Comparative dietary analysis of *Eurycheilichthys pantherinus* and *Pareiorhaphis hystrix*: two Loricariidae species (Ostariophysi, Siluriformes) from *Campos Sulinos* biome, southern Brazil

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ABSTRACT. This work was carried out in Marco river, São José dos Ausentes municipality, state of Rio Grande do Sul, southern Brazil. This region is located within the *Campos Sulinos* biome, an area of great biological importance due to its high diversity and endemism of fish. The feeding habits and food overlap between *Eurycheilichthys pantherinus* (Reis & Schaefer, 1992) (n=108) and *Pareiorhaphis hystrix* Pereira & Reis, 2002 (n=60) are described. Monthly samples were obtained between September 2000 and July 2001 with dipnets using the kick sampling technique. Stomach contents were analyzed based on frequency of occurrence, volumetric frequency and index of alimentary importance. The level of dietary specialization and food overlap were determined by the Levins measure and the Morisita index, respectively. *Eurycheilichthys pantherinus* fed mainly on immature aquatic insects, such as Dipterans and Ephemeropterans, and was classified as insectivore. *Pareiorhaphis hystrix* fed mainly on detritus associated with small amounts of aquatic insects, and was classified as detritivore. Species are clearly segregated by the use of food resources in Marco River. Their diets did not overlap and the differences observed in their feeding habits probably contribute for their coexistence.

KEYWORDS. Diet, feeding overlap, detritivory, insectivory, sympatry.

RESUMO. Análise comparada da dieta de *Eurycheilichthys pantherinus* e *Pareiorhaphis hystrix*: duas espécies de Loricariidae (Ostariophysi, Siluriformes) do bioma Campos Sulinos, sul do Brasil. Este estudo foi realizado no rio do Marco, município de São José dos Ausentes, estado do Rio Grande do Sul, sul do Brasil. Esta região está inserida no bioma Campos Sulinos, considerada uma área de grande importância biológica devido à grande diversidade e endemismo de peixes. Este trabalho tem como objetivos descrever os hábitos alimentares e verificar a presença de sobreposição alimentar na dieta de duas espécies simpátricas de Loricariidae do rio do Marco: *Eurycheilichthys pantherinus* (Reis & Schaefer, 1992) (n=108) e *Pareiorhaphis hystrix* Pereira & Reis, 2002 (n=60). Os espécimes foram coletados mensalmente, entre setembro de 2000 e julho de 2001 com redes do tipo puçá utilizando a técnica de *kick sampling*. Os conteúdos estomacais foram analisados através dos métodos de frequência de ocorrência, frequência volumétrica e índice de importância alimentar. O grau de especialização alimentar e a sobreposição nas dietas foram calculadas através da medida de Levins e do índice de Morisita, respectivamente. *Eurycheilichthys pantherinus* alimentou-se preferencialmente de formas imaturas de insetos aquáticos, tais como Diptera e Ephemeroptera, apresentando o hábito alimentar insetívoro. *Pareiorhaphis hystrix* alimentou-se de detrito associado a pequenas quantidades de insetos aquáticos, apresentando o hábito alimentar detritívoro. As espécies estão claramente segregadas quanto ao uso dos recursos alimentares no rio do Marco e possivelmente as diferenças nos hábitos alimentares contribuem para sua coexistência.

PALAVRAS-CHAVE. Dieta, sobreposição alimentar, detritivoria, insetivoria, simpatria.

Food utilization studies might be an important field for discussing theoretical issues, such as species substitution through spatial, temporal and trophic niche components (Schöener, 1974). This would allow a better knowledge on species biology, system trophic organization and interaction mechanisms among species (Herrán, 1988).

São José dos Ausentes municipality belongs to the Campos Sulinos biome, and is regarded as an area of great biological importance with high diversity and endemism of fish species (MMA, 2000). It is part of the Alto Uruguai River co-region (Abell *et al*., 2008), an area with conservation priority regarding freshwater fish diversity. The knowledge about aspects such as distribution, composition and occurrence of fish species, as well as studies of their biology are poorly documented, a problematic conservation issue. Moreover, this biome is being altered due to anthropogenic interventions, such as the introduction of exotic fish species (*Oncorhynchus mykiss* Walbaum, 1792), one of the reasons why the Campos Sulinos were diagnosed as having priority for the inventory of the ichthyofauna, according to MMA (2000).

Loricariidae is the largest family of armored catfishes in the Neotropics, comprising more than 650 described species (Reis *et al*., 2003). Their distribution is limited to South and Central America, from Northern Costa Rica to Southern Argentina (Reis *et al*., 2003) and constitutes one of the most specialized families among Neotropical siluriforms (Gosline, 1947). Loricariids are bottom-dwelling fishes in flowing waters, from small montane streams to large lowland rivers, where they are found mainly in rocky places (Power, 1983; Muller *et al*., 1994; Lowe-McConnell, 1999). They are characterized by a body covered with bony plaques, lower mouth and sucker-like lips (Nelson, 2006). Among other loricariids species found in these region, there are two sympatric and endemic species from Marco river in São José dos Ausentes municipality: *Eurycheilichthys pantherinus* (Reis & Schaefer, 1992), whose distribution includes the Alto and Medio Uruguai river basin, and *Pareiorhaphis hystrix* Pereira & Reis, 2002, occurring at Pelotas river, higher portion of Antas river, in the Jacui river drainage (Pereira & Reis, 2002).

Several studies about feeding behavior of Loricariidae species showed the preference on autochthonous food resources, such as detritus in different stages of decomposition (ANGELESCU & GNERI, 1949; SAUL, 1975; FUGI *et al*., 1996; LUIZ *et al*., 1998; MELO *et al*., 2004; MÉRONA & RANKIN-DE-MÉRONA, 2004; OLIVEIRA & BENNEMANN, 2005), aquatic invertebrates (GOULDING *et al*., 1988; UIEDA *et al*., 1997) and algae (POWER, 1983, 1984a, b, 1990; SHAEFER & LAUDER, 1986; COSTA, 1987; BUCK & SAZIMA, 1995; LOWE-MCCONNELL, 1999). So far, no studies on the ecology of *E. pantherinus* and *P. hystrix* were made.

The coexistence of similar species in ecological communities is one of the most important problems in ecology (GORDON, 2000). The degree of overlap in resource use among coexistent species is variable. In this context, the position of a species within a community may be defined in terms of its patterns use of resources and its interaction with other species, which uses the same resources (PUTMAN, 1994). This abstraction of the position that a species has within the community and its relationships with other organisms is expressed in the ecological niche concept (PUTMAN, 1994). Following ABRAMS (1980), niche overlap occurs when two or more species use the same resource from the environment. Other dimensions of niche are time, space and food (PIANKA, 1994). The importance of these dimensions is variable in fish communities, but generally the food dimension is often more important than the space and time (ROSS, 1986). Ecological differences in each of these three dimensions may reduce competition and allow the coexistence of a variety of species (PIANKA, 1994).

According to the Competitive Exclusion Principle (GAUSE, 1934), when phylogenetically related species with similar morphological characteristics coexist in the same habitat, they may compete and result in the exclusion of minos adapted. However, if the species who explore the same resources in a community coexists, then we assume that they explore these resources differently, or the competition may not occur if the resources were abundant in the environment (MARGALEF, 1986; PIANKA, 1994).

In order to understand the factors that allow the coexistence between *E. pantherinus* and *P. hystrix* in Marco river, we determined their feeding, diet breadth and feeding overlap.

MATERIAL AND METHODS

The São José dos Ausentes municipality lies on the plateau of state of Rio Grande do Sul. Marco river belongs to Pelotas river drainage and is characterized by fast flowing waters, stony bottom, scarce marginal vegetation and also some muddy-bottomed lateral puddles, forming a mosaic pattern that increases the availability of microhabitats supporting species with different preferences.

Fishes were sampled monthly, between September 2000 and July 2001, in Marco river (28°36’41’’S, 49°55’09’’W) (Fig. 1). The sampling areas were 100 m long and 20 m width, with fast flowing water, rocky substrate, and scarce marginal vegetation. Samples were made by day, with dip nets in riffles about 0.5 m deep using *kick sampling* technique. Right after capture, specimens were fixed and biometric data was taken in the laboratory for each individual as follows: standard length (SL), in millimeters, total weight (WT) and stomach weight (We), in grams. Voucher specimens were catalogued in the ichthyological collection of the Departamento de Zoologia, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil (*E. pantherinus*: UFRGS 7862, 7870-7874, 7879-7884, 7887, 7889; *P. hystrix*: UFRGS 8908).

Stomach contents were analyzed under a stereoscopic microscope and, when necessary, under an optical microscope. Food items were identified to the lowest possible taxonomic level, using specific literature (NEEDHAM & NEEDHAM, 1978; LOPRETTO & TELL, 1995). All analyses were conducted considering the year seasons: spring (September, October and November 2000), summer (December 2000, January and February 2001), autumn (March, April and May 2001) and winter (June and July 2001).

Stomach content analysis was based on the frequency of occurrence (Fo) (HYNES, 1950) and volumetric frequency (Vo) (HYSLOP, 1980). Frequency of occurrence was calculate considering the number of stomachs containing a particular food category in relation to total number of stomachs containing food. The volumetric frequency (relative volume) was estimated

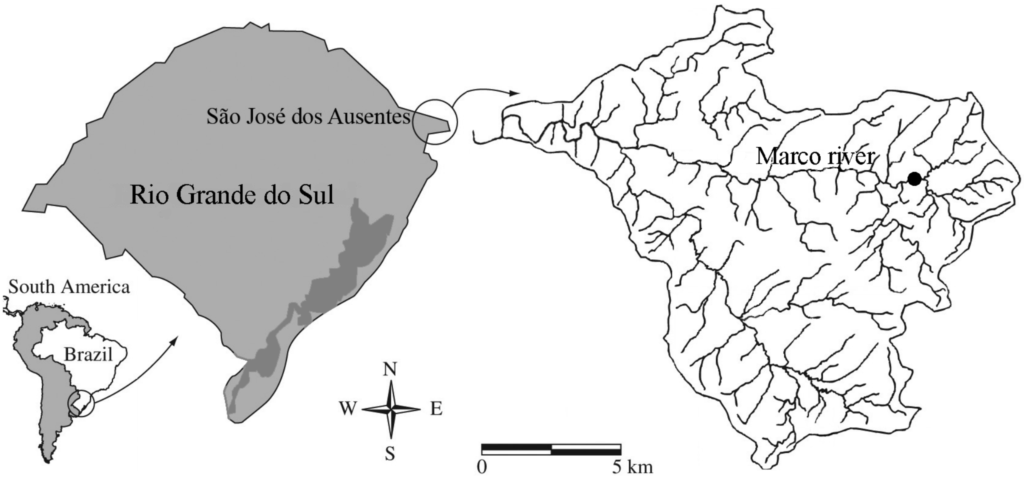

Figure 1. Map of the Marco river, São José dos Ausentes municipality, state of Rio Grande do Sul, Brazil. Modified from WINCKLER-SOSINSKI *et al*. (2008).

taking into account the quantitative contribution of each item. It was determined by the number of checkered squares occupied by each item on millimeter-ruled paper (points method), in relation to the total number of squares occupied by all of the items. To assess the proportion of food items in the diets, these two methods were combined in the graphical analysis proposed by Costello (1990) with Amundsen *et al*. (1996) modifications. This method consists of a two-dimensional representation of prey abundance values in the y axis, and frequency of occurrence in the x axis.

The relative importance of each food category was established according to the index of alimentary importance (IAi), following Kawakami & Vazzoler (1980). It was calculate according to the model: $IAi = [(Fo_i \times Vo_i)/\Sigma(Fo_i \times Vo_i)] \times 100$, where i = feeding item; Fo = frequency of occurrence; Vo = volumetric frequency.

Food items were grouped in taxonomic or ecological categories as follows: Coleoptera larvae (Col), Diptera larvae (Dipt), Ephemeroptera larvae (Eph), Lepidoptera larvae (Lepi), Trichoptera larvae (Tric), autochthonous insects parts (AIP), Arachnida (Arac), algae (Alg), vegetal matter (VM), inorganic sediment (Sed) and detritus (Detr). Detritus is defined basically as highly particulate and clustered organic matter, while inorganic sediment predominantly includes sand and mineral particles.

In order to show the relative level of dietary specialization of each species, the diet breadth of a species was calculated using the Levins measure (Krebs, 1989), with occurrence value data. The Hurlbert formula (Hurlbert, 1978) was applied to standardize the trophic niche measure (ranging from 0 to 1), according to the formula: $Bi = \{[1/(n-1)] / [(1/\Sigma_j p_{ij}^2)-1]\}$, where: B = Levins standardized index fro predator i; p_{ij} = proportion of diet of predator i that is made up of prey j; n = total number of food resources. Diet breadth values were set at the following levels: high (> 0.6), intermediate (0.4 – 0.6) or low (< 0.4).

Feeding overlap was calculated for each season through the simplified Morisita index (Krebs, 1989), using the alimentary importance index values for each alimentary item. The calculated feeding overlap values vary from 0, when diets are completely different, to 1, when diets are overlapped. According to Zaret & Rand (1971), values equal or above 0.6 indicate a significant feeding overlap.

Differences in the alimentary importance index values between seasons were tested to detect a possible seasonality in the ingestion of some alimentary categories using the Kruskal-Wallis test (Zar, 1999). These tests were made using the seasons as factor, and the values of alimentary importance index as variable.

RESULTS

Eurycheilichthys pantherinus diet was determined through the analysis of 108 stomach contents of specimens ranging from 33.69 mm to 61.77 mm (SL). The diet includes seven alimentary items, such as Coleoptera, Diptera, Ephemeroptera and Trichoptera larvae, autochthonous insects parts, vegetal matter, and inorganic sediment. The most important and representative alimentary items were Ephemeroptera and Diptera larvae, showing the highest values of occurrence and abundance in all seasons (Tab. I; Fig. 2). The relative food items contribution in *E. pantherinus* diet did not changed statistically during the studied period, indicating the absence of dietary seasonality when evaluated with Kruskal-Wallis test (Hc = 0.2834, p = 0.9766).

A total of 60 individuals of *P. hystrix* were analyzed, ranging from 31.29 to 65.67 mm (SL). The stomach contents were composed of 11 food items, such as detritus, Coleoptera, Diptera, Ephemeroptera, Lepidoptera and Trichoptera larvae, autochthonous insects parts, Arachnida, algae, vegetal matter and inorganic sediment. Detritus was the most important alimentary item, presenting the highest values of occurrence and abundance (Tab. II; Fig. 3) in the entire studied period. Autochthonous insects, such as Diptera and Ephemeroptera larvae, were also representative in *P. hystrix* diet, but with lower values than detritus (Tab. II; Fig. 3). As in *E. pantherinus*, the alimentary items contribution in *P. hystrix* diet did not changed during the studied period, indicating the absence of dietary seasonality when evaluated with Kruskal-Wallis test (Hc = 2.7692, p = 0.4331).

Eurycheilichthys pantherinus diet breadth values were low in all seasons (spring 0.3056; summer 0.3702; autumn 0.3318; winter 0.3797). *Pareiorhaphis hystrix*, on the other hand, presented intermediate values of diet breadth (spring 0.4003; summer 0.4043; autumn 0.5743; winter 0.5468).

The feeding overlap results showed low values in all seasons (spring 0.0745; summer 0.1133; autumn 0.4507; winter 0.1715), indicating that the diet of these species are different.

Table I. Frequency of occurrence (Fo), volumetric frequency (Vo) and index of alimentary importance (IAi) of food items ingested by *Eurycheilichthys pantherinus* (Reis & Schaefer, 1992) (n=108) at Marco river, São José dos Ausentes municipality, state of Rio Grande do Sul, Brazil, between September 2000 and July 2001.

Alimentary items	Spring/00			Summer/01			Autumn/01			Winter/01		
	Fo	Vo	IAi	Fo	Vo	IAi	Fo	Vo	IAi	Fo	Vo	IAi
Coleoptera larvae	2.7	2.5	0.1	0	0	0	0	0	0	0	0	0
Diptera larvae	49	52.3	36.65	62	52.4	43.46	88.8	47.1	47.59	65	52.7	45.23
Ephemeroptera larvae	100	44.2	63.21	100	41.7	55.79	93	49.3	52.17	95.6	43.2	54.53
Trichoptera larvae	0	0	0	9.5	5.9	0.75	7.4	2.1	0.18	4.3	3.1	0.18
Autochthonous insects parts	0	0	0	0	0	0	3.7	1.3	0.05	0	0	0
Vegetal matter	0	0	0	0	0	0	3.7	0.2	0.01	0	0	0
Inorganic sediment	2.7	1	0.04	0	0	0	0	0	0	4.3	1	0.06

Table II. Frequency of occurrence (Fo), volumetric frequency (Vo) and index of alimentary importance (IAi) of food items ingested by *Pareiorhaphis hystrix* Pereira & Reis, 2002 (n=60) at Marco river, São José dos Ausentes municipality, state of Rio Grande do Sul, Brazil, between September 2000 and July 2001.

Alimentary items	Spring/00			Summer/01			Autumn/01			Winter/01		
	Fo	Vo	IAi	Fo	Vo	IAi	Fo	Vo	IAi	Fo	Vo	IAi
Coleoptera larvae	0	0	0	0	0	0	0	0	0	7.69	2	0.28
Diptera larvae	33.3	21	11.38	15.3	9	2.87	86.6	20	28.52	53.8	18	17.41
Ephemeroptera larvae	0	0	0	30.76	13	8.35	33.3	8	4.39	0	0	0
Lepidoptera larvae	0	0	0	7.69	3	0.48	13.33	3	0.66	0	0	0
Trichoptera larvae	11.1	6	1.08	7.69	6	0.96	26.66	8	3.51	23.07	8	3.32
Autochthonous insects parts	11.1	6	1.08	30.76	13	8.35	46.66	11	8.45	30.76	10	5.53
Arachnida	0	0	0	7.69	3	0.48	6.66	1	0.11	7.69	3	0.41
Algae	0	0	0	7.69	3	0.48	20	5	1.65	23.07	8	3.32
Vegetal matter	11.1	6	1.08	7.69	3	0.48	40	10	6.59	15.38	5	1.38
Inorganic sediment	22.2	11	3.98	23.07	9	4.33	40	10	6.59	38.46	13	8.99
Detritus	100	50	81.4	92.3	38	73.22	100	24	39.53	100	33	59.36

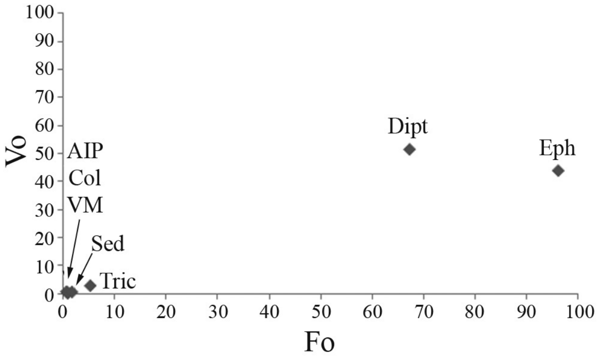

Figure 2. Proportion of alimentary items in the diet of *Eurycheilichthys pantherinus* (Reis & Schaefer, 1992) (n=108) at Marco river, São José dos Ausentes municipality, state of Rio Grande do Sul, Brazil, according to the method proposed by COSTELLO (1990) and modified by AMUNDSEN *et al.* (1996).

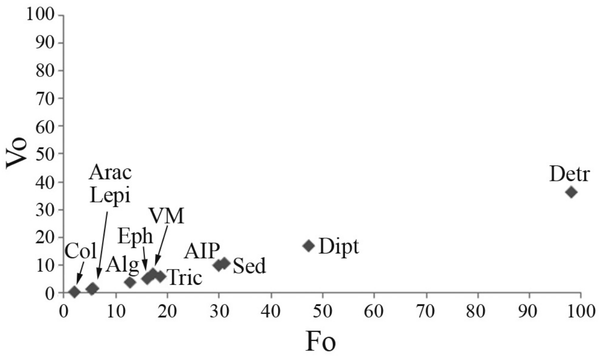

Figure 3. Proportion of alimentary items in the diet of *Pareiorhaphis hystrix* Pereira & Reis, 2002 (n=60) at Marco River, São José dos Ausentes municipality, state of Rio Grande do Sul, Brazil, according to the method proposed by COSTELLO (1990) and modified by AMUNDSEN *et al.* (1996).

DISCUSSION

Eurycheilichthys pantherinus and *P. hystrix* have a reduced alimentary spectrum when compared with loricariids studied by FUGI & HAHN (1991), BUCK & SAZIMA (1995), FUGI *et al.* (1996), LUIZ *et al.* (1998) and DELARIVA & AGOSTINHO (2001). Their studies report the consumption of items like unicellular algae, vegetal matter, detritus, sediment, crustaceans, mollusks, annelids, nematodes, arachnids, sponges, bryophytes and insects. However, this wide range of food items seems to reflect their high availability in the environments (WEATHERLEY, 1972) or just is an indicative of the species' preferences for obtaining a limited number of alimentary items in their diets.

Eurycheilichthys pantherinus was characterized as an insectivore, feeding on immature aquatic insects. This is an unusual feeding habit among loricariids since they are commonly algivore, herbivore or detritivore due to their tooth shape (SCHAEFER & LAUDER, 1986; LOWE-MCCONNELL, 1999; GEERINCKX *et al.*, 2007). Other studies with Loricariidae species also report a diet based on invertebrates related to the bottom. *Loricaria* species from Amazonian rivers, feed on aquatic insects (GOULDING *et al.*, 1988) and *Rineloricaria* sp. from Itaúna stream, state of São Paulo, was classified as insectivore (UIEDA *et al.*, 1997).

Pareiorhaphis hystrix was characterized as a detritivore, feeding on detritus and some aquatic insects as complementary items. GOULDING *et al.* (1988) defines detritus as any inorganic and organic material finely particulate associated with vegetal remains in decomposition, being an important item for some Loricariidae species (ANGELESCU & GNERI, 1949; SAUL, 1975). In addition, some detritivorous fish also feed on algae, aquatic invertebrates, fungi, bacteria and protozoans in smaller amounts (BOWEN *et al.*, 1984; ARAÚJO-LIMA & HARDY, 1987). Several studies with detritivorous loricariids show the same results found for *P. hystrix*, where fish consumed detritus associated with a small amount of autochthonous invertebrates, vegetal matter and algae. Among these studies in the Paraná River basin is FUGI *et al.* (1996, 2001) analyzing *Loricariichthys platymetopon* Isbrücker & Nijssen, 1979 diet, LUIZ *et al.* (1998) studying *Hypostomus derbyi* (Haseman, 1911) and *H. tietensis* (Ihering, 1905) feeding habits, and DELARIVA & AGOSTINHO (2001) determining *Rhinelepis aspera* Spix & Agassiz, 1829, *Hypostomus regani* (Ihering, 1905) and *H. ternetzi* (Boulenger, 1895) diets. In a Cerrado stream in Central Brazil, MELO *et al.* (2004) verified *Hypoptopoma* sp., *Squaliforma emarginata* (=*Hypostomus emarginatus* (Valenciennes, 1840)), *Hypostomus* sp. 1, sp. 2, sp. 3 and sp. 4, *Parotocinclus britskii* Boeseman, 1974, *Sturisoma nigrirostrum* Fowler, 1940 and *Farlowella* sp. diets, and in Ribeirão Cambé, south Brazil, OLIVEIRA & BENNEMANN (2005) analyzed *Hypostomus ancistroides* (Ihering, 1911) feeding habits.

Detritivory in Neotropical freshwater fishes is a controversial issue, as recognized by several authors (ROBERTS, 1972; GOULDING, 1980; BOWEN, 1983; GOULDING *et al*., 1988). The relative contribution of this item, its advantage and function in several parts of the alimentary canal are the most problematic aspects due to the complex nature of the material obtained over the river substratum (DARNELL, 1961; BOWEN, 1983; GOULDING *et al*., 1988). Despite the lack of knowledge about the nutritional significance of detritus, it is one of the most frequent items in stomach contents of fish in Neotropical rivers (BOWEN, 1983; WELCOMME, 1988; LOWE-MCCONNELL, 1999) which may be related to the great number of microorganisms associated to it (KEENLEYSIDE, 1979; GOULDING, 1980).

No pattern of seasonal use of alimentary resources was identified in the loricariids studied. This tendency of low seasonal changes in fish feeding habits was documented in Brazilian streams that supposedly would suffer high hydrological variation during the year: ESTEVES & LOBÓN-CERVIÁ (2001) in an Atlantic rainforest stream, ESTEVES *et al*. (2008) in Piraitinga river, and ROCHA *et al*. (2009), in Turvo Grande river basin. We believe that the Loricariidae species studied here are consuming the most abundant items at the time – detritus and aquatic insects – which explains the lack of seasonality in their diet.

The low values of feeding overlap between these species and a low diet breadth in *E. pantherinus* and an intermediate one in *P. hystrix* may be explained by the specialization in insectivorous and detritivorous diets. Studies have shown that low diet overlap between sympatric species may be explained by differences in feeding strategies. SABINO & CASTRO (1990) studying a fish community from an Atlantic rainforest stream, found differences in spatial distribution and feeding tactics as mechanisms that was determining the reduction in feeding overlap. MÉRONA & RANKIN-DE-MÉRONA (2004), studying food resource partitioning among fish in a lowland lake in Central Amazonia, found a low diet overlap at a community level, suggesting an efficient partition of food resources. However, other studies with Loricariidae species show a high feeding overlap, being an indicative of the same feeding behavior between these sympatric species. BUCK & SAZIMA (1995) verified the same feeding habits in four Loricariidae species, *Ancistrus* sp., *Harttia kronei* Miranda Ribeiro, 1908, *Kronichthys heylandi* (Boulenger, 1900) and *Schizolecis guntheri* (Miranda Ribeiro, 1918), in Ribeirão da Serra, southeastern Brazil, and LUIZ *et al*. (1998) found high feeding overlap among *Hypostomus* Lacepède 1803 species in Paraná river basin streams.

Apparently *E. pantherinus* and *P. hystrix* explore the available alimentary resources differently in Marco river. Although including a few taxa in their diets, autochthonous insects were the most important item for the first one, and detritus were the most important to the second one. This allows us to hypothesis that there is segregation in the trophic niche between them. There are few opportunities for diet specialization in freshwater fish (LARKIN, 1956). However, trophic specialization may be favored when a food type is available and constant in the environment, and this is the case of detritivorous fish (FUGI & HAHN, 1991). The diversity of feeding habits found in fish is the result of evolutionary processes, which lead to several structural adaptations and specializations on a specific food resource requires some morphological fitness to explore such resource (LAGLER *et al*., 1977).

The differences in feeding behavior suggest a segregation of feeding niches between *E. pantherinus* and *P. hystrix* in Marco river. In addition, this finding can be associated with some small differences in morphological attributes of these species found in literature. It is possible that little morphological differences such as the shape and position of mouth and tooth shape presented by these two species reflect different ways to obtain food. The more expanded lip of *E. pantherinus* and the presence of accessory unicuspid teeth internally to the main series in the premaxillary and dentary (REIS & SCHAEFER, 1992) make this species apt to explore benthonic resources, differently of the sympatric species *P. hystrix*, which feed predominantly on detritus possibly because of the lack of accessory teeth and the less expanded shape of the lip (PEREIRA & REIS, 2002). Several studies describe the diversity in number and size of teeth in Loricariidae (MULLER & WEBER, 1992; DELARIVA & AGOSTINHO, 2001; GEERINCKX *et al*., 2007), showing clearly the possibility of these species to explore different food resources because of their morphological attributes related to feeding behavior.

When we analyze feeding overlap, interspecific competition is an important issue in resource partitioning (GERKING, 1994). However, for the studied loricariids, the competitive relationships, in an alimentary dimension, apparently are not so important or evident, which agrees with assumptions of the Competitive Exclusion Principle. Thus, the hypothesis which may explain the coexistence of these species in the same local is due to the high availability of detritus and associated items such as aquatic immature insects, suggesting that no intense competitive interactions necessarily occur between these two species.

In conclusion, this study showed that *E. pantherinus* and *P. hystrix* are clearly segregated by the use of food resources in Marco river. They do not show diet overlap and possibly the differences observed in their feeding habits contribute for their coexistence.

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