



**ICMGP 2024**  
CAPE TOWN • SOUTH AFRICA • 21 - 26 JULY

## **MSc Ewa Korejwo**

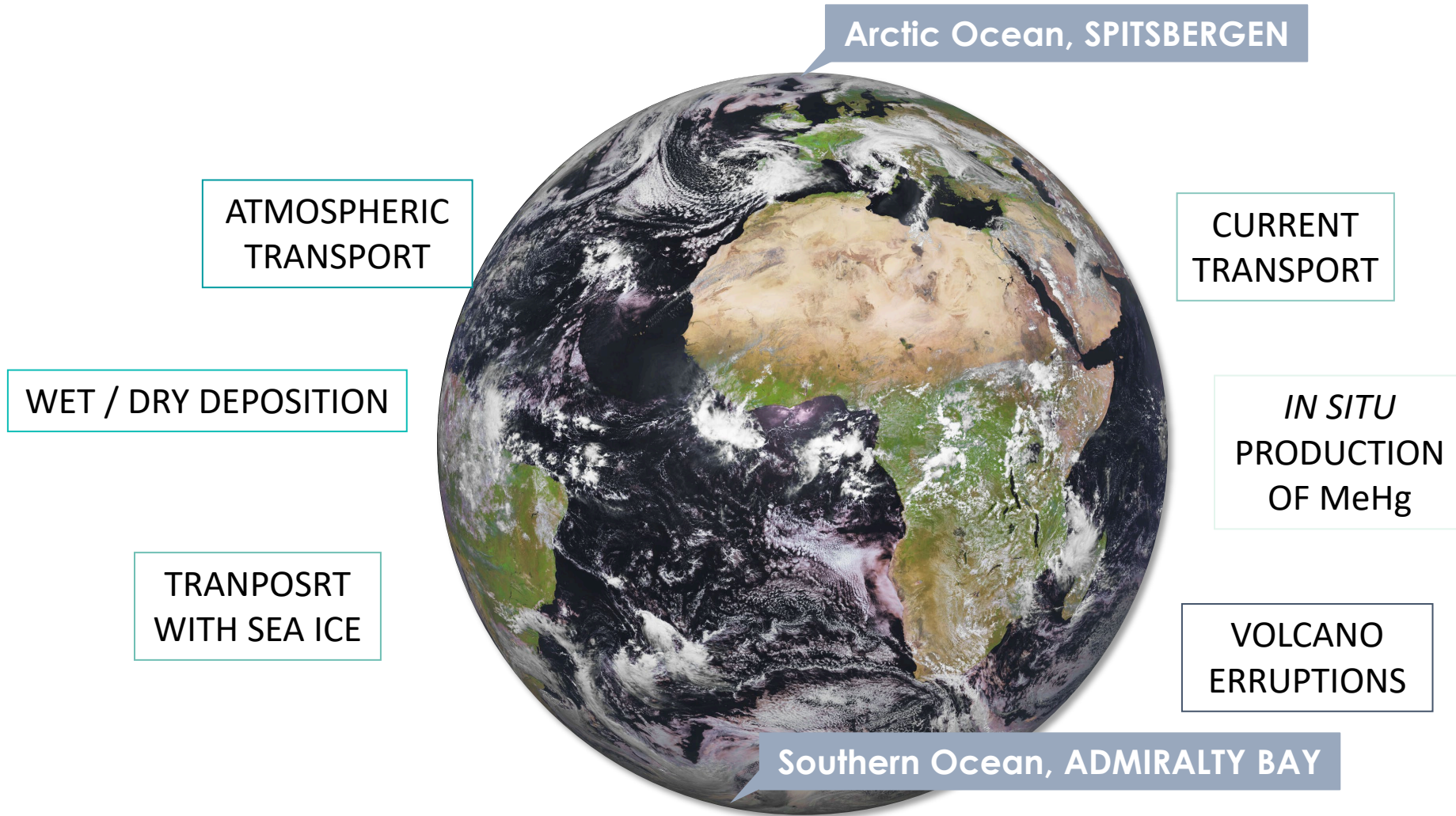
**Mercury in the Arctic and Antarctica:  
The Role of Benthic Organisms**

Institute of Oceanology Polish Academy of Sciences  
Contemporary Threats to Marine Ecosystems Laboratory



# Introduction





# Methods

total mercury, Hg fractions, methylmercury



## Research area



### ARCTIC:

Horsund, Isfjorden, Kongsfjorden



### ANTARCTIC:

Admiralty Bay

## Research material



*Henricia* sp. (**Arctic**) N6

*Odontaster validus* (**Antarctic**) N8



*Buccinum Glaciale* (**Arctic**) N11

*Neobuccinum eatoni* (**Antarctic**) N7



*Strongylocentrotus droebachiensis* (**Arctic**) N23

*Sterechinus neumayeri* (**Antarctic**) N25

## Methods

### TOTAL MERCURY (THg):

→ Thermo-desorption method using a Direct Mercury Analyzer (DMA-80). Total mercury analysis involved sample combustion at 750°C in two repetitions. Simultaneously, blank samples were also analyzed.

### MERCURY FRACTIONS:

→ Thermo-desorption method using a direct mercury analyzer (DMA-80). Fraction analysis involved gradual sample combustion at 5 temperatures:

- 175°C – fraction Hg<sub>F1</sub>
- 225°C – fraction Hg<sub>F2</sub>
- 325°C – fraction Hg<sub>F3</sub>
- 475°C – fraction Hg<sub>F4</sub>
- 750°C – fraction Hg<sub>F5</sub>

labile  
stabile

### METHYLMERCURY (MeHg):

→ Atomic fluorescence spectroscopy (AFS) method following prior separation on a chromatographic column (GC) using an automated methylmercury system MERX-M according to EPA Method 1630.

# Mercury fractions

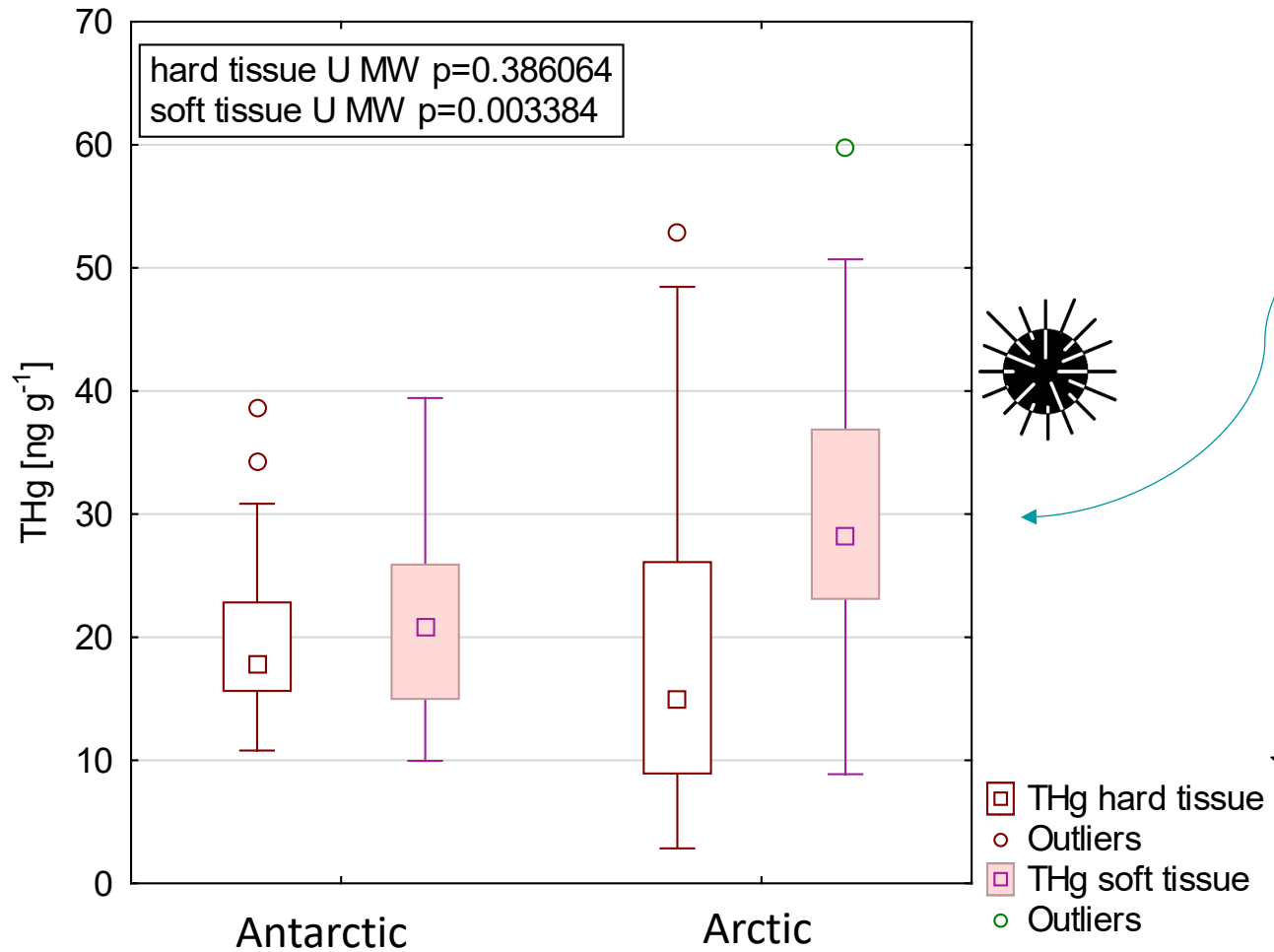
FRACTION		GROUPS	COMPOSITION
HgF1	TEMPERATURE ↓	mercury halides	$\text{HgCl}_2$ , $\text{HgBr}_2$ , $\text{HgI}_2$ , $\text{Hg}(\text{CN})_2$
HgF2		mercury bound to organic matter, as well as other Hg compounds formed with organic ligands	$\text{Hg}(\text{SCN})_2$ , $(\text{CH}_3\text{COO})_2\text{Hg}$ , $\text{Hg}(\text{NO}_3)_2 \cdot \text{H}_2\text{O}$ , $\text{Hg}(\text{ClO}_4)_2 \cdot x\text{H}_2\text{O}$ and $\text{MeHg}$
HgF3		the least toxic to organisms	$\text{HgS}$
HgF4		mainly semi-labile compounds	$\text{HgO}$ , $\text{HgSO}_4$ , and $\text{HgF}_2$
HgF5		non-specific mercury compounds, mineral bound mercury	residual fraction



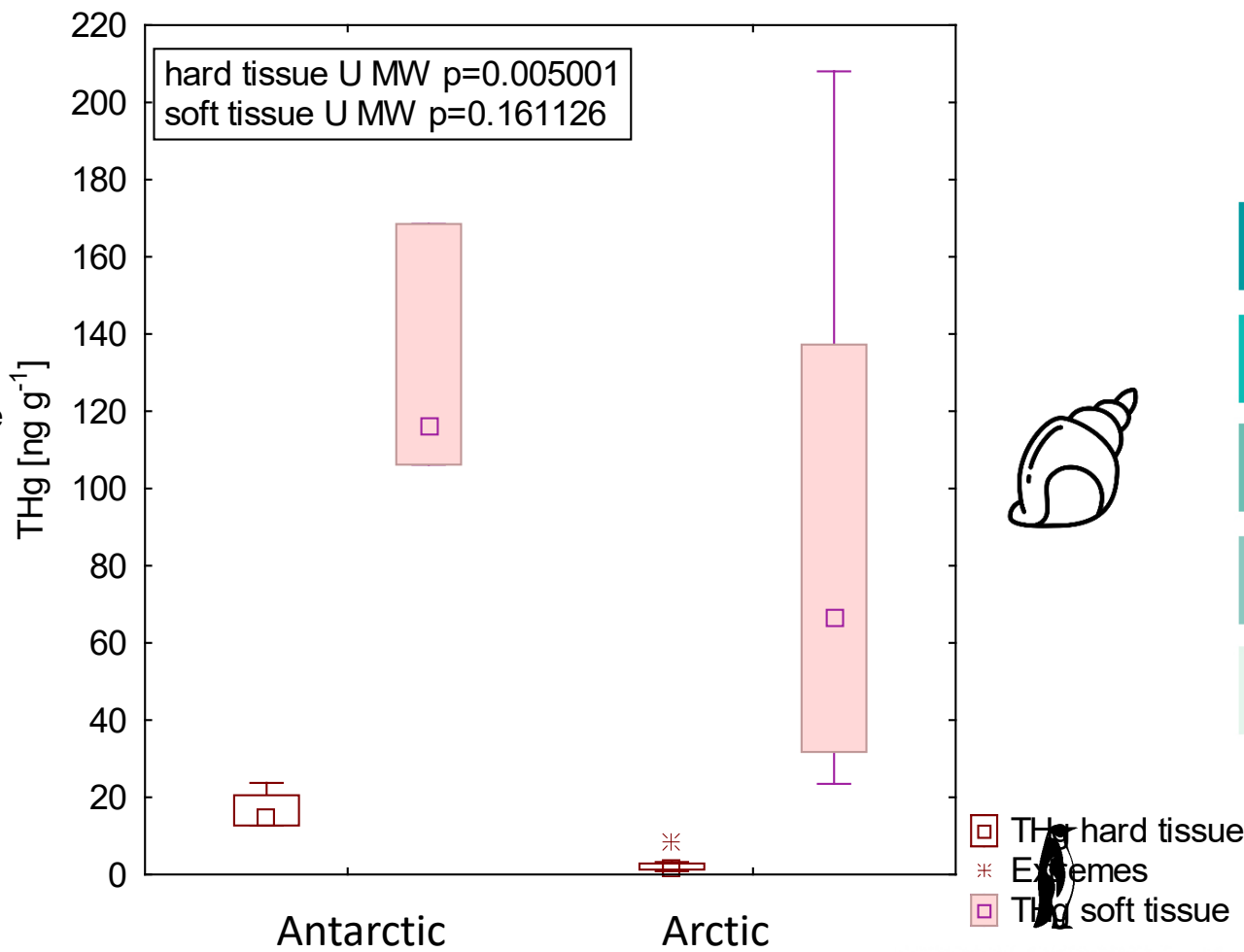
# Results

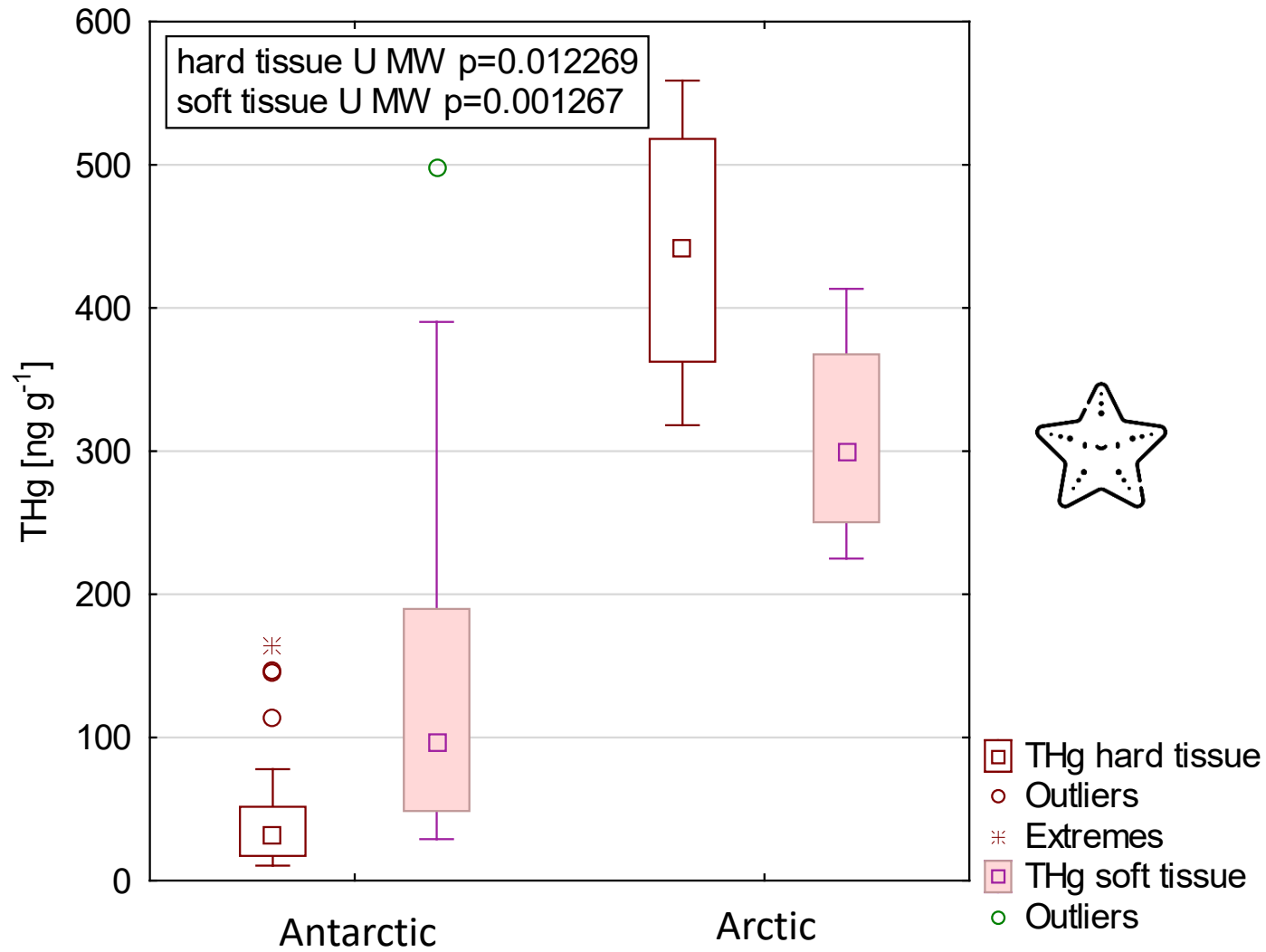
total mercury





Higher concentrations are observed in soft tissue compared to hard tissue.





A different situation in the case of starfish from the Arctic region.



# Results

mercury fractions



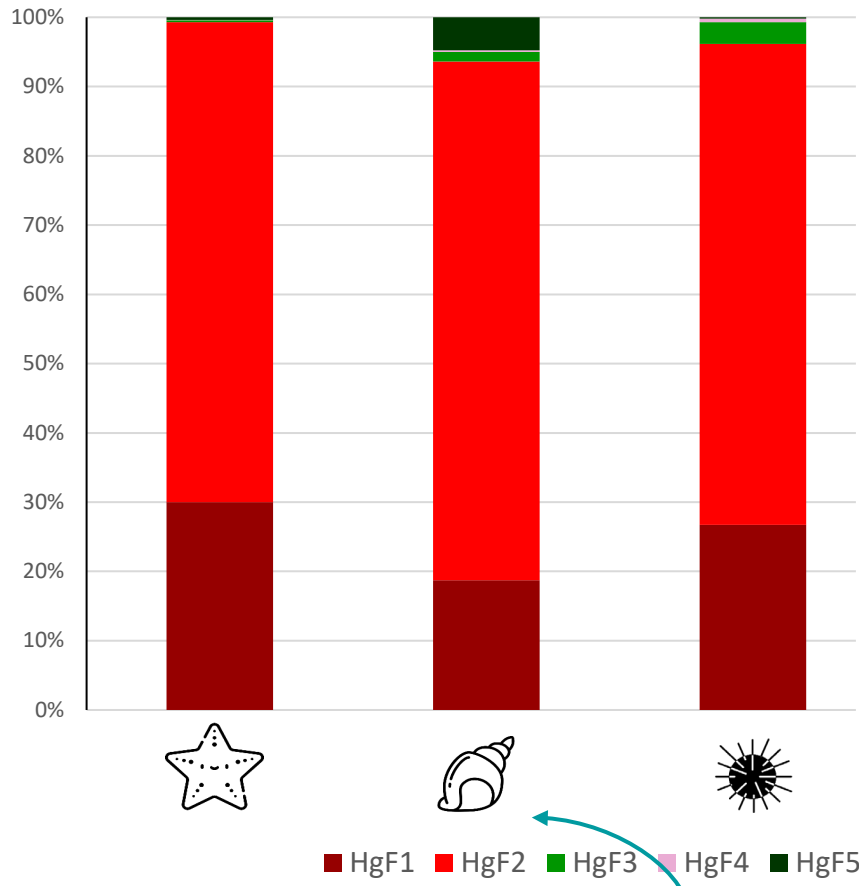
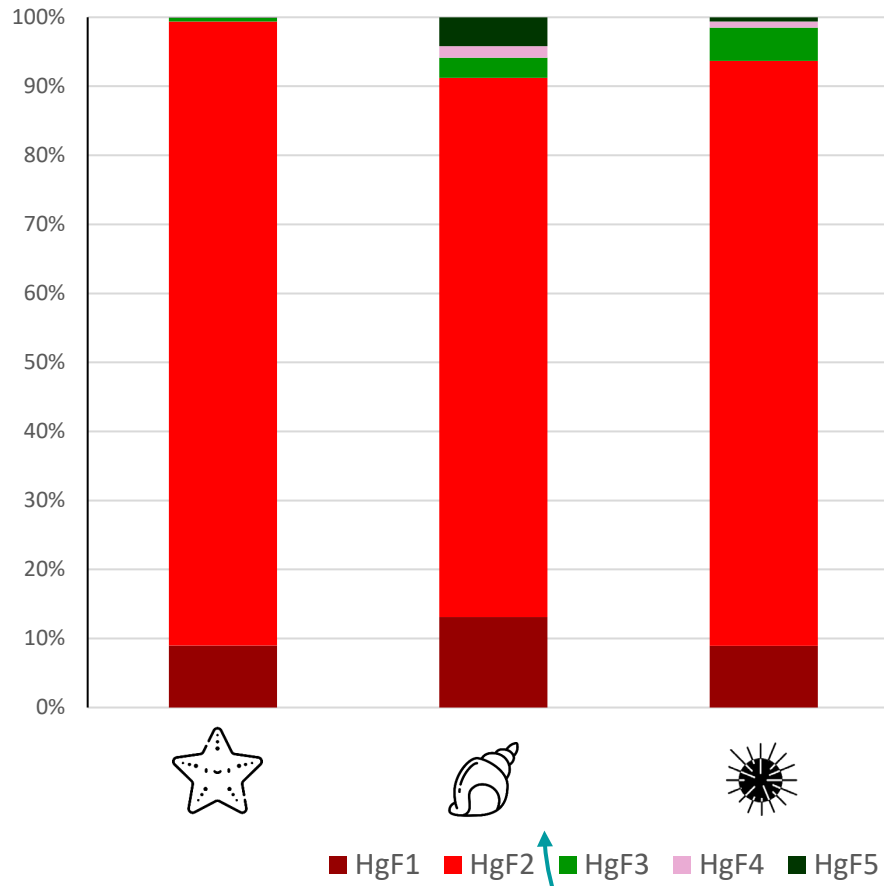
More mercury transformation processes can occur on land.



ARCTIC



ANTARCTIC



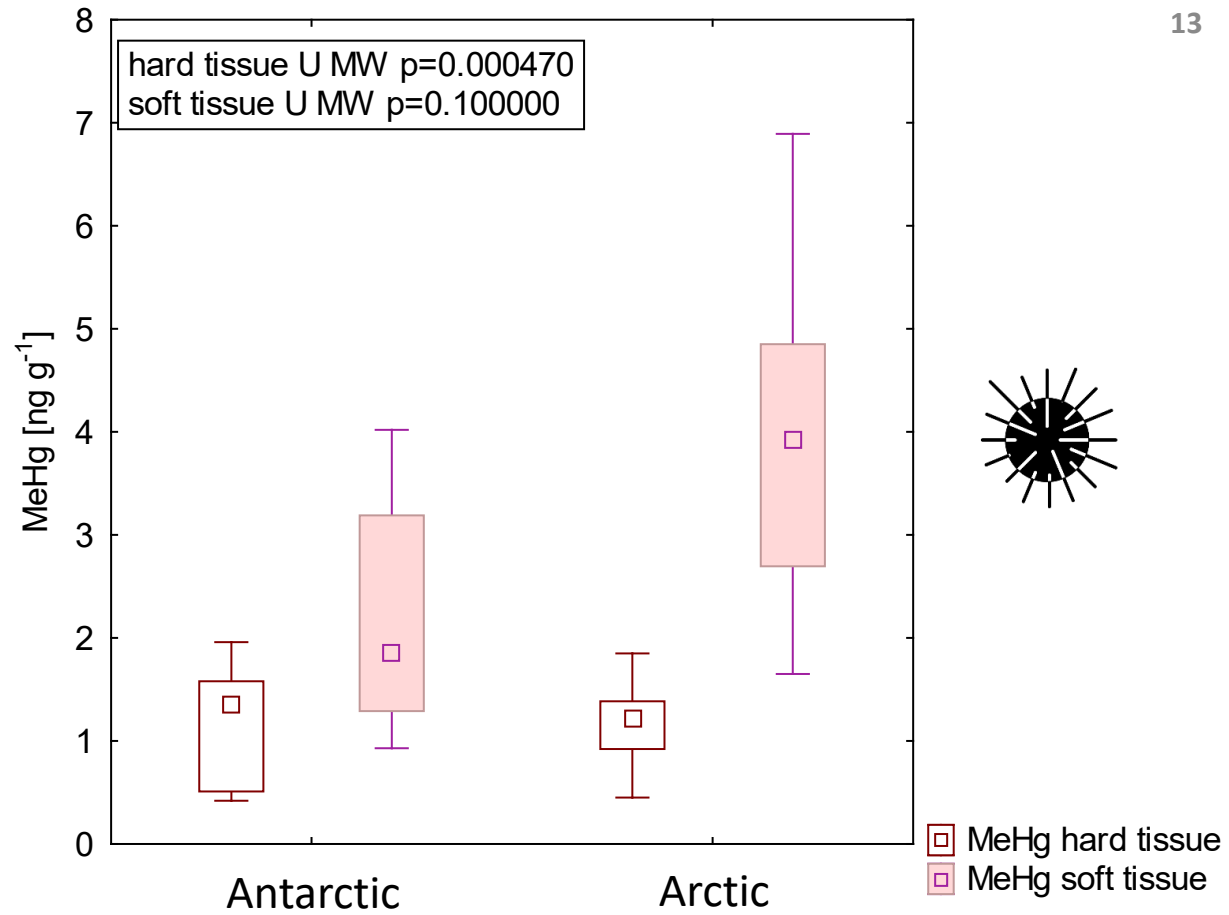
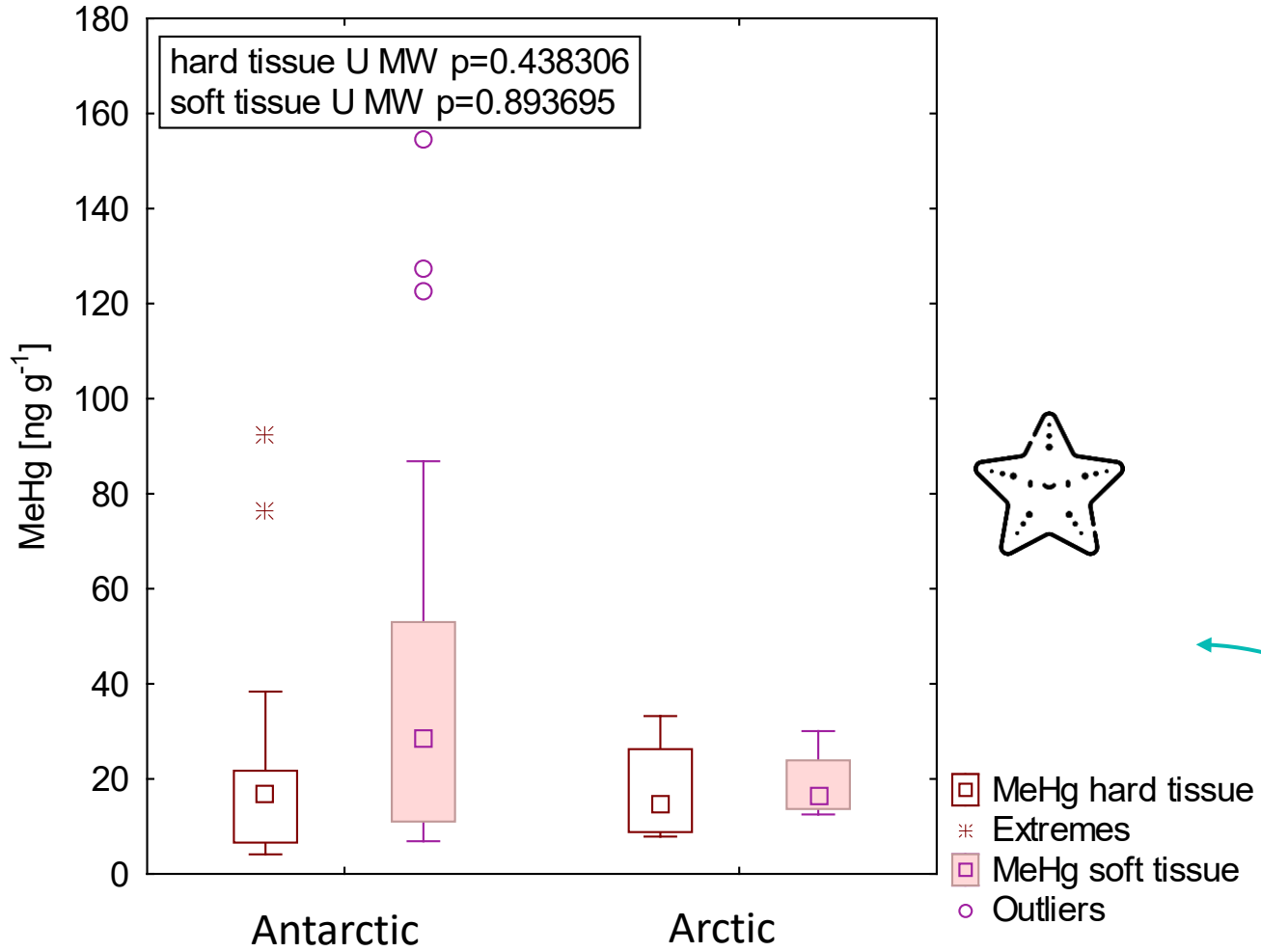
A different type of hard tissue.



# Results

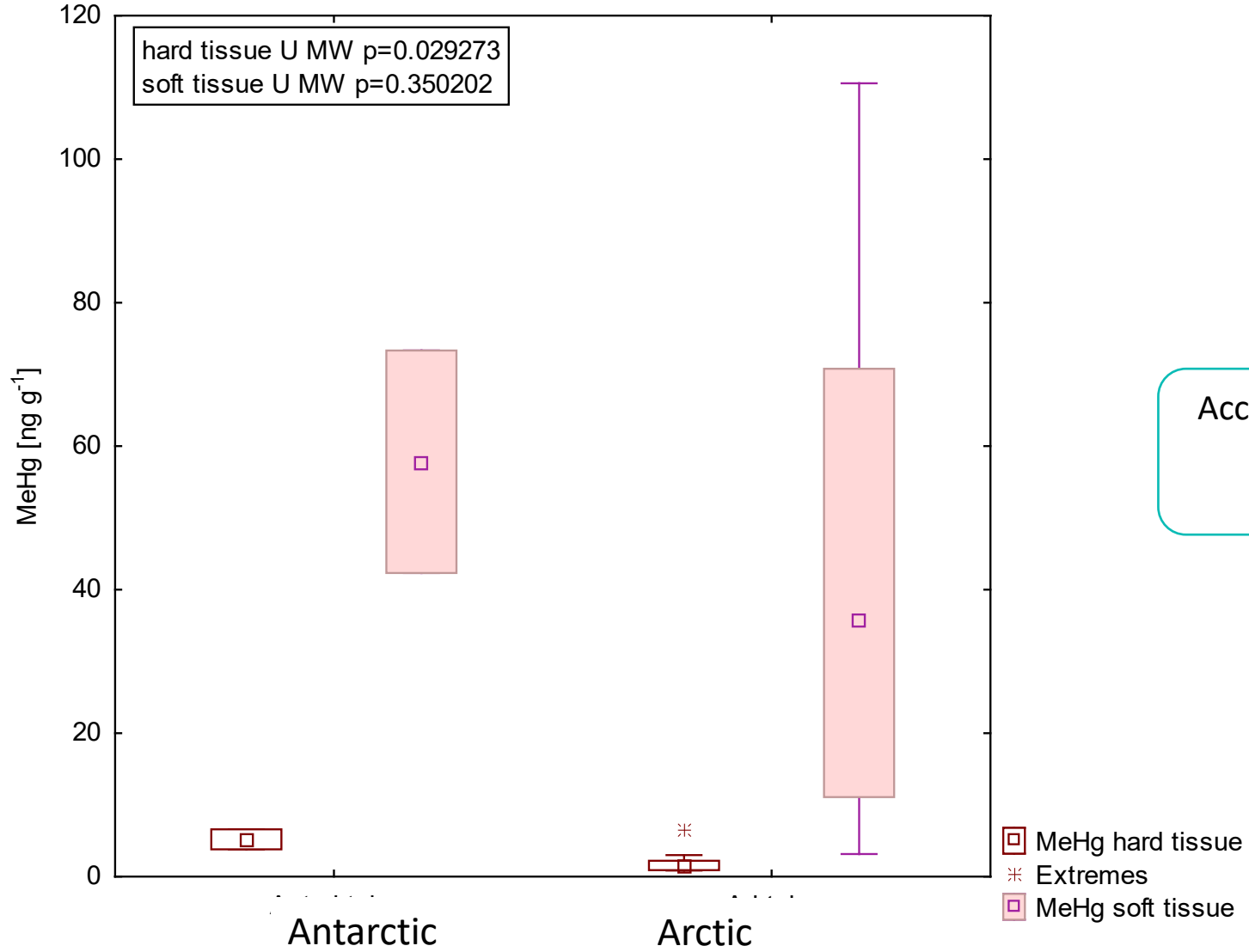
methylmercury





Transport MeHg to hard tissues.





Accumulation of MeHg in soft tissues.



# Summary



The **highest concentrations** among the studied organisms were found in **starfish**.

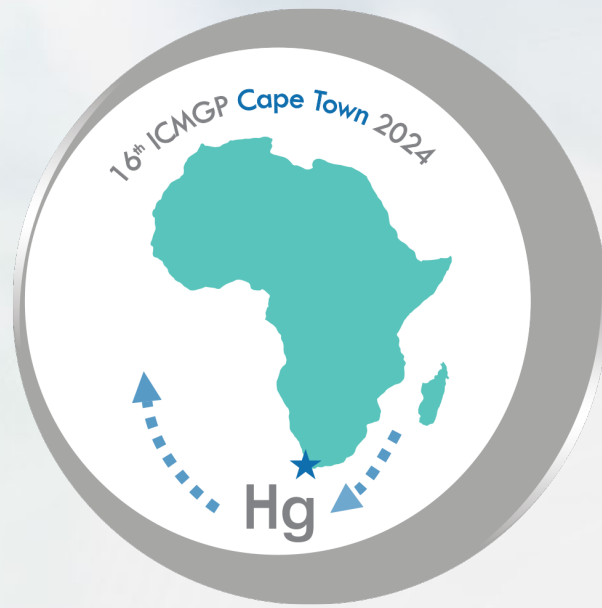
In most cases, **higher concentrations** of THg were found in the **soft tissues** of the organisms.

The transport of **mercury** from soft tissues to hard tissues was **the most efficient** in starfish.

The efficiency of **mercury transport** between soft and hard tissues was **the lowest** in gastropods.

In **both regions**, the same mercury fractions associated with **halides, organic matter, and MeHg** dominated.





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