COMMUNITY ECOLOGY OF THE METAZOAN PARASITES OF THE GREY TRIGGERFISH, *Balistes capriscus* GMELIN, 1789 AND QUEEN TRIGGERFISH *B. vetula* LINNAEUS, 1758 (OSTEICHTHYES: BALISTIDAE) FROM THE STATE OF RIO DE JANEIRO, BRAZIL

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ABSTRACT:- LUQUE, J. L.; ALVES, D. R.; PARAGUASSÚ, A. R. **Community ecology of the metazoan parasites of the grey triggerfish, *Balistes capriscus* Gmelin, 1789 and queen triggerfish *B. vetula* Linnaeus, 1758 (Osteichthyes: Balistidae) from Rio de Janeiro, Brazil.** [Ecologia da comunidade de metazoarios parasitos dos perus, *Balistes capriscus* Gmelin, 1788 e *B. vetula* Linnaeus, 1758 (Osteichthyes: Balistidae) do Rio de Janeiro, Brasil]. *Revista Brasileira de Parasitologia Veterinária*, v. 14, n. 2, p. 71-77, 2005. Instituto de Veterinária, Departamento de Parasitologia Animal, Universidade Federal Rural do Rio de Janeiro, Km 7 da BR 365, Seropédica, RJ 23890-000, Brazil. E-mail: jlluque@ufrrj.br

Sixty-six specimens of grey triggerfish *Balistes capriscus* Gmelin, 1788 and thirty specimens of queen triggerfish *B. vetula* Linnaeus, 1758 (Osteichthyes: Balistidae) collected from the coastal zone of the State of Rio de Janeiro (21-23ºS, 41-45ºW), Brazil, from April 2001 to May 2003, were necropsied to study their metazoan parasites. All fish were parasitized by at least one parasite species. Twenty-seven parasites species were collected: 22 in *B. capriscus* and 15 in *B. vetula*. Ten parasite species were common to the two host species. *Balistes capriscus* and *B. vetula* were a new host record for 16 and seven parasite species, respectively. *Hypocreadium biminensis* and *Taeniacanthus balistae* were recorded for the first time in Brazil. The copepod *T. balistae* and the nematode *Contracaecum* sp. were the dominant species with highest parasitic prevalence and abundance in the parasite community of *B. capriscus* and *B. vetula*, respectively. The metazoan parasites of *B. capriscus* and *B. vetula* showed typical aggregated pattern of distribution. The infracommunities of adult endoparasites showed highest values of mean abundance and parasite species richness. The parasite species richness, the total number of specimens and the mean Berger-Parker's index of the infracommunities of *B. capriscus* and *B. vetula* showed significant differences.

KEY WORDS: parasitic ecology, community structure, *Balistes capriscus*, *Balistes vetula*, Brazil.

RESUMO

Sessenta e seis espécimes de *Balistes capriscus* Gmelin, 1789 e 30 espécimes de *B. vetula* Linnaeus, 1758 (Osteichthyes: Balistidae) coletados do litoral do Estado do Rio de Janeiro (21-23ºS, 41-45ºW), Brasil, durante abril 2001 a maio 2003, foram necropsiados para estudo dos seus metazoários parasitos. Todos os peixes estavam parasitados por pelo menos uma espécie de metazoário. Foram coletadas 22 espécies de parasitos em *B. capriscus* e 15 em *B. vetula*. Dez espécies de parasitas foram comuns às duas espécies de hospedeiros. *Balistes capriscus* e *B. vetula* foram novos registros de hospedeiros para 16 e sete espécies de parasitos, respectivamente. *Hypocreadium biminensis* e *Taeniacanthus balistae* foram registrados pela primeira vez no Brazil. O copepode *T. balistae* e o nematóide *Contracaecum* sp. foram as espécies dominantes e com maior prevalência e abundância nas comunidades parasitarias de *B. capriscus* e de *B. vetula*, respectivamente. Os metazoários parasitos de *B. capriscus* e *B. vetula* mostraram o típico padrão agregado de distribuição espacial. As infracomunidades de endoparasitos adultos mostraram maiores valores de abundância e de riqueza parasitaria. A riqueza parasitaria e o grau de dominância foram significativamente diferentes entre as infracomunidades de *B. capriscus* and *B. vetula*.

PALAVRAS-CHAVE: ecologia parasitaria, estrutura da comunidade, *Balistes capriscus*, *Balistes vetula*, Brasil.

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INTRODUCTION

The balistid fishes *Balistes capriscus* Gmelin, 1789 and *B. vetula* Linnaeus, 1758 are reef-associated species, typically associated with complex hard bottom structures, natural and artificial reefs in waters greater than 10 m in depth on the continental shelf. They are feeding on barnacles (dominant prey), also polychaetes, decapod crabs, gastropods, sea stars, sea cucumbers, brittle stars, sea urchins and sand dollars. They are fully recruited into the recreational fishery by age 3 and into the commercial fishery by age 4 (TURIGAN; WAINWRIGHT, 1993, VOSE; NELSON, 1994, KURZ, 1995). According to Figueiredo and Menezes (2000) *B. capriscus* and *B. vetula* are the only species of *Balistes* recorded along the Brazilian coast. These species are found eastern and western Atlantic Ocean. In American eastern coast *B. capriscus* is distributed from Nova Scotia and northern Gulf of Mexico to Argentina, while *B. vetula* is distributed from Massachusetts and northern Gulf of Mexico to southeastern Brazil (SMITH-VANIZ et al., 1999; BERNARDES; DIAS, 2000; FIGUEIREDO; MENEZES, 2000).

The parasite fauna of *B. capriscus* from Brazil is poorly known, while parasitological studies for *B. vetula* were made by Gomes and Fábio (1970, 1971) and Gomes et al. (1978) with descriptions and records of digeneans; São Clemente et al. (1995) for larval of Trypanorhyncha cestodes and Guimarães and Cristofaro (1974); Vicente et al. (1985) and São Clemente et al. (1995) for nematodes. Recently, Poulin and Luque (2003), Luque and Poulin (2004) and Luque et al. (2004) including these fishes in studies about parasite biodiversity of marine fishes of Brazil.

In this report, we analyzed comparatively the composition and structure of the metazoan parasite communities of *B. capriscus and B. vetula* from the coastal zone of the State of Rio de Janeiro, Brazil.

MATERIALS AND METHODS

From April 2001 to May 2003, 66 specimens of *B. capriscus* and 30 specimens of *B. vetula* were examined. Fishes were collected by local fishermen from the coastal zone of the State of Rio de Janeiro (21-23ºS, 41-45ºW), Brazil. The fishes were identified according to Figueiredo and Menezes (2000). Specimens of *B. capriscus* measured 21 – 42 (mean = 29.1 ± 6.7 cm) and specimens of *B. vetula* 35 – 61 (mean = 44.7 ± 7 cm) in total length.

The variance to mean ratio of parasite abundance (index of dispersion) was used for each infracommunities to determine distribution pattern (LUDWIG; REYNOLDS, 1988). Numerical dominance was determined by using of Berger-Parker dominance index (MAGURRAN, 1988). Spearman's rank correlation coefficient r_s was calculated to determine possible correlations between the host's total body length and abundance of parasite and the mean parasite species richness (ZAR, 1996). Differences in mean parasite species richness, mean number total of parasites and Berger-Parker dominance were determined using *Zc* normal approximation to the Mann-Whitney test. The possible interspecific association between concurrent species was determined using the chi-square test. Possible covariation among the abundance of concurrent species was analyzed using the Spearman rank correlation coefficient. Parasite infracommunities were separated into three groups – ectoparasites, adult endoparasites and larval stages of endoparasites to determine possible interspecific associations. Ecological terminology follows Bush et al. (1997). Statistical significance level was evaluated at $P < 0.05$.

Voucher specimens of the parasites were deposited in the Coleção Helmintológica do Instituto Oswaldo Cruz (CHIOC), Rio de Janeiro, RJ, Brazil, and in the Coleção de Crustacea do Museu Nacional (MNRJ), Rio de Janeiro, RJ, Brazil.

RESULTS

Twenty-seven species of metazoan parasites were collected: 22 in *B. capriscus* and 15 species in *B. vetula* (Table 1). *Balistes capriscus* and *B. vetula* were a new host record for 16 and 7 species, respectively. Ten parasites species were common for both species of *Balistes*. *Hypocreadium biminensis* and *Taeniacanthus balistae* were recorded for the first time in Brazil (Table 1). The digeneans, with eight species, were the majority of the parasite specimens collected (34.7%) in *B. capriscus*, while in *B. vetula* the majority were nematode specimens (47.8%), with four species. *Taeniacanthus balistae* and *Contracaecum* sp. showed the highest values of mean abundance and prevalence of *B. capriscus* and *B. vetula*, respectively. All parasites had the typical aggregated pattern of distribution (Table 2).

All fishes studied were parasitized by one or more metazoan species. A total of 3,599 individual parasites were collected: 2,836 specimens in *B. capriscus* and 763 in *B. vetula*, with mean abundance of 25.4 ± 19.8 and 23.3 ± 22, respectively. The parasite mean abundance in *B. capriscus* and *B. vetula* were positively correlated with the host total length. The mean parasite species richness in *B. capriscus* and *B. vetula* were 4 ± 1.9 (2-9) and 4.9 ± 1.7 (1-8), respectively. Only in *B. capriscus* the mean parasite species richness was positively correlated with the host's total length (r_s = 0.673, P <0.001).

Ectoparasites: The ectoparasite infracommunities of *B. capriscus* and *B. vetula* showed the same number of species (4). The mean abundance of ectoparasites were 13 ± 13.3 and 6.2 ± 10.2 *B. capriscus* and *B. vetula*, respectively. *Taeniacanthus balistae* was the dominant species in *B. capricus* while the Cymothoid not identified was dominant in *B. vetula*. The Berger-Parker dominance index values were 0.9 ± 0.2 and 0.7 ± 0.3 for *B. capriscus* and *B. vetula*, respectively. Negative correlation between the ectoparasite abundance and the host's total length of *B. capriscus* were observed. The ectoparasite infracommunities of *B. capriscus* and *B. vetula* showed the typical aggregated pattern (Table 2). Were detected four species pairs (3 in *B. capriscus*, 1 in *B. vetula*) sharing significant association and/or covariation (Tabela 4).

Table 1. Prevalence (P%), mean intensity (MI) and mean abundance (MA) of metazoan parasites of *Balistes capriscus* and *B. vetula* from the coastal zone of the State of Rio de Janeiro, Brazil during April 2001 to May 2003.

Parasites	*B. capriscus*			*B. vetula*		
	P(%)	MI	MA	P(%)	MI	MA
Aspidogastrea						
Lobatostoma sp. † (CHIOC 36466)	6	7.2 ± 10	0.4 ± 2.7	-	-	-
Digenea						
Aponurus laguncula †‡ (CHIOC 36467 and 36468)	66	12.2 ± 7.7	8.1 ± 8.5	26.7	2 ± 1	0.5 ± 1
Gonocercella sp. † (CHIOC 36470)	18.2	19.2 ± 19.5	3.5 ± 11	-	-	-
Hypocreadium biminensis ‡# (CHIOC 36471 and 36472)	4.5	21.7 ± 30.7	0.9 ± 7	46.7	8.6 ± 6	4 ± 6
Opechona sp. † (CHIOC 36469)	10.6	2 ± 0.6	0.2 ± 0.6	-	-	-
Peracreadium annahoineffae † (CHIOC 36473 and 36474)	12	1.8 ± 0.7	0.2 ± 0.6	33.4	4.5 ± 5.1	1.5 ± 3.5
Stephanostomum sp. † (CHIOC 36475)	3	6 ± 5.7	0.2 ± 1.2	-	-	-
Varelacreptotrema travassosi † (CHIOC 36476)	3	1	0.03 ± 0.1	-	-	-
Xystretum pulchrum †‡ (CHIOC 36477 and 36478)	20	8.6 ± 7.4	1.7 ± 4.8	6.7	1	0.06 ± 0.2
Monogenea						
Capsalid not identified	-	-	-	13.4	1	0.1 ± 0.3
Cestoda						
Callitetrarhynchus sp. † (larval) CHIOC 36479, 36480)	16.7	6.6 ± 9.5	1.1 ± 4.5	36.7	1.6 ± 0.8	0.6 ± 0.9
Nybelinia sp. † (larval) (CHIOC 36481)	3	1	0.03 ± 0.1	-	-	-
Otobothrium sp. (larval) (CHIOC 36482)	-	-	-	20	2.3 ± 1	0.4 ± 1
Pseudophyllidean not identified (larval)	1.5	1	0.01 ± 0.1	-	-	-
Scolex pleuronectis † (CHIOC 36483)	10.7	2.1 ± 1.3	0.2 ± 0.7	-	-	-
Acanthocephala						
Serrasentis sp. † (cystacanth) (CHIOC 36484)	3	3 ± 1.4	0.1 ± 0.5	-	-	-
Rhadinorhynchus pristis ‡ (CHIOC 36485)	-	-	-	6.7	1	0.6 ± 0.2
Nematoda						
Anisakis sp. ‡ (larval) (CHIOC 35316)	-	-	-	16.7	1.3 ± 0.5	0.3 ± 1.2
Contracaecum sp. † (larval) (CHIOC 35317 and 35318)	44	14.4 ± 23	6.3 ± 16.7	76.7	10.1 ± 9.3	7.7 ± 9.2
Dichelyne sp. (CHIOC 35319 and 35320)	27.3	23.8 ± 26.3	6.5 ± 17.2	50	9.4 ± 11	4.4 ± 8.8
Hysterothylacium sp. ‡ (larval) (CHIOC 35321)	-	-	-	10	3.2 ± 1.8	1 ± 2.3
Terranova sp. † (larval) (CHIOC 35322)	6	1.2 ± 0.5	0.07 ± 0.3	-	-	-
Raphidascaris sp. *† (larval)* (CHIOC 35323)	7.5	1.4 ± 0.5	0.1 ± 0.4	-	-	-
Copepoda						
Caligus balistae †‡ (CHIOC 35324 and 35325)	32	2.5 ± 2	0.8 ± 1.6	53.4	1.4 ± 0.8	0.7 ± 0.9
Taeniacanthus balistae # (MNRJ 15403)	69.7	15 ± 13.8	10.6 ± 13.7	-	-	-
Hirudinea						
Piscicolid not identified	30.3	5.5 ± 6.8	1.7 ± 4.5	30	2 ± 1.9	0.6 ± 1.3
Isopoda						
Cymothoid not identified	4.5	1	0.04 ± 0.2	63.4	7.3 ± 11.2	4.7 ± 9.5

(†) New host record for *B. capriscus*
(‡)New host record for *B. vetula*
(#) New geographical record

Endoparasites: *Balistes capriscus* showed 11 adult endoparasites species, while *B. vetula* only 6 species. The mean abundance of endoparasites were 22 ± 23 and 11 ± 14 *B. capriscus* and *B. vetula*, respectively. *Aponurus laguncula* was the dominant species in *B. capriscus* and *Dichelyne* sp. in *B. vetula*. The Berger-Parker dominance index values were 0.9 ± 0.5 and 0.6 ± 0.3 for *B. capriscus* and *B. vetula*, respectively. The adult endoparasites infracommunities of *B. capriscus* and *B. vetula* showed positive correlation between the abundance and the host's total length. The adult endoparasites infracommunities of *B. capriscus* and *B. vetula* showed the typical aggregated pattern (Table 2). Among the adult endoparasites were detected twelve pair species (7 in *B. capriscus*, 5 in *B. vetula*) shared significant association and/or covariation (Table 4).

Table 2. Characteristics of the metazoan parasites infracommunities found in *Balistes capriscus* and *B. vetula*.

Characteristics	*B. capriscus* (n= 66)	*B. vetula* (n=30)
All species		
Total number of species	22	15
Mean abundance	43 ± 29.4	25.4 ± 19.8
Mean parasite species richness	4 ± 1.9	4.5 ± 1.5
Dominant species	*Taeniacanthus balistae*	*Contracaecum* sp.
Mean Berger-Parker's index	0.6 ± 0.2	0.5 ± 0.1
Spearman's rank coefficient (r_s)	0.441*	0.433*
Dispersion index (ID)	20.179	16.154
Ectoparasite species		
Total number of species	4	4
Mean abundance	13 ± 13.3	6.2 ± 10.2
Mean parasite species richness	1.3 ± 0.5 (0-3)	1.5 ± 0.8 (0-3)
Dominant species	*Taeniacanthus balistae*	Cymothoid not identified
Mean Berger-Parker's index	0.9 ± 0.2	0.7 ± 0.3
Spearman's rank coefficient (r_s)	-0.423*	0.057
Dispersion index (ID)	13.683	16.771
Adult endoparasites		
Total number of species	11	6
Mean abundance	22 ± 23	11 ± 14
Mean parasite species richness	1.7 ± 0.9 (0-5)	1.8 ± 1.1 (0-4)
Dominant species	*Aponurus laguncula*	*Dichelyne travassosi*
Mean Berger-Parker's index	0.9 ± 0.5	0.6 ± 0.3
Spearman's rank coefficient (r_s)	0.484*	0.438*
Dispersion index (ID)	24.287	17.802
Larval stages of endoparasites		
Total number of species	7	5
Mean abundance	7.8 ± 17.5	9.2 ± 9.3
Mean parasite species richness	0.8 ± 0.9 (0-3)	1.5 ± 0.9 (0-3)
Dominant species	*Contracaecum* sp.	*Contracaecum* sp.
Mean Berger-Parker's index	0.8 ± 0.4	0.7 ± 0.3
Spearman's rank coefficient (r_s)	0.658*	-0.193
Dispersion index (ID)	38.930	9.396

(*) significant values

Table 3. Values of Mann-Whitney's *U* – test for evaluation the differences between the infracommunities of *B. capriscus* e *B. vetula*.

	All species	Ectoparasite species	Adult endoparasites	Larval stages endoparasites
Abundance	- 3.174*	- 3.833*	- 3.421*	- 2.932*
Parasite species richness	- 7.355*	- 1.549	- 0.905	- 2.915*
Berger-Parker's index	- 1.134	- 3.212*	- 2.601*	- 1.516

(*) significant values

Larval helminths: The larval stages of endoparasites infracommunities showed 7 species in *B. capriscus* and 5 species in *B. vetula*. The mean abundance of larval helminths were 7.8 ± 17.5 and 9.2 ± 9.3 *B. capriscus* and *B. vetula*, respectively. *Contracaecum* sp. was the dominant species in both infracommunities. Berger-Parker dominance index values were 0.8 ± 0.4 and 0.7 ± 0.3 for *B. capriscus* and *B. vetula*, respectively. Positive correlation between the larval helminths abundance and the host's total length of *B. capriscus* were observed. The larval stages of endoparasites infracommunities of *B. capriscus* and *B. vetula* showed the typical aggregated pattern (Table 2). Among the larval helminths only one species pair (in *B. capriscus*) shared significant association (Table 4).

Significant differences between parasite species richness and abundance of *B. capriscus* and *B. vetula* were observed. Also, differences between abundance, parasite species richness and Berger-Parker dominance index in the infracommunities of of ectoparasites and adult endoparasites of *B. capriscus* and *B. vetula* were detected (Table 3).

Table 4. Concurrent species pairs, with statistical significant relationship, of metazoan parasites in *Balistes capriscus* and *B. vetula* from the coastal zone of the State of Rio de Janeiro, Brazil.

Hosts	Concurrent ectoparasite species	r_s	χ^2
B. capriscus	*Caligus balistae* - *Taeniacanthus balistae*	- 0.252	11.12
	C. balistae - Piscicolid not ident.	-	4.37
	T. balistae - Piscicolid not ident.	- 0.682	33.56
B. vetula	Cymothoid not ident. - Piscicolid not ident.	0.446	-
	Concurrent adult endoparasite species		
B. capriscus	*Aponurus laguncula* - *Xystretum pulchrum*	-0.578	-32.38
	Aponurus laguncula – *Gonocercella* sp.	-0.551	-29.33
	Aponurus laguncula – *Dichelyne* sp.	-0.581	11.46
	X. pulchrum - *Gonocercella* sp.	0.328	8.51
	Opechona sp. - *Gonocercella* sp.	-	4.49
	X. pulchrum – *Dichelyne* sp.	-	26.84
	Gonocercella sp. – *Dichelyne* sp.	-	8.15
B. vetula	*Aponurus laguncula* - *Peracreadium annahoineffae*	-	-5.45
	A. laguncula - *Hypocreadium biminensis*	-0.479	-
	H. biminensis - *P. annahoineffae*	0.606	-
	P. annahoineffae – *Dichelyne* sp.	-	6.70
	P. annahoineffae - *X. pulchrum*	0.400	-
	Concurrent larval helminth species		
B. capriscus	*Callitetrarhynchus* sp. - *Contracaecum* sp.	0.592	18.71

DISCUSSION

The results obtained from the present work showed similarities in the structure and composition of the parasite communities of *B. capriscus* and *B. vetula*. *Balistes capriscus* showed higher parasite species richnes at level of component community than *B. vetula*. This difference was more notorious in the endoparasite infracommunities. Nevertheless, 10 parasite species were common to the two *Balistes* species studied. Similarity in the composition of the parasite communities would be related with the overlapping of the spectrum diet and ecological niche of these species. The balistids showing morphological specializations in order to feed echinoderms, coral polyps and other invertebrates with carapace (VOSE; NELSON, 1994; KURZ, 1995). Also, the two species are opportunistic, benthic, carnivorous, with a wide spectrum diet, mainly bottom invertebrates (COSTA et al., 1987; VOSE; NELSON, 1994; KURZ, 1995; FIGUEIREDO; MENEZES, 2000). Also, Lowe-Mcconnell (1999) observed that balistid fishes are depredated by elasmobranchs and carnivorous teleosts. This characteristic would given more possibilities of feeding intermediate hosts, as was mentioned in Alves and Luque (2001). The two species of *Balistes* were infected by larval helminths as anisakids, tetraphyllidean and trypanorhynchids. The presence of these larval migth suggest the intermediate level of *Balistes* spp. at the marine trophic web. According George-Nascimento (1987), Marcogliese (2002), and Luque and Poulin (2004), the fish species at the intermediate level of the thropic web can showed a high number of parasite species, because a possible accumulation of parasite species in addition with the other levels of the web, mainly larval stages.

The parasite fauna of *B. capriscus* e *B. vetula* is composed by some generalist species as *Aponurus lagungula*, *Callitetrarhynchus* sp., *Contracaecum* sp. and *Scolex pleuronectis* which were recorded parazitizing other fish species from Brazil (TAKEMOTO et al., 1996; ALVES; LUQUE, 2001; ALVES et. al., 2002, 2003; LUQUE et al., 2002, 2003). Nevertheless, also was observed species with high host preference, the digenean *Hypocreadium biminensis* for example is a specific parasite of tetraodontiform fishes (BRAY; CRIBB, 1996). The presence of lepocreadiid digeneans were recorded for *Balistes* spp in several studies (BRAVO-HOLLIS; MANTER, 1957; NAHHAS; CABLE, 1964; LAMOTHE, 1965; HUSSAIN et. al., 1986; BRAY; CRIBB, 1996).

The parasite communities of *B. capriscus* e *B. vetula* showed some differences in relation to dominant species, in *B. capriscus* the copepod *T. balistae* was the most dominant, while in *B. vetula* was *Contracaecum* sp.. In the case of *Contracaecum* sp., recorded in both balistid fishes, the difference in the quantitative parasite descriptors migth be attributed to dynamics and abundance of the hosts (MARCOGLIESE, 2002; SANCHEZ-RAMIREZ; VIDAL-MARTINEZ, 2002). These differences in the composition and the species richness of the parasite communities of *B. capriscus* and *B. vetula* suggested the importance of ecological traits determining the structure of parasite communities.

The correlation among the total length of *Balistes* species and the total abundance of several parasite species was possibly originated by accumulative infection. This is a pattern anteriorly found in other marine fishes from Rio de Janeiro (LUQUE et al., 1996; ALVES; LUQUE, 2001). As pointed out in the classic study by Polyanski (1961), quantitative and qualitative changes in parasitism are expected with the fish growth. In the case of the endoparasites this relationship would be strongly influenced by possible changes in the feeding habits of the fish correlated with the age (SAAD-FARES; COMBES, 1992).

The low number of associated pairs of parasite species detected in *B. capriscus* and *B. vetula* is in agreement with the data obtained from other Neotropical marine fishes (OLIVA; LUQUE, 1998; CHAVES; LUQUE, 1999; ALVES; LUQUE, 2001). However, these data could be used with caution to explain the parasite community structure. According to Rohde et al. (1995), interspecific relationships only can be considered valid when are tested under experimental conditions. Moreover, Poulin and Luque (2003) proposed an index of interactivity which measures the overall tendency of the different species in a component community to co-occur in the same infracommunities where low values are indicative of interactive parasite communities, whereas high values of CC_{50} are to be expected in isolationist communities. This index was tested using a sample gastrintestinal helminth communities of 37 marine teleost fishes of Brazil including *B. capriscus* and *B. capriscus*. The *Balistes* species showing values that indicate their proximity with the isolationist type of community.

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