

# Effects of fluid preservation on sea star stable isotope compositions: How useful can museum collections be for trophic ecology studies?

Baptiste LE BOURG<sup>a</sup>, Gilles LEPOINT<sup>a</sup>, Pierre BALTHASART<sup>b</sup>, Loïc N. MICHEL<sup>a,c</sup>

a: Laboratory of Oceanology, University of Liège, 4000 Liège, Belgium, b: Collectif des Enseignements en Biologie, University of Liège, 4000 Liège, Belgium, c: Deep Environment Laboratory (LEP), Ifremer Brittany, 29280 Plouzané, France  
Contact: baptiste.lebourg@doct.ulg.ac.be

## 1. Introduction

Stable isotope analyses of carbon ( $\delta^{13}\text{C}$ ) and nitrogen ( $\delta^{15}\text{N}$ ) are a common tool to investigate the trophic ecology of animals

Animal stored in museums sampled during past periods with environmental conditions different from today

→ Possibility to use them for stable isotope analyses to study past food webs?

→ Does preservation method alter stable isotope ratios? No study on sea stars

Objective: To investigate the influence of preservation methods on C and N stable isotope ratios in sea stars

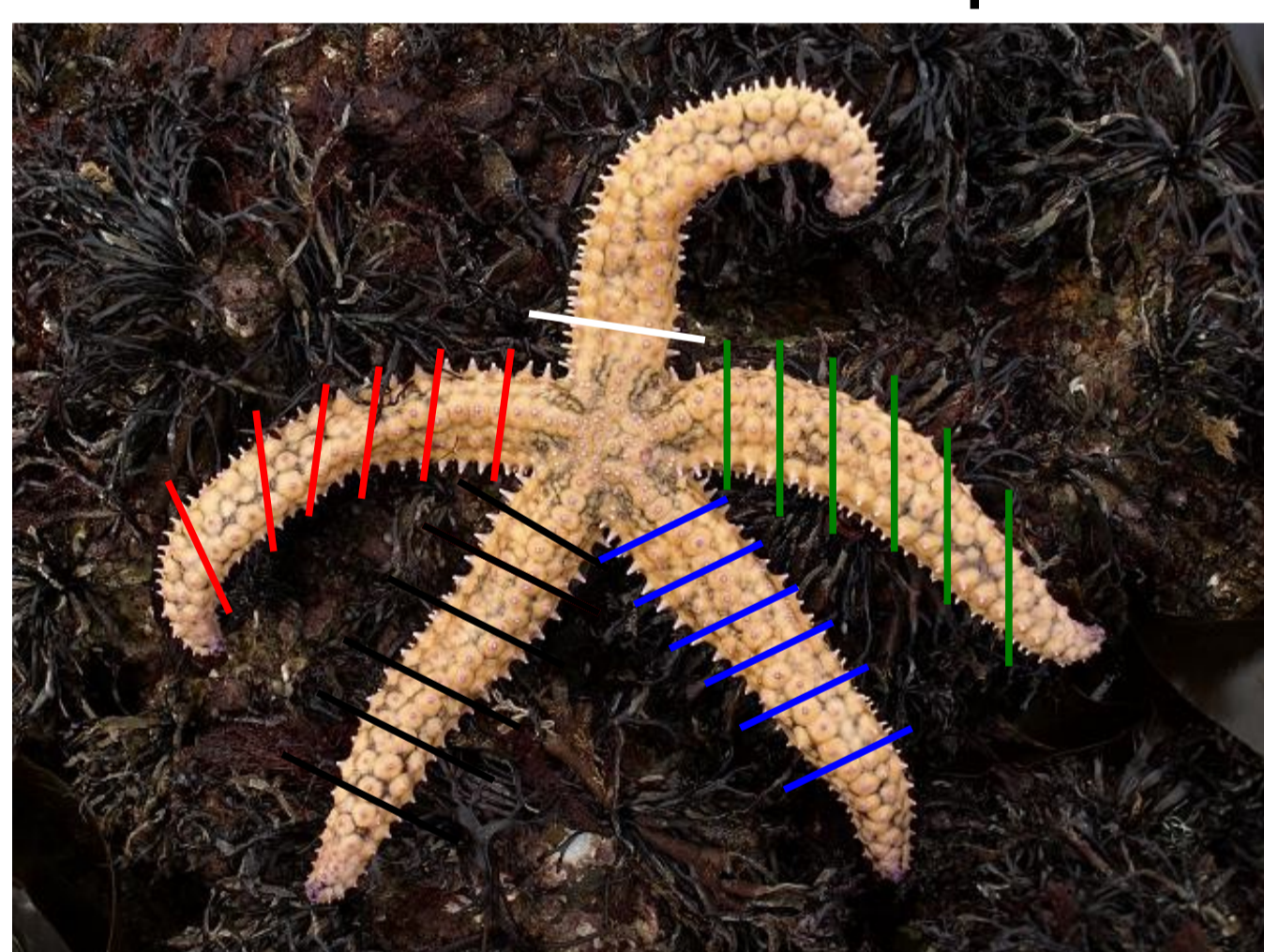
## 2. Material and methods

n = 20 sea stars (*Marthasterias glacialis*)

Analysis of stable isotope ratios in the tegument:

- One arm: **control** (dissection, immediate drying and grinding)
- Other arms: **preservation treatments** (freezing at  $-28^\circ\text{C}$ , 3.7% formaldehyde, 99.8% alcohol, drying)
- Arms cut in sections: **time effect** (from 1 to 12 months)

Comparison to control of stable isotope ratios and Bayesian estimation of the isotopic niche (proxy of trophic niche) area



- Frozen + dried
- Formaldehyde + dried
- Alcohol + dried
- Dried + dried

## 3. results

**Formaldehyde:** decrease and then stability of  $\delta^{13}\text{C}$  values

( $-0,8 \pm 0,5 \text{ ‰}$ , Fig. 1)

**No  $\delta^{13}\text{C}$  values significantly different from the control for the other methods (Fig. 1)**

**No consistent pattern of changes of  $\delta^{15}\text{N}$  values (Fig. 2)**

Higher variation of stable isotope values between individuals than between times of analyses: **high signal-noise ratio**

**No significant change of isotopic niche area except at 6 months for samples preserved in alcohol (Fig. 3)**

## 4. Discussion

Non-consistent pattern of changes of stable isotope values may result from variation of isotopic ratios in individual sea stars or analytical error

**Formaldehyde:** Possibility to use a same correction factor for  $\delta^{13}\text{C}$  no matter how long samples have been preserved

**Conclusion:** samples stored by museum in alcohol and formaldehyde (after using correction factor) may be used to study past trophic ecology of sea stars

## 3. results

Fig. 1: Evolution of  $\delta^{13}\text{C}$  values (‰) during 12 months of preservation

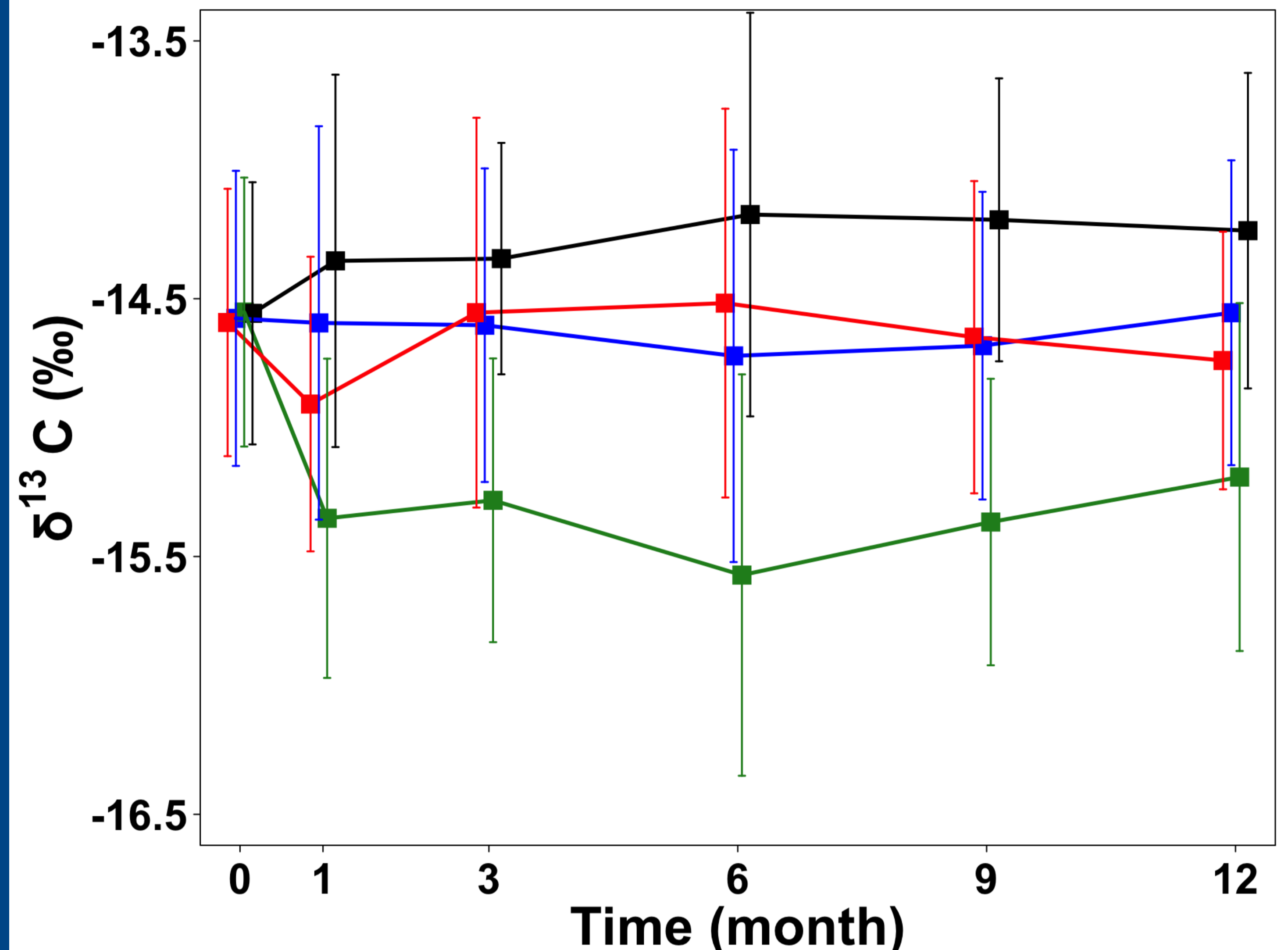


Fig. 2: Evolution of  $\delta^{15}\text{N}$  values (‰) during 12 months of preservation

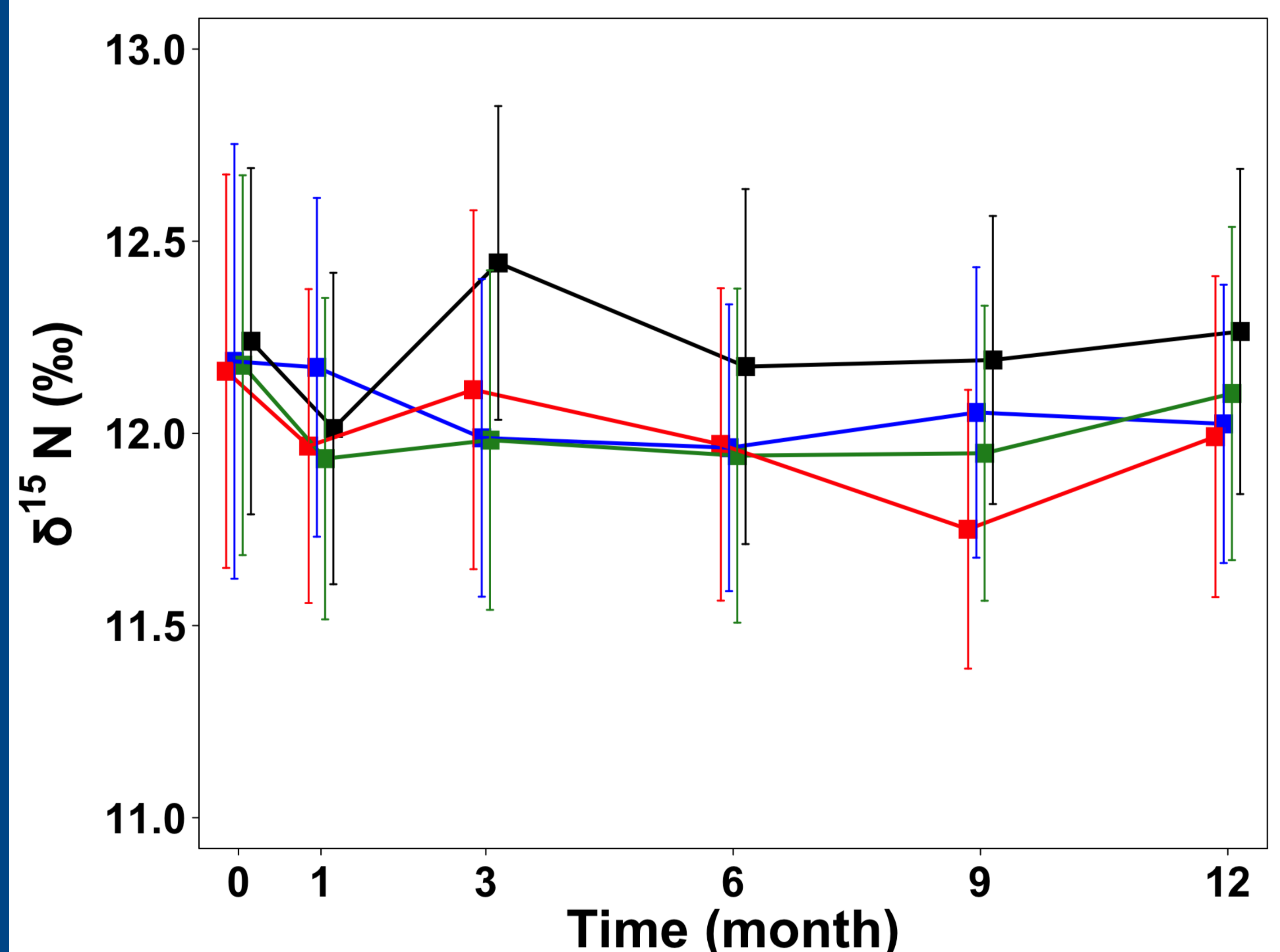


Fig. 3: Evolution of isotopic niche areas during 12 months of preservation

