

Painel

Oceanografia Química

## 46 - PRELIMINARY ASSESSMENT OF ARSENIC BIODISTRIBUTION IN FISH FROM AN ESTUARINE ECOSYSTEM IN SÃO PAULO STATE, BRAZIL

LARRISA YUMI MIRANDA<sup>1</sup>, MARCOS ANTONIO HORTELLANI<sup>2</sup>, ELISABETE DE SANTIS BRAGA<sup>3</sup>, JORGE EDUARDO DE SOUZA SARKIS<sup>4</sup>, JULIANA DE SOUZA AZEVEDO<sup>5</sup>

<sup>1</sup>UNIVERSIDADE FEDERAL DE SÃO PAULO, <sup>2</sup>INSTITUTE OF ENERGY AND NUCLEAR RESEARCH (IPEN / CNEN - SP), <sup>3</sup>SÃO PAULO UNIVERSITY, OCEANOGRAPHIC INSTITUTE, LABORATORY OF BIOGEOCHEMISTRY OF NUTRIENTS, MICRONUTRIENTS AND TRACES IN THE OCEANS (LABNUT), <sup>4</sup>INSTITUTE OF ENERGY AND NUCLEAR RESEARCH (IPEN / CNEN - SP), <sup>5</sup>FEDERAL UNIVERSITY OF SÃO PAULO (UNIFESP), INSTITUTE OF ENVIRONMENTAL, CHEMICAL AND PHARMACEUTICAL SCIENCES, AQUATIC TOXICOLOGY AND FISH ECOPHYSIOLOGY GROUP (AQUATOX)

Email: larrisamiranda@outlook.com

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### INTRODUÇÃO

Arsenic (As) is a metalloid that is highly toxic in its inorganic form. The Cananeia-Iguape Estuarine-Lagoon Complex (CIELC), located on the southern coast of the São Paulo State, is recognized by UNESCO as a natural heritage site (ICMBio, 2020). On the other hand, Olaria River System (ORS) is an environment that flows into the center of the CIELC, in the southern region. This study aimed to investigate the biodistribution of inorganic arsenic in fish species from CIELC at ecological and economically important.

### METHODS

A total of 19 fish of eight species were collected in two sites of the CIELC (southern sector: with higher salinity and marine influence; and northern region: with lower salinity and more inland influence) in November 2021 and in the Olaria River System (ORS) in August 2022. Before the fish sampling, water samples were taken to characterize the sites. Temperature (T) was obtained using digital thermometer. Dissolved Oxygen (DO) levels were determined by the Winkler method (Grasshoff et al., 1983). pH measurement was made using an Orion® potentiometer in accordance with Amiot & Chaussepied (1983). Salinity (S) was determined by inductive method using a Beckman® salinometer (RS-10). Fish species were collected using a bottom otter trawl net (1.6" mesh wall and 1.2" mesh cod end) (CIELC) and nets (0.40 mesh) (ORS). After collection, fish were identified (Figueiredo & Menezes, 1978) and dissected for muscle, liver and gill extraction. The obtained samples were stored at -20°C until As analysis by Inductively Coupled Plasma Mass Spectrometer following Azevedo et al. (2012a). A total of 57 samples were analyzed (19 fish \* 3 tissues). Results

were expressed as ng g<sup>-1</sup> (ppb), on wet weight basis.

### RESULTS AND DISCUSSION

Such a characteristic is due to the difference in salinity, the southern sector bearing as a sites Morro São João (MSJ) and Ararapira (ARA) present water data as being MSJ (S: 28.99; T: 24.45; pH: 8.24; DO: 5.09) and ARA (S: 24.16; T: 25.11; pH: 7.99; DO: 4.54). While in the northern sector bearing as a point Pedrinhas (PED) and Valo Grande Channel (VG) present water data as being PED (S: 11.98; T: 26.90; pH: 7.92; DO: 5.59) and VG (S: 12.46; T: 25.11; pH: 7.78; DO: 4.32). About that ORS in August (S: 6.67; T: 22,1; pH: 7.06; DO: 1.35) and October (S: 1.71; T:; pH: 7.21; DO: 1.82).

The collected fish species were Yellow catfish (*Aspistor luniscutis* and *Cathorops spixii*); Urutu catfish (*Genidens genidens*) Brazilian flounder (*Achirus lineatus*), Sea Bass (*Centropomus undecimalis*), Caratinga (*Diapterus rhombeus*), Spotted Pufferfish (*Sphoeroides testudineus*) and Mullet (*Mugil curema*).

In general, the arsenic levels obtained in the fish showed a relationship with the analyzed tissues in the northern sector (muscle~liver>gill) as on the ORS (liver>muscle>gill), while in the south sector, the concentration trend was different (gill>muscle>liver). Although the difference may be related to salinity, since the fish from the southern sector had higher average concentrations of As in the gill when compared to the other tissues (gill: 2681.416±2821.243 ng g<sup>-1</sup>; muscle: 2393.505±2196.213 ng g<sup>-1</sup>; liver: 1808.409±1616.122 ng g<sup>-1</sup>). As for the distribution of As in the fish of the northern sector (gill: 491.447±520.603 ng g<sup>-1</sup>; muscle: 906.509±628.893 ng g<sup>-1</sup>; liver: 901.962±423.841 ng g<sup>-1</sup>) and in the

Olaria river (gill:  $1308.941 \pm 255.103 \text{ ng g}^{-1}$ ; muscle:  $1622.717 \pm 757.757 \text{ ng g}^{-1}$ ; liver:  $3596.956 \pm 1529.933 \text{ ng g}^{-1}$ ), the results suggest collection sites may influence the animals exposures. It was noted that the southern sector, characterized by higher salinity influence, is adjacent to the ORS, which is not a typical river. Therefore, there is a high concentration of As in the muscle of the southern sector and in the Olaria River, exceeding the maximum tolerated limits of ANVISA, which is  $1000 \text{ ng g}^{-1}$  for fishing/fish. May indicate an anthropogenic contamination or naturally elevated levels, when it comes to fish and crustaceans, the less toxic organic form arsenic predominates over the inorganic form, serving to regulate osmotic stress (Kalantzi et al, 2017). This shows in the samples that the gills in the southern sector have a higher concentration, although this doesn't necessarily indicate contamination by As because the region is more saline.

## CONCLUSION

The highest levels of metal concentration observed in the liver confirm its important role in the detoxification process, especially in the northern sector and from the ORS. The observed variation in As levels between muscle and gill may be related to differences in input to the CIELC, especially considering the southern region and its environmental characteristics. As a consequence, there are high levels of arsenic in the muscle of the southern sector and in the Olaria River, which are higher than the limits approved by ANVISA, this doesn't necessarily mean that it's contaminated with As.

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