthropus cynoscicola CHIOC 35266	10.8	1-10	3.2 ± 3.0	0.3 ± 1.4	Gills

(29.8%). Larvals of *Hysterothylacium* sp. were the predominant species with 2,432 specimens obtained (42.2% of all parasites) and with highest values of dominance (Table 2). Eight species had abundance positively correlated with the host total length. Other four species showed correlation with both, prevalence and abundance (Table 3). The host sex did not influence parasite prevalence or abundance of any species.

Macrodon ancylodon: Fourteen species of metazoan parasites were collected (Table 4). The majority of the parasite specimens collected were digeneans (39.3% of total parasites), with five species, followed by three species of nematodes (37.3%). *Hysterothylacium* sp. was the predominant species, with 139 specimens collected (34.8% of all parasites) and showed the highest values dominance (Table 5). Host's total length was significantly correlated with abundance for three endoparasite species and with prevalence only for *P. americanus* (Table 6). Host sex did not influence in prevalence or abundance of any parasite species.

Table 2. Frequency of dominance and mean relative dominance of the metazoan parasites of *Cynoscion guatucupa* from the coastal zone of the State of Rio de Janeiro, Brazil.

Parasites	Frequency of dominance	Frequency of shared dominance with one or more species	Mean relative dominance
Lecithochirium microstomum	1	1	0.060±0.148
Parahemiurus merus	3	3	0.037±0.086
Prosorhynchus osakii	4	0	0.012±0.031
Cynoscioniola jamaicensis	11	3	0.125±0.243
Diplectanum squamatum	24	0	0.275±0.286
Hargicotyle louisianensis	3	0	0.047±0.198
Nybelinia sp.	0	0	0.002±0.013
Progrillotia dollfusi	0	0	0.026±0.044
Corynosoma australe	0	0	0.083±0.137
Cucullanus sp.	0	0	0.002+0.008
Hysterothylacium sp.	25	0	0.313±0.295
Terranova sp.	0	0	0.002±0.005
Lernanthropus cynoscicola	0	0	0.002±0.008

Table 3. Spearman's rank correlation coefficient (r_s) and Pearson's correlation coefficient (r) values used to evaluate possible relationships among the total length of *Cynoscion guatucupa*, abundance and prevalence of the components of its parasite community from the coastal zone of the State of Rio de Janeiro, Brazil.

Parasites	r_s	P	r	P
Lecithochirium microstomum	0.067	0.567	-0.133	0.830
Parahemiurus merus	0.308[a]	0.007	0.502	0.388
Prosorhynchus osakii	-0.100	0.396	-0.608	0.276
Diplectanum squamatum	0.775[a]	<0.001	0.441	0.457
Cynoscionicola jamaicensis	-0.637[a]	<0.001	-0.707	0.182
Hargicotyle louisianensis	-0.226	0.052	-0.580	0.304
Nybelinia sp.	0.002	0.986	-0.417	0.485
Progrillotia dollfusi	0.669[a]	<0.001	0.953[a]	0.012
Corynosoma australe	0.701[a]	<0.001	0.986[a]	0.002
Hysterothylacium sp.	0.734[a]	<0.001	0.880[a]	0.049
Terranova sp.	0.360[a]	0.001	0.755	0.140
Lernanthropus cynoscicola	0.426[a]	<0.001	0.885[a]	0.046

[a]Significant values (P<0.05), P: Significance level.

Infracommunities

Cynoscion guatucupa: All fishes were parasitized by at least one parasite species. A total of 5,767 individuals parasites were collected, with a mean of 77.9 parasites/fish. The mean parasite species richness 4.6 ±1.8 (1-8), was correlated with the host total legth (r_s=0.699, P<0.001). Four hosts (5.4%) were infected by two parasite species and 12 (21.8%), 17 (22.9%), 10 (13,5%), 13 (17.5%), 11 (14.8%) and 3 (40.5%) had multiple infections with 3,4,5,6,7 and 8 parasite species, respectively. Among the ectoparasite species, three pairs: *D. squamatum-C. jamaicensis*; *D. squamatum-Hargicotyle louisianensis* and *D. squamatum-L. cynoscicola* were associated. In the endoparasites larval stages was observed correlation between *P. dollfusi-Corynosoma australe, P. dollfusi-Terranova* sp., *P. dollfusi-Hysterothylacium* sp., *C. australe-Terranova* sp. and *C. australe-Hysterothylacium* sp. Among the adult endoparasites none pairs species were correlationated (Table 7).

Macrodon ancylodon:. A total of 399 specimens were collected with a mean of 11.4 parasites/fish. Two fishes were not parasitized. Three hosts were infected by one parasite species (8.6%) and 6 (17.1%), 15 (42.8%), 6 (17.1%), 2 (5.7%) and 1 (2.8%) were infected by 2, 3 , 4 ,5 and 6 parasite species, respectively. The parasite species richness 2.8±1.3 (1-6), was not correlated with the host's length (r_s=0.012, P=0.941). Statistical associations or covariations among the parasite species of *M. ancylodon* were not observed.

DISCUSSION

The parasite fauna of *C. guatucupa* and *M. ancylodon* are related and was composed mainly by generalist species. Similar results were recorded by Chaves and Luque (1999), Alves and Luque (2001) and Luque et al. (2003) for the metazoan parasites of *Menticirrhus americanus*, *Micropogonias furnieri* and *Paralonchurus brasiliensis* from the same locality. The predominance of endoparasite species might be explained because the two sciaenid species having similar feeding habits and diet items (VAZZOLER, 1975). The similarity of the trophic relationships among Sciaenid fishes in the Brazilian coastal zone has been widely documented; Vazzoler et al. (1999) determined interspecific associations between the populations of five species of Sciaenids from southern Brazil, with coexistence in the exploiting of available demersal and benthic resources in their diet. Both fish (*C. guatucupa* and *M. ancylodon*) preyed primarily upon crustaceans, polychaets other benthic invertebrates and eventually on fishes (LOPEZ-CAZORLA, 1996; VAZZOLER et al., 1999; LUCENA et al., 2000; SANTOS et al. 2003). At the same time, these sciaenids are preys of *Pontoporia blainvillei* (Cetacea) (VAZZOLER et al., 1999), which is a known definitive host for several species of marine helminths (AZNAR et al., 1994).

As well as other sciaenid fishes from South America, the presence of larval helminths suggesting these fishes at the intermediate level in the marine food web, because the benthopelagic habitat (MARCOGLIESE, 2002). Larval of Anisakids and *Corynosoma* are common in marine Sciaenid fishes from Brazil. Pereira Jr. and Neves (1993) and Alves and Luque (2001) recorded cystacanths of *C. australe* parasitic in *M. furnieri* from the coastal zone of Rio Grande do Sul and Rio de Janeiro, respectively. Cezar and Amato (1998) observed *C. australe* infecting *U. canosai* from the coast of Rio Grande do Sul. These records given higher prevalence and abundance values than those recorded for *C. guatucupa* and *M. ancylodon* studied in the present work.

Table 4. Prevalence, intensity, mean intensity, mean abundance, and site of infection of the metazoan parasites of *Macrodon ancylodon* from the coastal zone of the State of Rio de Janeiro, Brazil.

Parasites	Prevalence	Intensity (%)	Mean Intensity	Mean Abundance	Site of infection
Digenea					
Lecithochirium microstomum CHIOC 36354	5.7	1-3	4.0 ± 4.2	0.1 ± 0.5	Intestine
Opecoeloides polynemi CHIOC 36363	54.3	1-10	4.4 ± 3.4	2.3 ± 3.3	Intestine
Parahemiurus merus CHIOC 36356	5.7	1-7	2.0 ± 1.4	0.2 ± 1.2	Intestine
Pleorchis americanus CHIOC 36361	20	1-13	6.8 ± 4.4	1.4 ± 3.3	Intestine
Prosorhynchus osakii CHIOC 36359	11.4	1-7	3.5 ± 2.5	0.4 ± 1.3	Intestine
Monogenea					
Cynoscionicola jamaicensis CHIOC 36367	11.4	1-5	2.0 ± 2.0	0.2 ± 0.9	Gills
Diplectanum squamatum CHIOC 36364	3	-	1	<0.1	Gills
Hargicotyle louisianensis CHIOC 36368	8.6	-	1	<0.1	Gills
Cestoda					
Callitetrarhynchus gracilis CHIOC 36374	3	-	1	<0.1	Mesenteries
Nybelinia sp. CHIOC 36371	11.4	-	1	0.1 ± 0.3	Mesenteries
Progrillotia dollfusi CHIOC 36373	48.6	1-18	4.5 ± 4.4	2.2 ± 3.8	Mesenteries
Nematoda					
Cucullanus sp. CHIOC 35269	8.6	-	1	<0.1	Intestine
Hysterothylacium sp. CHIOC 35272	74.3	1-19	5.3 ± 4.5	4.0 ± 4.5	Mesenteries
Terranova sp. CHIOC 35273	17.1	1-2	1.1 ± 0.4	0.2 ± 0.5	Mesenteries

Comparing the parasite richness (at level of the component communities) of the Sciaenid fishes from Rio de Janeiro, *M. furnieri* (N=28) (ALVES; LUQUE, 2001) showed higher number of parasite species than *C. guatucupa* (N=17) and *M. ancylodon* (N=14). The other species studied (*P. brasiliensis* and *M. americanus*, N=15) (CHAVES; LUQUE, 1999; LUQUE et al., 2003) showed a parasite species richness more similar to *C. guatucupa* and *M. ancylodon*. As many parasite species systems are based on trophic transmission, the above differences might be explained mainly by the feeding relationships among these sciaenids. According to Vazzoler et al. (1999), *M. furnieri* is the unique species which conform feeding associations with the all other Sciaenid fishes, this situation can be result in the higher values of parasite richness of *M. furnieri* in addition of other factors as higher frequency and diversity of diet items and the larger size of *M. furnieri* mentioned in Luque et al. (2003)

Also, other patterns of distribution of the parasite infrapopulations are similar than those previously described for Sciaenid fishes (*P. brasiliensis*, *M. americanus* and *M. furnieri*) from Rio de Janeiro. The size of the host is not always correlationed with prevalence and abundance of parasite species, but is positively correlationed at the infracommunity level for *C. guatucupa* but no in *M. ancylodon*. As pointed by Poulin (2000) this pattern cannot be generalized because in many host-parasite species systems the correlation is positive but weak and non-significant. Also, ontogenetical changes in the feeding behaviour might influence on the parasite prevalence and abundance in the host size classes (SAAD-FARES; COMBES, 1992). The absence of correlations of parasite prevalence and abundance with the sex of the fish host is a pattern widely documented, and interpreted as a consequence of the absence of sexual differences in some biological aspects of the fish (LUQUE et al., 1996).

According to Luque and Oliva (1999), the parasite communities from sciaenid fishes from South American Pacific and Atlantic Ocean showed significant differences based in the numerical dominance of ectoparasites (Pacific)

Table 5. Frequency of dominance and mean relative dominance of the metazoan parasites of *Macrodon ancylodon* from the coastal zone of the State of Rio de Janeiro, Brazil.

Parasites	Frequency of dominance	Frequency of shared dominance with one or more species	Mean relative dominance
Opecoeloides polynemi	8	3	0.208±0.260
Pleorchis americanus	3	2	0.071±0.171
Prosorhynchus osakii	1	2	0.026±0.102
Cynoscionicola jamaicensis	1	3	0.024±0.094
Nybelinia sp.	0	0	0.011±0.039
Progrillotia dollfusi	5	3	0.161±0.228
Hysterothylacium sp.	14	2	0.364±0.333
Terranova sp.	0	3	0.026±0.073

Table 6. Spearman's rank correlation coefficient (r_s) and Pearson's correlation coefficient (r) values used to evaluate possible relationships among the total length of *Macrodon ancylodon*, abundance and prevalence of the components of its parasite community from the coastal zone of the State of Rio de Janeiro, Brazil.

Parasites	r_s	*P*	*r*	*P*
Opecoeloides polynemi	-0.157	0.365	-0.767	0.130
Pleorchis americanus	0.409[a]	0.014	0.880[a]	0.049
Prosorhynchus osakii	0.372[a]	0.027	0.673	0.213
Cynoscionicola jamaicensis	-0.161	0.354	-0.772	0.131
Nybelinia sp.	-0.085	0.627	-0.513	0.376
Progrillotia dollfusi	-0.298	0.081	-0.807	0.099
Hysterothylacium sp.	0.446[a]	0.007	0.876	0.051
Terranova sp.	0.077	0.656	0.223	0.718

[a]Significant values (*P*<0.05), *P*: Significance level.

Table 7. Concurrent species pairs of metazoan parasites of *Cynoscion guatucupa*.

Pair species	χ^2	*P*	r_s	*P*
Ectoparasites				
Diplectanum squamatum-Cynoscionicola jamaicensis	44.03[a]	<0.001	-0.675[a]	<0.001
D. squamatum-Hargicotyle louisianensis	4.61[a]	0.031	-0.253[a]	0.028
D. squamatum-Lernanthropus cynoscicola	3.54	0.060	0.313[a]	0.006
C. jamaicensis-H. louisianensis	0.99	0.320	0.108	0.356
C. jamaicensis-L. cynoscicola	2.16	0.141	-0.208	0.075
H. louisianensis-L. cynoscicola	<0.01	0.949	-0.020	0.862
Adult endoparasites				
Prosorhynchus osakii-Lecithochirium microstomum	2.18	0.139	-0.123	0.294
P. osakii-Parahemiurus merus	1.75	0.186	-0.172	0.142
L. microstomum-P.merus	0.03	0.861	-0.081	0.489
Larval helminths				
Progrillotia dollfusi - Nybelinia sp.	1.58	0.208	-0.174	0.137
P. dollfusi - Corynosoma australe	18.65[a]	<0.001	0.506[a]	<0.001
P. dollfusi - Terranova sp.	7.07[a]	0.007	0.353[a]	0.002
P. dollfusi - Hysterothylacium sp.	13.53[a]	<0.001	0.622[a]	<0.001
Nybelinia sp.-*C. australe*	1.45	0.229	-0.156	0.182
Nybelinia sp.-*Terranova* sp.	0.53	0.468	-0.145	0.217
Nybelinia sp.-*Hysterothylacium* sp.	1,17	0.279	0.114	0.331
C. australe -*Terranova* sp.	6.39[a]	0.011	0.300[a]	0.009
C.australe - Hysterothylacium sp.	6.87[a]	0.008	0.508[a]	<0.001
Terranova sp - *Hysterothylacium* sp.	1.30	0.255	0.133	0.256

χ^2Chi-square test, r_s: Spearman rank correlation coeficient, a: Significant values, *P*: Significance level.

and endoparasites (Atlantic). Luque and Oliva (1999) discussed these amphi-oceanic differences for *M. ophicephalus* (Pacific Ocean) and *M. americanus* (Atlantic Ocean), and suggested that these differences might be originated by the influence of regional ecological disturbances. The parasite community of *Cynoscion* species can be included as another example of these differences. Iannacone et al. (2001) studied the parasite community in *Cynoscion analis* from Peru, in the South American Pacific Ocean, and not recorded any endoparasite species, showing dominance by ectoparasites, mainly diplectanid monogeneans, while *C. guatucupa* had dominance by endoparasites, follows the same pattern detected anteriorly in *Menticirrhus* spp. by Luque and Oliva (1999).

Cynoscion guatucupa and *M. ancylodon* showed a parasite community little-ordered and with scarce quantitative evidences of interspecific association this pattern. Preceding studies about Neotropical Sciaenid fishes also showed this model of parasite community, in agreement with the postulates of Rohde et al. (1995) and Morand et al. (2002). Recently,

Poulin and Luque (2003) proposed a general test to evaluate the interactive-isolationist continuum in gastrointestinal parasites of 37 marine Brazilian fishes, including *C. guatucupa* and *M. ancylodon* with values that indicating that two communities are more near to isolationist extreme of the continuum.

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