

**OCCURRENCE OF *Nephtys fluviatilis* (MONRO, 1937) AND *Alitta succinea* (FREY & LEUCKART, 1847) (ANNELIDA: POLYCHAETA) IN AN OLIGOHALINE ENVIRONMENT AT FAISQUEIRA RIVER, ANTONINA, PARANA**

**OCORRÊNCIA DE *Nephtys Fluviatilis* (MONRO, 1937) E *Alitta succinea* (FREY & LEUCKART, 1847) (POLYCHAETA) EM UM AMBIENTE OLIGOALINO DO RIO FAISQUEIRA, ANTONINA, PARANÁ.**

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**ABSTRACT**

Estuarine basins are known as ecosystems with a wide variation on some abiotic factors mainly due to the inflow of freshwater coming from the continent. Salinity is an example and variations on this environmental factor, from freshwater to ordinary salinity levels found in open seas, require certain physiological tolerance. Many species from several kinds of animals (crustaceans, mollusks, echinoderms, polychaetes) present this feature. *Nephtys fluviatilis* and *Alitta succinea* are two polychaete species that had already been reported in estuarine waters, but not yet formally reported in Faisqueira River (Paranagua Bay, southern Brazil) at salinity 0‰. Surveys were performed with plankton net in the same direction of the water flow during a crescent moon night. Current literature indicates that these species must certainly be tolerant to such salinity variations in the estuarine basins where they have already been observed; this fact might also be true at least for some of their close relatives, which have also been reported in places with similar abiotic conditions around the world. The presence of these polychaete worms suggest that they might occur in a wider range than currently known, including estuarine regions where water salinity reaches values close to 0‰.

Keywords: Estuary. Polychaeta. Nephtyidae. Nereididae. Faisqueira River.

## RESUMO

Bacias estuarinas são conhecidas como ecossistemas com uma grande variação em alguns fatores abióticos, principalmente por causa do aporte de água doce proveniente do continente. Salinidade é um exemplo e variações neste fator ambiental, desde água doce até os níveis salinos regulares encontrados em mar aberto, requerem certa tolerância fisiológica. Na realidade, muitas espécies pertencentes a variados grupos animais (crustáceos, moluscos, equinodermos, poliquetas) apresentam essa característica. *Nephtys fluviatilis* e *Alitta succinea* são duas espécies de poliquetas que já foram reportadas em águas estuarinas, mas ainda não formalmente registradas como ocorrentes no rio Faisqueira (baía de Paranaguá, Sul do Brasil) em salinidade 0‰. Coletas foram realizadas com uma rede de plâncton na mesma direção da corrente d'água durante uma noite de lua crescente. A literatura atual indica que essas espécies devem certamente ser tolerantes em tais variações de salinidade em bacias estuarinas onde já foram observadas; este fato pode também ser válido para algumas espécies que são parentes próximos também já registrados em locais de condições abióticas similares em outras partes do mundo. A presença destes poliquetas sugere que devem apresentar ocorrência ainda mais ampla do que atualmente conhecida, incluindo regiões estuarinas onde a salinidade da água alcança valores próximos a 0‰.

Palavras-chave: Estuário. Polychaeta. Nephtyidae. Nereididae. Rio Faisqueira.

### 1. Introduction

Sea basins in Brazilian coast-lines are rich with rivers that drain estuaries in contact to the Atlantic Ocean. In the confluence among these rivers and the sea there are environments with intermediary features, such as the shift of salinity caused by tide variation and the major drainage of fresh water in periods of rainfall. These are considered biologically productive environments (LEVINTON, 1995) and the transition area between fresh and salty water is defined as a kind of ecotone, that is, a defined border between these environments with sudden shift in the distribution of species along its gradient (RICKLEFS, 1993). The source of this community may be either typical marine species, marine species that migrate to the estuary in order to breed, or fresh water species (DANDO, 1984). Plankton samples were taken in Faisqueira River, in the surroundings of Natural Reserve of Cachoeira River, in the municipality of Paranaguá, Paraná State.

The nephtyid polychaete *Nephtys fluviatilis* Monro, 1937 is a typical annelid of oligohaline environments, being firstly reported and described in similar areas in Uruguay and also in Brazil (Lana 1986). This genus presents other species that may also be found in other estuarine regions, where lower levels of salinity is typical, such as *N. picta* Ehlers, 1868 in North Carolina (HYLAND et al., 2004) and in Chesapeake Bay (SCHAFFNER, 2010).

The nereidid polychaete *Alitta succinea* (FREY; LEUCKART, 1847) used to be placed in the genus *Neanthes* Kinberg, 1866. According to the phylogenetic analysis of Bakken & Wilson (2005), this and other genera of the family were not well supported in the more than 10 000 equally parsimonious trees obtained. Therefore, these authors proposed new combinations for some nereidid species, including the latter, being now accepted as *Alitta succinea*. It occurs in several geographic areas in the world. Not only was it reported in close areas in southern Brazil (LANA et

al., 2006), but also in other regions in Southwestern Atlantic, more precisely in Argentina (ELÍAS et al., 2006; BREMEC; GILBERTO, 2006), in North Carolina (HYLAND et al., 2004) and California (SWAN, et al., 2007) in North America, and in further places such as the Mediterranean Sea (ERGEN, et al. 2006). In these places it has been reported as inhabiting low salinity waters (in estuaries) and this fact seems also to be true to other supposed close relatives, as *Neanthes japonica* Izuka, 1908 (LIU 2009).

Even though *N. fluviatilis* and *A. succinea* are known to occur in areas of lower salinity, the present paper is the first formal record of these two polychaete species in Faisqueira River, in Paranaguá Bay, southern Brazil.

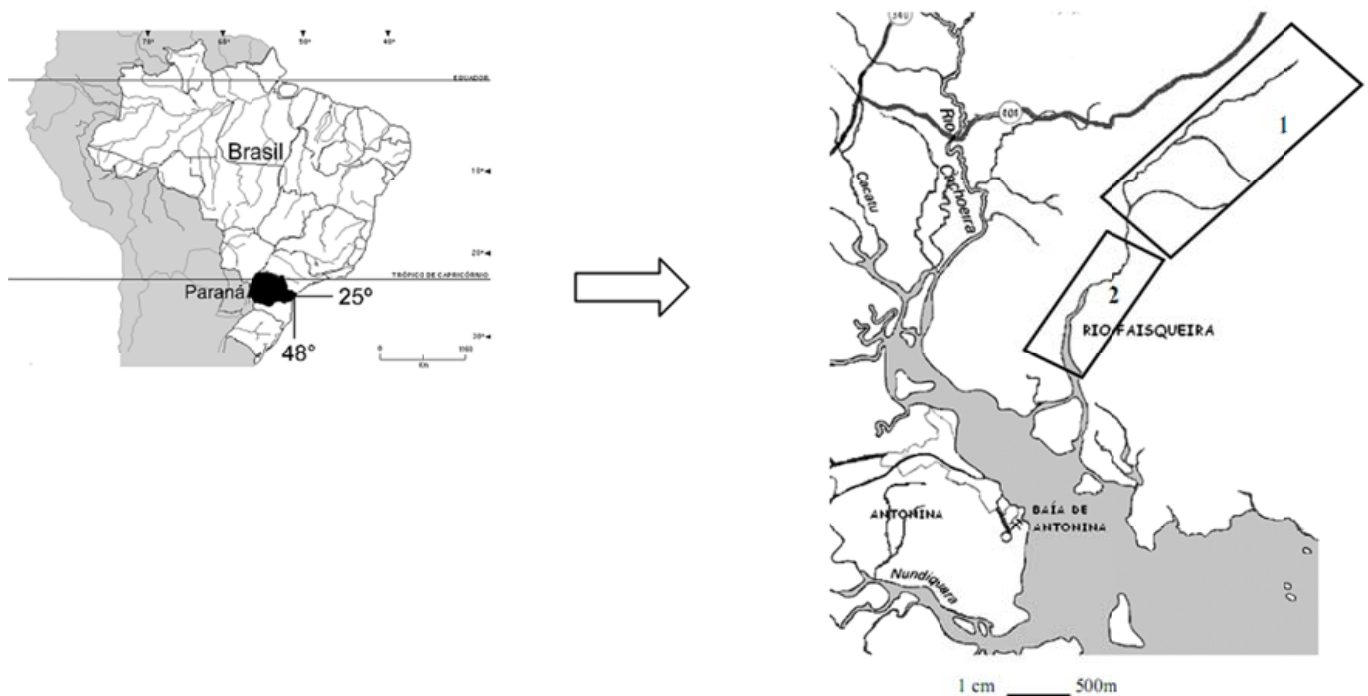
## 2. Material and Methods

Faisqueira River is entirely inside the Cachoeira River Natural Reserve at the coastal

plains of Paraná State, draining the estuary at Antonina Bay. In its lower stretch one can observe the ecotone fresh water/estuary where the influence of the tides modifies the abiotic conditions in the area (Figure 1).

Samples were monthly conducted from September 2004 to March 2005 with a conic-cylindrical plankton net (500  $\mu\text{m}$ ), always in the crescent moon in two periods, during the day and during the night. Five consecutive replicates were done in each stretch in the same direction of the water flow from upriver to downriver, passing through the transition stretch fresh water/estuary. Two sampling areas were determined according to their average salinity: area 1 (fresh water) with salinity values from 0 to 5 ‰ and area 2 (estuarine region), with 6 to 15‰. During sampling procedures, surface water salinity and temperature were measured. The water volume filtered through the net was calculated according to the diameter of the net opening and also based on data registered in a specific device designed to measure water flow.

**Figure 1-** Sampling areas (1 and 2) in Faisqueira River in detail (25°22'18,9" S; 48°39'24,3"W).



### 3. Results and Discussion

One specimen of *N. fluviatilis* and three of *A. succinea* were captured in area 2 during the night with salinity 0‰ in December 2004. This finding may be considered occasional since there had been intense rainfall right before sampling, which drove a high inflow of organic matter from the river margins and drastic decrease of salinity in a stretch usually oligohaline, even under the influence of high tide. Adult polychaetes in the plankton are uncommon (AMARAL; NONATO, 1981) for they are benthic organisms with carnivorous or detritivorous habits as *N. fluviatilis* reported by Bemvenuti (1994) of soft substrate infaunal communities.

As previously mentioned, both species already present a well-known history of records in estuarine waters, where salinity is often observed lower than 35‰. For instance, Schaffner (2010) measured variations from 18 to 27‰ in near-bottom depths in Chesapeake Bay; Hyland et al. (2004) did not give salinity values, however, predominately used the designations oligohaline and mesohaline, which also imply salinity lower than in open sea-water; Liu et al. (2009) mentioned specimens of *N. japonica* living in salinity varying from 1 to 37‰ in China.

### 4. Conclusion

In this context, our findings indicate that not only the occurrence of *N. fluviatilis* and *A. succinea* in oligohaline waters must be more widespread than formally and currently acknowledged, but also should be expected to at least occasionally occur in situations of 0‰ salinity, as well.

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### REFERENCES

- AMARAL, A. C. Z.; NONATO, E. F. Anelídeos poliquetas da costa brasileira. **Série Manuais de identificação da Fauna Brasileira**, CNPq, v. 1-2, 1981. 17 p.
- BEMVENUTI, C. E. O poliqueta *Nephtys fluviatilis* Monro, 1937, como predador da infauna na comunidade de fundos moles. **Atlântica**, v.16, p. 87-98, 1994.
- BREMEC, C., GILBERTO, D. Polychaete assemblages in the Argentinean Biogeographical Province, between 34° and 38°S. **Scientia Marina**, v.70, n.3, p. 249-257, 2006.
- DANDO, P. R. Reproduction in estuarine fishes. In: WOOTON, R. J.; POTTS, G. W. **Fish reproduction: strategies and tactics**. Orlando: Academic Press, 1984. 410 p.
- ELÍAS, R.; RIVERO, M. S.; PALACIOS, J. R.; VALLARINO, E. A. Sewage-induced disturbance on polychaetes inhabiting intertidal mussel beds of *Brachidontes rodriguezii* off Mar del Plata (SW Atlantic, Argentina). **Scientia Marina**, v.70, N.3, p. 187-196, 2006.
- ERGEN, Z.; ÇINAR, M. E.; DAGLI, E.; KURT, G. Seasonal dynamics of soft-bottom polychaetes in Izmir Bay (Aegean Sea, eastern Mediterranean). **Scientia Marina**, v.70, n.3, p. 197-207, 2006.
- HYLAND, J. L.; BALTHIS, W. L.; POSEY, M.; HACKNEY, C. T.; ALPHIN, T. The soft-bottom macrobenthos of North Carolina estuaries. **Estuaries**, v.27, n.3, p. 501-514, 2004.
- LANA, P. C. Nephtyidae (Annelida: Polychaeta) do litoral do Estado do Paraná (Brasil). **Nerítica**, v.1, p. 135-154, 1986.
- LANA, P. C.; SANTOS, C. S. G.; GARRAFFONI, A. R. S.; OLIVEIRA, V. M.; RADASHEVSKY, V. Checklist of polychaete species from Paraná State (Southern Brazil). **Checklist**, v.2, n.3, p. 30-63, 2006.
- LEVINTON, J. S. **Marine Biology**. Oxford University Press, 1995. 420 p.

LIU, Y.; XIAN, W.; SUN, S. Metabolism of polychaete *Neanthes japonica* Izuka: relationships to temperature, salinity and body weight. **Chinese Journal of Oceanology and Limnology**, v.27, n.2, p. 356-364, 2009.

RICKLEFS, R. E. **A economia da natureza**. 3. ed. Rio de Janeiro: Guanabara Koogan, 1993. 470p.

SCHAFFNER, L. C. Patterns and rates of recovery of macrobenthic communities in a polyhaline temperate estuary following sediment disturbance: effects of disturbance severity and potential importance of non-local processes. **Estuaries and Coasts**, v.33, p. 1300-1313, 2010.

SWAN, B. K.; WATTS, J. M.; REIFEL, K. M.; HURLBERT, S. H. Role of the polychaete *Neanthes succinea* in phosphorus regeneration from sediments in the Salton Sea, California. **Hydrobiologia**, v.576, p. 111-125, 2007.