Occurrence of *Chaetogaster limnaei* K. von Baer, 1927 (Oligochaeta, Naididae) associated with Gastropoda mollusks in horticultural channels in Southeastern Brazil

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Abstract

The aim of this study was to evaluate the presence of *Chaetogaster limnaei* K. von Baer, 1927 in four species of mollusks collected in irrigation channels of a horticultural garden in the city of Juiz de Fora, Minas Gerais State, Southeastern Brazil. The collections were made from June 2005 to January 2006. Of the four species of mollusks analysed, we could not detect the presence of *C. limnaei* in *Pomacea lineata* (Spix, 1827). There were recorded 320 specimens of *C. limnaei* in association with *Aplexa rivalis* Mastou & Rackett, 1898, *Lymnaea columella Say*, 1818 and *Biomphalaria* sp., the latter having the highest number of associated Naididae.

Keywords: abundance, freshwater gastropods, Naididae, prevalence.

Ocorrência de *Chaetogaster limnaei* K. von Baer, 1927 (Oligochaeta, Naididae) associado com moluscos Gastropoda em canais de horticultura no sudeste do Brasil

Resumo

O objetivo deste estudo foi avaliar a presença de *Chaetogaster limnaei* K. von Baer, 1927 em quatro espécies de moluscos coletadas em canais de irrigação de uma horticultura no município de Juiz de Fora, Minas Gerais, sudeste do Brasil. As coletas foram realizadas de junho de 2005 a janeiro de 2006. Dentre as quatro espécies de moluscos analisadas, apenas em *Pomacea lineata* (Spix, 1827) não foi detectada a presença de *C. limnaei*. Foram registrados 320 espécimes de *C. limnaei* associadas a Aplexa rivalis Mastou & Rackett, 1898, *Lymnaea columella* Say, 1818 e *Biomphalaria* sp., sendo esta última a espécie de molusco com o maior número de Naididae associados.

Palavras-chave: abundância, moluscos aquáticos, Naididae, prevalência.

1. Introduction

The studies of Kahl and Konopacka (1981), Righi (1984), Corbi et al. (2004, 2005) and Gorni and Alves (2006) refer to the association of *Chaetogaster* species with aquatic invertebrates. The association between *Chaetogaster limnaei* K. von Baer, 1927 and various species of gastropod mollusks has been reported many times (Gruffydd, 1965a; Andrade and Campos, 1968; Buse, 1972, 1974; Conn et al., 1995; Agbolade et al., 2007; Ibrahim, 2007; Fried et al., 2008), however the nature of this relationship has not yet been clearly defined (Callisto et al., 2005).

In the past, naturalists considered *C. limnaei* a true parasite, since they believed the species fed from the mucus produced by the host (Michelson, 1964). However, latter investigations showed that this species mainly feeds off diatoms, algae, protozoans and rotifers, thus being considered commensal (Grufyydd, 1965b; Semenas and Brugni, 1996).

There are few records of the presence of *C. limnaei* associated with aquatic mollusks in Brazil (Ruiz, 1951; Andrade and Campos, 1968; Callisto et al., 2005). Thus, the present work aimed to evaluate the presence of this Naididae in association with four species of mollusks collected in irrigation channels of a horticultural garden in the city of Juiz de Fora, Minas Gerais.

2. Material and Methods

The mollusks were collected along irrigation channels of a horticultural garden situated in the northwest region of the city of Juiz de Fora, Minas Gerais state (21° 39' 6" S and 43° 25' 54" W) between June 2005 and January 2006. In total, 291 mollusks were collected using small nets; from these 75 were *Aplexa rivalis* Mastou & Rackett, 1898, 75 *Biomphalaria* sp., 75 *Lymnaea columella* Say, 1827 and 69 *Pomacea lineata* (Spix, 1827).

After shells were measured (diameter in *B. straminea* and height and width in the other species), gastropods were dissected under a stereoscopic microscope, in order to collect species of *C. limnaei*, which were put in formaldehyde 8% and kept in alcohol 70 °GL. Taxonomic criteria adopted by Righi (1984) and Brinkhurst and Marchese (1991) were used for species identification.

The absolute abundance, mean abundance and prevalence of *C. limnaei* in each species of mollusk were determined. Due to the low prevalence of this Naididae in *L. columella* and *A. rivalis*, the mean density was determined only in *Biomphalaria* sp.. Moreover, the correlation degree between the area of the shell of *Biomphalaria* sp. and the prevalence of *C. limnaei* was evaluated. The *Chaetogaster* specimens were deposited at the Laboratory of Benthic Invertebrates at the Universidade Federal de Juiz de Fora (LIB-UFJF).

3. Results and Discussion

In the 291 mollusks analysed, 320 specimens of *C. limanei* were recorded. Of the four species of mollusks analysed, the presence of *C. limnaei* was not detected only in *P. lineata*. *Biomphalaria* sp., with 316 worms, was the species of mollusk with the highest number of associated specimens (Table 1).

C. limnaei showed higher prevalence in *Biomphalaria* sp. (56%), and a lower one in *A. rivalis* and *L. columella*, both with 2.7%. This result may reflect a true difference in host specificity, such as that shown by Buse (1974) for species of British gastropods.

The highest mean density (18.37 specimens/cm^2) of *C. limnaei* in *Biomphalaria* sp. was observed in August 2005. In this month, the density varied between 1.85 ind.cm^{-2}

Table 1. Total abundance, mean abundance and standard error of *C. limnaei* in three species of mollusks collected in irrigation channels of a horticultural garden (Juiz de Fora – MG) between June 2005 and January 2006.

	***Biomphalaria* sp.**		***Lymnaea columella***		***Aplexa rivalis***	
	Total abundance	**Mean abundance**	**Total abundance**	**Mean abundance**	**Total abundance**	**Mean abundance**
June-2005	12	0.80 ± 0.30	-	-	-	-
July-2005	84	5.60 ± 0.56	-	-	2	0.13 ± 0.06
August-2005	127	8.47 ± 1.02	1	0.07 ± 0.03	-	-
November-2005	-	-	-	-	-	-
January-2006	93	6.20 ± 0.45	1	0.07 ± 0.03	-	-
Total	316	-	2	-	2	-

Table 2. Association of *Chaetogaster limnaei* per area classes (cm^2) of *Biomphalaria* sp.

Area (cm^2)	***Biomphalaria* sp.**												
	Collected and examined		**Totals of mollusk according to the number of associated *Chaetogaster limnaei***									**Number of mollusks with *Chaetogasterlimnaei* associated**	
	Nº	**%**	**0**	**1-3**	**4-6**	**7-9**	**10-12**	**13-15**	**16-18**	**19-22**	**23-27**	**N º**	**%**
0.30-0.39	1	1.33	1	-	-	-	-	-	-	-	-	0	-
0.40-0.49	1	1.33	1	-	-	-	-	-	-	-	-	0	-
0.50-0.59	9	12.00	8	-	-	-	-	-	-	-	1	1	1.33
0.60-0.69	20	26.66	10	4	2	1	1	-	1	1	-	10	13.33
0.70-0.79	6	8.00	2	-	-	3	-	-	1	-	-	4	5.33
0.80-0.89	14	18.66	5	4	1	1	2	1	-	-	-	9	12.00
0.90-0.99	3	4.00	1	1	1	-	-	-	-	-	-	2	2.67
1.00-1.09	6	8.00	2	3	-	-	-	-	-	1	-	4	5.33
1.10-1.19	1	1.33	-	-	-	-	1	-	-	-	-	1	1.33
1.20-1.29	4	5.33	1	1	-	2	-	-	-	-	-	3	4.00
1.30-1.39	4	5.33	1	-	1	1	1	-	-	-	-	3	4.00
1.40-1.49	4	5.33	1	1	-	1	1	-	-	-	-	3	4.00
1.50-1.59	1	1.33	-	-	-	1	-	-	-	-	-	1	1.33
:	-	-	-	-	-	-	-	-	-	-	-	0	-
1.90 → 1.99	1	1.33	-	-	1	-	-	-	-	-	-	1	1.33
Total nº	75	-	33	14	6	10	6	1	2	2	1	42	56.00
(%)	-	100.00	44.00	18.67	8.00	13.33	8.00	1.33	2.67	2.67	1.33	-	-

and 52.08 ind.cm^{-2}. However, in November 2005, no worm was found.

It was observed that *C. limnaei* was present in a higher number in *Biomphalaria* sp. with its shell area ranging from 0.60 to 0.69 cm (n = 10) and from 0.80 to 0.89 cm (n = 9) making a total of 25.3% of the mollusks associated with *C. limnaei.* This indicates that there was no correlation between host size and the presence of this Naididae ($P > 0.05$). A similar result was obtained by Conn et al. (1995) with the bivalves *Dreissena polymorpha* Pallas, 1771 and *Dreissena bugensis* Andrusov, 1897. However, Andrade and Campos (1968) detected a positive relation between the size of *B. straminea* and the prevalence of *C. limanei*.

The number of *C. limnaei* present in *Biomphalaria* sp. ranged from 1 to 27 specimens, and a higher number of mollusks with 1 to 3 organisms (Table 2) was observed. The maximum number of *C. limnaei* found was close to that found by Andrade and Campos (1968), in which the maximum number was 23 worms per *B. Straminea;* however, it is quite inferior to 70 parasites/host found by Gruffydd (1965b).

In conclusion, these results attest the ability of *Chaetogaster limnaei* to use different organisms that are present in an aquatic environment as substrate, and also they show the preference of this Naididae for Gastropods of the genus *Biomphalaria*.

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