Community Ecology of the Metazoan Parasites of White Croaker, *Micropogonias furnieri* (Osteichthyes: Sciaenidae), from the Coastal Zone of the State of Rio de Janeiro, Brazil

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One hundred specimens of white croakers, Micropogonias furnieri *(Desmarest 1823) (Osteichthyes: Sciaenidae) collected from Pedra de Guaratiba (23°01'S, 43°38'W), State of Rio de Janeiro, Brazil, from September 1997 to August 1999, were necropsied to study their parasites. The majority of the fish (95%) were parasitized by metazoan. Twenty-eight species of parasites were collected. The nematodes were the 40.5% of the total number of parasites specimens collected.* Dichelyne elongatus *was the most dominant species.* Lobatostoma ringens, Pterinotrematoides mexicanum, Corynosoma australe, D. elongatus, *and* Caligus haemulonis *showed a positive correlation between the host's total length and parasite prevalence and abundance. The monogenean* P. mexicanum *had differences in the prevalence and abundance in relation to sex of the host. The mean diversity in the infracommunities of* M. furnieri *was H=0.499±0.411, with correlation with the host's total length and without differences in relation to sex of the host. One pair of ectoparasites showed positive covariation, and two pairs of endoparasites showed positive association and covariation between their prevalences and abundances, respectively. Negative association or covariations were not found. The dominance of endoparasites in the croakers parasite infracommunities reinforced the differences found in sciaenids from the South American Pacific Ocean, in which the ectoparasites are dominant.*

Key words: parasite ecology - community structure - marine fish - Sciaenidae - *Micropogonias furnieri* - Brazil

Micropogonias furnieri (Desmarest 1823) is a demersal and benthic sciaenid fish with known distribution from Gulf of Mexico, Antilles to Gulf of San Matías, Argentina (Menezes & Figueiredo 1980). In the life cycle of *M. furnieri*, the juvenile individuals migrate to estuarine areas and the adults reach the adjacent coastal zone to reproduce (Vazzoler 1991). *M. furnieri* is very common in the southern Brazilian coastal zone and has significant commercial importance.

Several taxonomic papers on the parasites of *M. furnieri* from Brazil were published: Amato (1983a, b), Fabio (1988), Fernandes and Goulart (1992), Pereira Jr. et al. (1996), Alves and Luque (2000a) on digeneans and aspidobothreans; Kohn et al. (1989), Alves and Luque (2000a) on monogeneans; Oliveira (1985), São Clemente (1986a, 1987), Pereira Jr. (1993) and Alves and Luque (2000a) on cestodes; Pereira Jr. and Neves (1993) and Alves and Luque (2000a) on acanthocephalans; Pereira Jr. and Costa (1996), Alves and Luque (2000a) on nematodes. Additional taxonomic records of parasites of *M. furnieri* in the South American Atlantic Ocean were made by Suriano (1966, 1975) from Argentina, and Vicente et al. (1989) from Venezuelan coastal zone.

Studies on quantitative aspects of the parasites of *M. furnieri* from the Brazilian coastal zone were restricted to larval stages of trypanorhynch cestodes and acanthocephalan (São Clemente 1986b, Pereira Jr. 1993, Pereira Jr. & Neves 1993). Recently, Alves and Luque (1999, 2000b) made preliminary quantitative studies, at the parasite infrapopulation level, in adult and juvenile *M. furnieri* from the State of Rio de Janeiro. Additional quantitative studies of parasites of *M. furnieri* from the South American Atlantic Ocean were made by Suriano (1966), Sardella et al. (1995), and Rohde et al. (1995) from Argentina.

Other Brazilian sciaenid fishes were studied for quantitative and ecological aspects of their parasites: Oliveira (1985) recorded quantitative aspects of the infection by trypanorhynch larval in *Macrodon ancylodon* (Bloch) from the State of Rio

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Grande do Sul, and Cezar and Amato (1998) recorded infection by cystacanths of *Corynosoma* sp. in *Umbrina canosai* Berg from the State of Rio Grande do Sul. Chaves and Luque (2000) studied the parasite community of *Menticirrhus americanus* Linnaeus from the State of Rio de Janeiro, Brazil. Recently, Luque and Oliva (1999) made an amphi-oceanic comparative analysis with the parasite infracommunities of *M. americanus* from Rio de Janeiro and *M. ophicephalus* Jenyns from Lima, Peru.

In this report, we analyzed the metazoan parasite community of *M. furnieri* from the coastal zone of the State of Rio de Janeiro, at the component and infracommunity levels, and compared our results with those on the parasite communities of marine sciaenid fishes from the Neotropical region.

MATERIALS AND METHODS

From September 1997 to August 1999, 100 specimens of *M. furnieri* were examined. Local fishermen collected fish from Pedra de Guaratiba (23°01'S, 43°38'W), coastal zone of the State of Rio de Janeiro, Brazil. Fishes were identified according to Menezes and Figueiredo (1980) and measured 10–66 cm (mean=33.2±16.4 cm) in total length. The average total length of male (29.3±14.9 cm, n=53) and female (37.6±17.2 cm, n=47) fishes in the study sample were significantly different (t= 2.589, P=0.011).

The analysis included only parasite species with prevalence greater than 10% (Bush et al. 1990). The quotient between variance and mean of parasite abundance (index of dispersion) was used to determine distribution patterns. Overdispersion or degree of aggregation was determined with the Green index (Ludwig & Reynolds 1988). The dominance frequency and the relative dominance (number of specimens of one species/total number of specimens of all species in the infracommunity) of each parasite species were calculated according to Rohde et al. (1995). Spearman's rank correlation coefficient rs was calculated to determine possible 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) and partition of host samples into three length intervals, according to Haimovici (1987) and Pereira Jr. (1993). The effect of host sex on abundance and prevalence of parasites was tested using the Z normal approximation to the Mann-Whitney test and the Fisher exact test, respectively. Parasite species diversity was calculated using the Brillouin index (H), because each fish analyzed corresponded to a fully censused community (Zar 1996). The probable variation of diversity in relation to host sex (Mann-Whitney test) and to host total length (Spearman's rank correlation coefficient) was tested. For each infracommunity, the evenness (Brillouin-based evenness index) was calculated. 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. Ecological terminology follows Bush et al. (1997). Statistical significance level was evaluated at $P \leq 0.05$.

Voucher specimens of helminths were deposited in the Coleção Helmintológica do Instituto Oswaldo Cruz (CHIOC), Rio de Janeiro, Brazil; copepods were deposited in the Coleção de Crustacea do Museu Nacional (MNRJ), Quinta da Boa Vista, Rio de Janeiro, RJ, Brazil.

RESULTS

Component community - Twenty-eight species of metazoan parasites were collected (Table I). Nematodes were the most abundant with five species and they accounted for 40.5% of the total parasites collected. *Dichelyne elongatus* (Tornquist) was the dominant species, with 601 specimens collected (36.8% of all parasites); and showed the highest values of mean relative dominance and frequency of dominance (Table II). All parasites of *M. furnieri* had the typical overdispersed pattern of distribution observed in many parasite systems. Cystacanths of *Corynosoma australe* Johnston showed the highest values of dispersion indices (Table III).

Abundance and prevalence of *Lobatostoma ringens* (Linton), *Pterinotrematoides mexicanum* Caballero and Bravo-Hollis, *C. australe*, *D. elongatus*, and *Caligus haemulonis* Krøyer were positively correlated with the host total length (Tables IV, V). The mean abundance and the prevalence of *P. mexicanum* were significant higher in the female (5.8 and 46.8%) than in the male (1.6 and 26.4%) hosts (Z = -2.605, P = 0.009; F = 0.039).

Infracommunities - Ninety-five percent of croakers were parasitized by at least one parasite species. A total of 1,631 individual parasites was collected, with mean of 16.3 parasites/fish. The values of the dispersion and Green indices for the total individual parasites were 36.828 and 0.382, respectively. Relationships between the total parasite abundance and the total body length (rs = 0.784, P<0.001) of fish were observed. The mean parasite species richness 2.9±2 (1-9), was correlated with total body length of fish (rs = 0.698, P<0.001). Twenty hosts (20%) showed infection with one parasite species and 30 (30%), 12 (12%),

TABLE I

Prevalence, intensity, mean intensity, mean abundance, and site of infection of the metazoan parasites of *Micropogonias furnieri* from the coastal zone of the State of Rio de Janeiro, Brazil

Parasites	Prevalence (%)	Intensity	Mean intensity	Mean abundance	Site of infection
Aspidobothrea					
Lobatostoma ringens (CHIOC 34.016)	10	1-7	1.7±1.9	0.2±0.7	Intestine
Digenea					
Brachadena pyriformis (CHIOC 34.013)	4	-	1	<0.1	Stomach
Diplomonorchis leiostomi (CHIOC 34.300a-b)	5	1-6	3.6±2.4	0.2±0.9	Intestine
Immature didymozoid (CHIOC 34.301)	4	1-2	1.2±0.5	<0.1	Mesenteries
Lecithochirium microstomum (CHIOC 34.014)	26	1-4	1.2±0.7	0.3±0.6	Stomach
Opecoeloides stenosomae (CHIOC 34.302a-b)	2	1-5	5	0.1±0.7	Intestine
Pachycreadium gastrocotylum (CHIOC 34.015)	17	1-8	2.8±2.4	0.3±1.4	Intestine
Monogenea					
Encotyllabe spari (CHIOC 34.017)	5	1-2	1.2±0.4	0.1±0.2	Gills
Macrovalvitrema sinaloense (CHIOC 34.018)	41	1-18	2±2.8	0.8±2.1	Gills
Pterinotrematoides mexicanum (CHIOC 34.019)	36	1-66	9.9±13.2	3.6±9.2	Gills
Eucestoda					
Callitetrarhynchus gracilis (larval) (CHIOC 34303)	4	1-2	1.2±0.5	<0.1	Coelomic cavity
Pterobothrium heteracanthum (larval) (CHIOC 34.020)	5	1-62	20.6±23.9	1±6.6	Coelomic cavity
Scolex pleuronectis (CHIOC 34.304)	1	-	1	<0.1	Intestine
Acanthocephala					
Corynosoma australe (cystacanth) (CHIOC 34.021a-b)	12	1-73	17.4±23.2	2.1±9.6	Mesenteries
Dollfusentis chandleri (CHIOC 34.022)	4	1-2	1.2±0.5	<0.1	Intestine
Nematoda					
Contracaecum sp. (larval) (CHIOC 33.841)	8	1-16	5.9±5.3	0.5±2.1	Mesenteries
Cucullanellus rodriguesi (CHIOC 33897)	1	1-2	2	<0.1	Intestine
Dichelyne elongatus (CHIOC 33.842a-c, 33.843a-c)	60	1-70	10±12.2	6±10.6	Intestine
Pseudocapillaria sp. (CHIOC 33.898)	5	1-2	1.4±0.5	0.1±0.3	Intestine
Pseudoterranova sp. (larval) (CHIOC 33.899)	2	1-2	1.5±0.7	<0.1	Mesenteries
Hirudinea					
Piscicolid not identified	3	1-4	2±1.7	0.1±0.4	Gills
Copepoda					
Bomolochus paucus (MNRJ 14005)	4	1-2	1.2±0.5	<0.1	Gills
Caligus haemulonis (MNRJ 13329)	10	1-5	1.9±1.3	0.2±0.7	Gills

↓

Parasites	Prevalence (%)	Intensity	Mean intensity	Mean abundance	Site of infection
Clavellotis dilatata (MNRJ 13330)	3	-	1	<0.1	Gill rakers
Colobomatus sp. (MNRJ 14006)	1	1-2	2	<0.1	Gills
Ergasilus euripedesi (MNRJ 14007)	5	1-8	3.4±3	0.2±0.9	Gills
Neobrachiella chevreuxii (MNRJ 13331)	7	1-4	1.6±1.1	0.1±0.5	Operculum
Isopoda					
Cymothoid not identified (MNRJ 13332)	4	1-2	1.7±0.5	0.1±0.3	Branchial cavity

TABLE II

Frequency of dominance and mean relative dominance of the metazoan parasites of *Micropogonias furnieri* from the coastal zone of the State of Rio de Janeiro, Brazil

Parasites	Frequency of dominance	Frequency of dominance shared with one or more species	Mean relative dominance
Lobatostoma ringens	0	0	0.009±0.039
Lecithochirium microstomum	3	7	0.081±0.211
Pachycreadium gastrocotylum	6	3	0.062±0.188
Macrovalvitrema sinaloense	8	9	0.131±0.255
Pterinotrematoides mexicanum	8	2	0.105±0.172
Corynosoma australe	4	0	0.031±0.107
Dichelyne elongatus	28	4	0.268±0.304
Caligus haemulonis	1	1	0.021±0.113

TABLE III

Dispersion index (DI) and Green's index of aggregation (GI) of the metazoan parasites of *Micropogonias furnieri* from the coastal zone of the State of Rio de Janeiro, Brazil

Parasites	DI	GI
Lobatostoma ringens	3.626	0.026
Lecithochirium microstomum	2.318	0.003
Pachycreadium gastrocotylum	4.313	0.033
Macrovalvitrema sinaloense	5.134	0.041
Pterinotrematoides mexicanum	23.615	0.228
Corynosoma australe	44.165	0.436
Dichelyne elongatus	18.714	0.178
Caligus haemulonis	2.625	0.016

14 (14%), 9 (9%), 5 (5%), 0 (0%), 4 (4%) and 1 (1%) had multiple infections with 2, 3, 4, 5, 6, 7, 8 and 9 parasite species, respectively. The mean parasite species diversity (H) was 0.499±0.411 and the maximum diversity was 1.383. The Brillouin-based evenness index (J) had a mean of 0.533±0.355. Parasite diversity was correlated to host total length (rs=0.652; P<0.001) and no significant differences (t = -1.820, P = 0.071) in parasite diversity were observed between male (H = 0.431±0.391) and female croakers (H = 0.578±0.423).

Parasite infracommunities were separated into two groups – ectoparasites (monogeneans and copepods) and adult endoparasites (aspidobothrid, digeneans acanthocephalans and nematodes) – to determine possible interspecific associations. Larval stages were not included in this analysis because only one species (*C. australe*) showed prevalence higher than 10%. Among the ectoparasites, only one species pair, *P. mexicanum* and *C. haemulonis,* shared significant positive covariation (Table VI). The infracommunities of endoparasites had one pair of species that exhibited significant positive association and covariation, *L. ringens* and *D. elongatus* (Table VII).

DISCUSSION

The present study detected some patterns in the structure of the infracommunities of metazoan parasites of *M. furnieri*: (1) endoparasite dominance; (2) correlation of parasite abundance at the infracommunity level with the size of the host; and (3) low number of parasite species associated pairs.

The nematodes (adult and larval stages) were the main component of the parasite infracommu-

TABLE IV

Prevalence and mean abundance of metazoan parasites of *Micropogonias furnieri*, in relation to body total length of hosts

	Class I (<23cm)	(n=40)	Class II (23.5-45 cm)	(n=28)	Class III (>45 cm)	(n=32)
	P(%)	MA	P(%)	MA	P(%)	MA
Lobatostoma ringens[a]	-	-	14.3	0.3±1.3	15.6	0.1±0.3
Lecithochirium microstomum	22.5	0.2±0.4	28.5	0.4±0.7	28.2	0.4±0.9
Pachycreadium gastrocotylum	5	0.1±0.3	42.8	1.5±2.4	9.3	0.1±0.3
Macrovalvitrema sinaloense	45	0.7±0.9	21.4	0.5±1.5	53	0.9±1.4
Pterinotrematoides mexicanum[a]	5	1±0.5	57.8	0.3±0.6	87.5	11±13.7
Corynosoma australe[a]	-	-	3.5	0.03±0.2	34.3	6.5±16.3
Dichelyne elongatus[a]	27.5	0.3±0.5	64.2	5.7±13.8	96.8	13.5±9.5
Caligus haemulonis[a]	2.5	0.02±0.1	7.1	0.07±0.2	21.8	0.5±1.2

P: prevalence; MA: mean abundance; *a*: differences of the parasite prevalence and abundance among the three length classes are significant.

TABLE V

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

Parasites	*rs*	*P*	*r*	*P*
Lobatostoma ringens	0.254[a]	0.011	0.884[a]	0.019
Lecithochirium microstomum	0.073	0.469	0.369	0.471
Pachycreadium gastrocotylum	0.117	0.243	0.252	0.630
Macrovalvitrema sinaloense	0.009	0.922	0.443	0.378
Pterinotrematoides mexicanum	0.712[a]	<0.001	0.924[a]	0.008
Corynosoma australe	0.477[a]	<0.001	0.955[a]	0.003
Dichelyne elongatus	0.761[a]	<0.001	0.974[a]	0.001
Caligus haemulonis	0.255[a]	0.010	0.877[a]	0.022

a: significant values; *P*: significance level

TABLE VI

Concurrent species pairs of ectoparasites on *Micropogonias furnieri* from the coastal zone of the State of Rio de Janeiro, Brazil

Species pairs	χ^2	*P*	*rs*	*P*
Macrovalvitrema sinaloense - Caligus haemulonis	0.701	0.786	0.070	0.487
Pterinotrematoides mexicanum - C. haemulonis	1.740	0.187	0.219[a]	0.028
P. mexicanum - M. sinaloense	0.101	0.753	0.104	0.301

χ^2: Chi-square test; *rs*: Spearman rank correlation coefficient; *a*: significant values; *P*: significance level

TABLE VII

Concurrent species pairs of endoparasites in *Micropogonias furnieri* from the coastal zone of the State of Rio de Janeiro, Brazil

Species pairs	χ^2	*P*	*rs*	*P*
Lecithochirium microstomum - Dichelyne elongatus	-0.001	0.962	0.013	0.893
L. microstomum - Pachycreadium gastrocotylum	1.590	0.206	0.136	0.177
Lobatostoma ringens - D. elongatus	5.671[a]	0.017	0.225[a]	0.024
L. ringens - L. microstomum	-0.010	0.939	-0.027	0.789
L. ringens - P. gastrocotylum	0.501	0.477	0.146	0.144
P. gastrocotylum - D. elongatus	0.501	0.479	0.067	0.504

χ^2: Chi-square test; *rs*: Spearman rank correlation coefficient; *a*: significant values; *P*: significance level nities of *M. furnieri*. The feeding habits and wide diet spectrum of demersal fishes, bringing them in contact with several potential intermediate hosts of marine digenean, acanthocephalan and nematodes, might favor the presence of endoparasites in fishes. *M. furnieri* has a highly diversified diet with components of the demersal and benthic communities, and with polychaetes as most frequent item (Amaral & Migotto 1980, Vazzoler 1991).

Helminth larval stages infecting *M. furnieri* may show the possible intermediate trophic level of this fish and may be part of the diet of marine mammal or birds (definitive hosts of *C. australe* and anisakids), and elasmobranch fishes (definitive hosts of tetraphyllidean and trypanorhynch cestodes). The highest values of dispersion of *C. australe* cystacanths detected in *M. furnieri* from the State of Rio de Janeiro, are in agreement with the results obtained by Pereira Jr. and Neves (1993) and Sardella et al. (1995) in *M. furnieri* from Brazil and Argentina, respectively; and by Cezar and Amato (1998) in *U. canosai* from Brazil.

The prevalence and abundance of helminth larval stages recorded in this paper were lower than the ones recorded by São Clemente (1986b), Oliveira (1985) and Pereira Jr. (1993) for trypanorhynch cestodes in *M. furnieri* from the States of Rio de Janeiro and Rio Grande do Sul, and by Pereira Jr. and Neves (1993) for *C. australe* in Rio Grande do Sul. According to Fernandez and Esch (1991a, b) the role of the parasite species in their communities would be studied considering their particular distribution strategies. Infections by trypanorhynch cestodes and polymorphid acanthocephalans in marine fishes are strongly influenced by the diet of the fishes and mainly by the regional distribution and density of the hosts (George-Nascimento 1987). Also, differences with data furnished by São Clemente (1986b) from the State of Rio de Janeiro, might be attributed to local changes in distribution of the hosts along the time. Kennedy (1990, 1993) stated that the majority of studies on parasite ecology is restricted to short period times, under three years. This situation can be considered a limiting factor to detect community and population patterns, because ecological perturbations and changes are also influencing the composition and density of the host communities. Moreover, the host samples studied by São Clemente (1986b) were highly heterogeneous because were collected subsamples from ten localities from Rio de Janeiro, including Cabo Frio, locality strongly influenced by an upwelling system (Valentin 1994).

According to Vazzoler (1991) and Haimovici et al. (1994), the populations of *M. furnieri* along the Brazilian coastal zone showed different patterns of relative abundance, aggregation and behavior, possibly originated by the influence of the southern Brazil Subtropical Convergence Ecosystem. These ecological differences might explain the highest parasitism level by larval stages of cestodes and acanthocephalans in *M. furnieri* from the coastal zone of Rio Grande do Sul, recorded by Oliveira (1985), Pereira Jr. (1993), and Pereira Jr. and Neves (1993). *M. furnieri* from Rio Grande do Sul has higher population density (sometimes in 8:1 rate) than the white croaker populations from the coastal zone of the State of Rio de Janeiro (Vazzoler 1991, Haimovici & Umpierre 1996). This factor appears to be one of the responsible for the high level of prevalence and abundance by *C. australe* in white croakers from Rio Grande do Sul. Cezar and Amato (1998) also recorded high values of prevalence and abundance of *Corynosoma* sp. cystacanths in *U. canosai*, another sciaenid fish common in the coastal zone of Rio Grande do Sul, with high similarity with *M. furnieri* in their feeding habits (Vazzoler 1975).

The correlation among the total length of *M. furnieri* and the prevalence and abundance of several parasite species, possibly originated by accumulative infection. This is a pattern anteriorly found in other marine fishes from Rio de Janeiro (Luque et al. 1996, Knoff et al. 1997, Luque & Chaves 1999). The digeneans *Lecithochirium microstomum* Chandler and *Pachycreadium gastrocotylum* (Manter) were exceptions, with the highest values of prevalence and abundance in the intermediate length class, when the fish inhabiting 25-30 m deep-waters. 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 digeneans, this relationship is strongly influenced by changes in the feeding habits of the fish correlated with the age (Saad-Fares & Combes 1992). *M. furnieri* along its life cycle inhabits three different ecosystems and has strongly changes in its diet composition (Vazzoler 1991).

The correlation of the sex of *M. furnieri* with the abundance and prevalence of the monogenean *P. mexicanum* was surprising because differences in biological conditions of male and female croakers are unknown. However, this pattern can be explained because of the prevalence and the abundance of this parasite were positively correlated with host's total length. Moreover, the lengths of male and female croakers were significantly different; thus, this relationship is confounded with the apparent inequalities between female and male infection levels. A similar situation was detected in *M. americanus*, with the monogenean *Rhamnocercus stichospinus* Seamster and Monaco, but in this case, the total lengths of female and male hosts were not significantly different (Chaves & Luque 2000). Quantitative relationships of the sex of the host with the infection levels of some components of the parasite infracommunities were also detected in other benthic fishes from Brazil (Luque et al. 1996, Knoff et al. 1997).

The low number of parasite species associated pairs detected in *M. furnieri* is in agreement with the data obtained from other Neotropical sciaenids fishes, where was observed dominance of generalist species (Luque 1996, Oliva & Luque 1998, Chaves & Luque 2000). 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.

Chaves and Luque (2000) studied the structure of the parasite infracommunities in 115 *M. americanus* from the State of Rio de Janeiro. Some patterns observed were similar to *M. furnieri*, but some quantitative differences were detected: *M. americanus* showed mean parasite richness and parasite diversity higher than *M. furnieri*, and the mean parasite abundance and prevalence were higher in *M. furnieri* at the infracommunity level. These differences might be attributed to differences in the ecological relationships (behavior, habitat, and diet) recorded for *M. americanus*, benthic, inhabiting shallow, "surf-zone" waters (Lunardon et al. 1991), and *M. furnieri*, benthic-demersal, inhabiting deeper waters (Vazzoler 1991) from Brazil.

Some of the patterns detected by Thoney (1991, 1993) in the parasite infracommunities of *M. undulatus* (Linnaeus) from North American Atlantic Ocean, are close to those detected in *M. furnieri*. According to Thoney (1991, 1993), the parasite community of *M. undulatus* is dominated by endoparasites and the young fishes showed similar parasite diversity in relation to adults croakers, but the parasites recorded by Thoney (1991, 1993) showed higher values of prevalence and parasite abundance. Luque (1996), and Oliva and Luque (1998) studied the characteristics of the parasite infracommunities in five sciaenids from Peru, in the South American Pacific Ocean. These sciaenids showed absolute dominance by ectoparasites, mainly diplectanid monogeneans and lerneopodid copepods, while *M. americanus* and *M. furnieri* from South American Atlantic Ocean had dominance by endoparasites. Luque and Oliva (1999) discussed these amphi-oceanic differences for *M. ophicephalus* (Pacific Ocean) and *M. americanus* (Atlantic Ocean). The parasite community of *M. furnieri* can be included as another example of these differences.

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