SPATIAL DISTRIBUTION AND SIZE STRUCTURE OF *Apistobranthus glacerae* HARTMAN 1978 (POLYCHAETA: APISTOBRANCHIDAE) AT ADMIRALTY BAY, KING GEORGE ISLAND, ANTARCTICA

Filipe Alonso de Camargo Rouefski^{1*}, Mônica A.V. Petti² & Helena P. Lavrado¹

¹ Laboratório de Benthos, Departamento de Biologia Marinha, Instituto de Biologia,
Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil

² Instituto Oceanográfico, Universidade de São Paulo, São Paulo, Brazil

*e-mail: alonsodecamargo@gmail.com

<https://doi.org/10.4322/apa.2016.015>

Abstract: Polychaetes represent one of the most abundant groups of the Antarctic benthic macrofauna and *Apistobranthus glacerae* is among the most abundant, although poorly studied, species in this group. The population variability in terms of size structure and the spatial distribution of this species as well as its correlation with some environmental characteristics were investigated in Admiralty Bay. Great variability between sites was observed and this suggests spatial distribution in patches within few meters. No significant variability in size structure was observed within few meters of distance. However, differences were observed between samples of different inlets and years. Studies on the reproduction of the species are being undertaken in an attempt to clarify the patterns of distribution and size structure of this species in Admiralty Bay.

Keywords: Macrofauna, Morphometry, Martel Inlet, South Shetland Islands

Introduction

The Antarctic soft bottom benthos is relatively well known in Admiralty Bay and polychaetes are estimated to represent more than 50% of the total macrofauna of this region in terms of abundance (Sicinski *et al.*, 2011). *Apistobranthus glacerae*, the only species of Apistobranchidae found in Antarctic so far, may occur in high densities in the macrofauna and in temporary meiofauna communities in Admiralty Bay, with dominance over 40% (Bromberg *et al.*, 2000; Petti *et al.*, 2006). Despite of this abundance, there is little information on the biology and development of apistobranchids. As larvae have not yet been found, the presence of young individuals with only five body setigers in the sediment may indicate a very short-lived or absent pelagic larval stage (Petti *et al.*, 2007).

This study aims to describe the spatial distribution of *Apistobranthus glacerae* in Admiralty Bay and correlate its

occurrence to some environmental characteristics and to analyze the population variability in terms of size structure.

Material and Methods

Specimens of *A. glacerae* were sampled in four distinct years between 2003 and 2010 in Admiralty Bay at 20 and 60 m depth. Six sites were chosen (Figure 1) and samples were obtained using a van Veen grab (0.056 m²).

The spatial distribution was analyzed in the austral summer of 2003/2004. Specimens collected in 2008, 2009 and 2010 were measured (total body length and third setiger width) using a stereo-microscope. Student's t-test was used to compare means. One-way ANOVA was used to detect significant differences ($p < 0.05$) between different years, with *a posteriori* Tukey's test.

Figure 1. Sampling sites of *A. glaciera* at Admiralty Bay. 1- Comandante Ferraz Station, with three sites with distances of 200 m (CF1, CF2 and CF3); 2- Botany Point (BP); 3- Refuge 2 (Ref-2); 4- Machu Picchu (MP) ; 5- Hennequin Point (HE); 6- Arctowsky Station (AR).

Results

Four hundred and seventy eight specimens were recorded in the summer of 2003/2004. Great mean variability is observed across the different sampling sites (Table 1): the highest mean density was found in CF3 (250 ind.m⁻²) and the lowest were found in CF1 and in BP (no individuals found).

A total of 100 specimens was measured from the austral summer of 2007-2008 (Jan-Feb) and 104 specimens from 2008-2009 (Dez-Feb) at CF1, and no significant differences were found between length ($t = 0.1861, p > 0.05$) and width ($t = 0.3841; p > 0.05$) in any of the years (Table 2).

Low frequency of individuals measuring 6.1-7.0 mm in length was observed in both years, and the mode was between 4.1 and 5.0 mm (21%) and 7.1-8.0 mm (18.3%), respectively (Figure 2).

Four different sites were sampled in February 2010: three in Martel Inlet and one in Mackellar Inlet. *A. glaciera* was found in only two points of Mackellar Inlet, with 200 m of distance (REF2-1 e REF2-2). A total of 67 complete individuals was found in REF2-1, and 107 in REF2-2. Both modes were observed for the class 1.1-2.0 mm (Figure 3). No significant differences were found between width and length ($t = 0.1294$ and $t = 0.6338, p > 0.05$, respectively) (Table 2).

Table 1. Mean and standard error (SE) of the density of *A. glaciera* in sampling sites in the summer of 2003-2004 (ind.m⁻²).

	CF1 (n=0)	CF2 (n=71)	CF3 (n=294)	BP (n=0)	HE (n=28)	MP (n=80)	AR (n=5)
Mean	0	60.37	250.0	0	26.32	62.11	4.25
SE	0	±47.70	±163.51	0	±13.81	±38.48	±2.10

Figure 2. Relative frequencies of size-classes (total length) of *A. glacerae* in CF1 in 2008 (n = 100) and 2009 (n = 104).

Table 2. Mean width of the 3rd setiger (W_3) and mean length (ML) (mm) of *A. glacerae* in 2008 and 2009 (CF1), and 2010 (REF2-1 and REF2-2) (mean $\pm$ standard error).

	2008 CF1 (n = 100)	2009 CF1 (n=104)	2010 REF2-1 (n=67)	2010 REF2-2 (n=107)
W_3 (mm)	0.81 (± 0.07)	0.79 (± 0.06)	0.40 (± 0.017)	0.44 (± 0.017)
ML (mm)	6.30 (± 0.72)	5.84 (± 0.79)	2.33 (± 0.150)	2.45 (± 0.169)

Figure 3. Relative frequencies of size-classes (total length) of *A. glacerae* in REF2-1 and REF2-2 in 2010, n = 67 and n = 107 respectively.

Figure 4. Width at 3rd setiger and length of *A. glacieraе* (mean + standard error) in the sampling sites and years in Admiralty Bay. Different letters indicate significant differences obtained with the *post hoc* test in ANOVA results.

Nevertheless, significant differences were found between CF1 (2009) and two sites of REF2 (2010), in the case of both, mean width ($F = 11.645$, $p < 0.01$) and mean length ($F = 8.057$, $p < 0.01$) (Figure 4).

Discussion

Difference in the abundance of individuals during the summer of 2003/2004 were observed between close sites (CF1 and CF3), suggesting a spatial distribution in patches of few meters. The high environmental heterogeneity of Admiralty Bay (Sicinski *et al.*, 2011) also seems to influence the abundance of *A. glacieraе*, which varied along the three inlets: Martel (CF, BP and HE), Mackellar (MP) and Ezcurra (AR).

Significant differences were not observed between sampled sites at Mackellar Inlet (REF-2) indicating the lack of size structure variability of this species within few meters of distance. Despite of this, differences were observed between the summers of 2008 and 2009 at Martel Inlet and in the summer of 2010 at Mackellar Inlet.

Studies addressing the reproduction of *A. glacieraе* are being undertaken in order to provide better understanding

of its influence over the size structure and distribution patterns of this species in Admiralty Bay.

Acknowledgements

This work is part of the National Institute of Science and Technology of Antarctic Environmental Research (INCT-APA), that receives scientific and financial support from the National Council for Research and Development (CNPq process: 574018/2008-5) and from the Carlos Chagas Filho Research Support Foundation of the State of Rio de Janeiro (FAPERJ process E-16/170.023/2008). The authors also acknowledge the support of the Brazilian Ministry of Science, Technology and Innovation (MCTI), the Ministry of Environment (MMA), and the Biological Collection "Prof. Edmundo F. Nonato" (ColBio) of the Oceanographic Institute of the University of São Paulo (IOUSP), for providing specimens of *Apistobranchus glacieraе*. Inter-Ministry Commission for Sea Resources (CIRM). Filipe Rouefski also thanks the CNPq for his master scholarship.

References

- Bromberg, S., Nonato, E. F., Corbisier, T. N., & Petti, M. A. V. (2000). Polychaetes distribution in the near-shore zone of Martel Inlet, Admiralty Bay (King George Island, Antarctica). *Bulletin of Marine Science*, 67(1), 175-188.
- Petti, M. A. V., Nonato, E. F., Bromberg, S., Gheller, P. F., Paiva, P. C., & Corbisier, T. N. (2007). On the taxonomy of *Apistobrachus* species (Polychaeta: Apistobrachidae) from the Antarctic. *Zootaxa*, 1440, 51-59.
- Petti, M. A. V., Nonato, E. F., Skowronski, R. S. P., & Corbisier, T. N. (2006). Bathymetric distribution of the meiofaunal polychaetes in the nearshore zone of Martel Inlet (King George Island, Antarctica). *Antarctic Science*, 18, 163-170.
- Sicinski, J., Jazdzewski, K., De Broyer, C., Presler, P., Ligowski, R., Nonato, E. F., Corbisier, T. N., Petti, M. A. V., Brito, T. A. S., Lavrado, H. P., Blazewicz-Paszkowycz, M., Pabis, K., Jazdzewska, A., & Campos, L. S. (2011). Admiralty Bay Benthos Diversity - A census of a complex polar ecosystem. *Deep-sea Research. Part II, Topical Studies in Oceanography*, 58, 30-48.