

The Research Groups  
**Archaeology, Environmental Changes & Geo-Chemistry**  
and

**Social History of Capitalism**

are honoured to invite you to the public defence of the PhD thesis of

**Rachèl Spros**

to obtain the degree of Doctor of Interdisciplinary Studies

Title of the PhD thesis:

**Down the Ypres rabbit-hole:  
a multi-isotope analysis of a medieval urban population**

Promotors:

**Prof. Dr. Philippe Claeys**

**Prof. Dr. Ir. Christophe Snoeck**

**Prof. Dr. Bart Lambert**

The defence will take place on

**Friday, November 15, 2024 at 4p.m. in  
room D.0.05**

**Members of the jury**

Prof. Dr. Steven Goderis (VUB, chair)

Prof. Dr. Barbara Veselka (VUB, secretary)

Prof. Dr. Steven Provyn (VUB)

Prof. Dr. Tamsin O'Connell (University of  
Cambridge, UK)

Dr. Anton Eryvynck (Agentschap Onroerend  
Erfgoed)

Alexander Lehouck (Abdijmuseum Ten Duinen)

### Curriculum vitae

Rachèl Spros obtained her BA at the Vrije Universiteit Brussel and her MSc at the University of Oxford (UK). In 2020 she started her PhD at the VUB as part of the 'Make-Up of the City' project to study the influence of environmental and historical events on the lives of the medieval urban population of Ypres through isotope analysis.

During her PhD, Rachèl set up several in-house analytical methods for light isotope analysis on both organic and inorganic materials. Furthermore, she (co-)authored 5 articles, presented her work at 11 conferences, received 2 awards, and supervised 4 BA/MA/MSc student dissertations.

### Abstract of the PhD research

Ypres was one of the most important European cities north of the Alps during the 12<sup>th</sup> and 13<sup>th</sup> centuries, and the third largest city in the medieval Low Countries due to its extensive cloth industry. During the 13<sup>th</sup> and 14<sup>th</sup> centuries, however, its economic success started to wane, and conflicts, crop failures, waves of animal murrain, and the Black Death drastically affected the lives of the city's inhabitants. This thesis provides new and unique insights into the lives of these medieval city-dwellers.

The diet and mobility patterns of the population buried at Ypres' St. Nicholas parish cemetery are studied using multi-isotope analysis on multi-skeletal tissues. In total, 1475 <sup>14</sup>C,  $\delta^{13}\text{C}_{\text{ap}}$ ,  $\delta^{13}\text{C}_{\text{col}}$ ,  $\delta^{15}\text{N}$ ,  $\delta^{18}\text{O}_{\text{C}}$ , <sup>87</sup>Sr/<sup>86</sup>Sr, and [Sr] datapoints were obtained from 150 human adult individuals (12<sup>th</sup> – 16<sup>th</sup> C.). The results are compared against established baselines. For  $\delta^{13}\text{C}_{\text{col}}$  and  $\delta^{15}\text{N}$  values, an animal baseline is created with 51 animals from medieval Ypres. For the <sup>87</sup>Sr/<sup>86</sup>Sr baseline, modern Belgian plants are measured. And finally, for the  $\delta^{18}\text{O}$  values, 23 human individuals from the early medieval population of Koksijde (Belgium) are used. The latter was needed as this thesis shows that current existing oxygen isotope baselines do not match past Belgian populations.

The majority of the Ypres individuals were born in the city. The 17% of the population with signs of mobility is balanced between males and females, and show mobility towards and/or away from the city. Besides human mobility, the significance of imported foodstuffs is observed in the isotope results as well. The general diet consisted mainly of C<sub>3</sub> crops and terrestrial animals with some influence of marine products. During the 13<sup>th</sup> century, a change in diet is observed. The waves of animal murrain and crop failures during the early 14<sup>th</sup> century appear to have had little influence on the general diet. Overall, social differences in the population's diet are visible in individuals buried closer to the church compared to those buried further away, and in male individuals compared to females.

Finally, attention was given to the comparability of intra-individual  $\delta^{13}\text{C}_{\text{col}}$  and  $\delta^{15}\text{N}$  values. A natural occurring offset between ribs and femora exist in  $\delta^{15}\text{N}$  values, and the turnover time of nitrogen in bone collagen may take longer than previously thought.

The implications of the finds in this thesis are not only relevant for future studies on Ypres and urban medieval north-western Europe, but of future bio-archaeological studies using isotope analyses as well.