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Biomonitoring air quality for praseodymium in Leicestershire (UK)

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INTRODUCTION

Aim: to biomonitor air quality for praseodymium (Pr) in Leicester city (England) after detecting slight contamination of this element in topsoils across the city and surrounding rural areas when compared with other industrialised towns in Europe (Peña-Fernández et al., 2023**).**

MATERIAL AND METHODS

Thin layers of bark were collected from 96 trees from Leicester (n=55) and surrounding rural/suburban areas (41; Fig. 1), at a consistent height of 1.50–1.80 metres from the ground (Guéguen et al., 2011**) from September to November 2018.**

- ❑ Pr was monitored by ICP-MS in cleaned/ground/homogenised samples (Minganti & Drava, 2018) mineralised with HNO_3/H_2O_2 [LoD=0.066 ng/g dry weight (dw)].
- ❑ Data was processed using statistical methods applied to censored data available in the 'NADA' statistical package.
- ❑ Results was compared with the levels of Pr described in 52 topsoil composite samples collected the same year (2017-18).

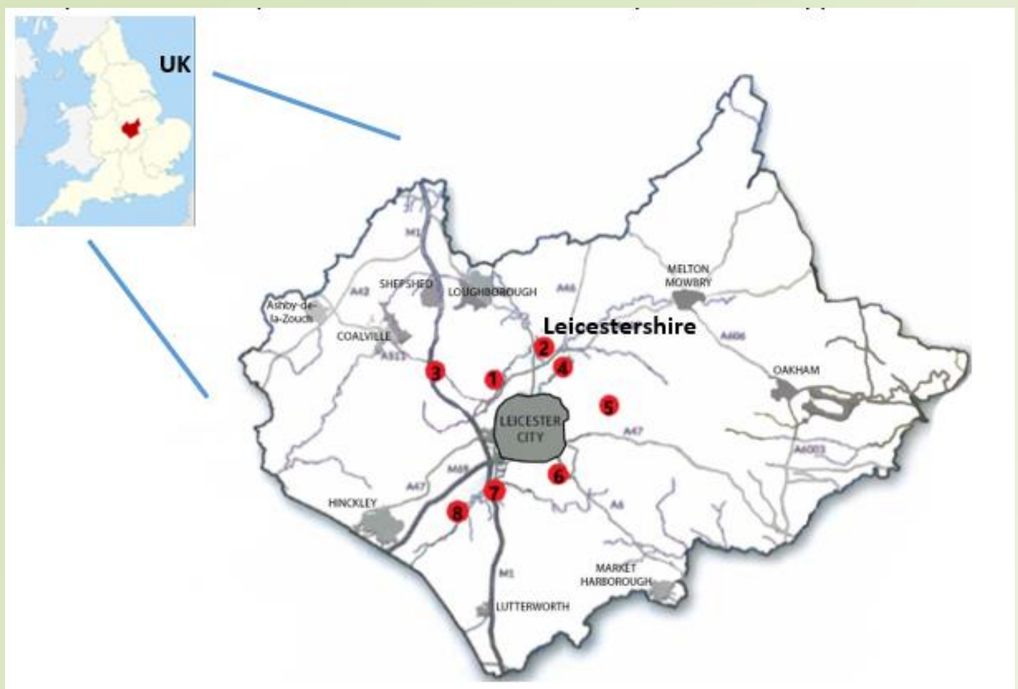

Fig 1. Study area. The city of Leicester is indicated in grey (Leicestershire, UK).

RESULTS AND DISCUSSION

✓**Levels of Pr were slightly higher in the samples collected from trees that grow in urban areas (median and ranges, in ng/g dw): 2.611 (0.714-47.603) and 2.450 (0.757-14.839).**

✓**These results might be explained by the presence of Pr monitored in topsoils, in which no statistical differences were found between both main areas, detecting a wide distribution of this element across the city and surrounding rural areas (**Peña-Fernández et al., 2023**).**

✓**Levels were much higher than the range reported in *Pinus ponderosa* bark samples (US; 1.85-2.69 ng/g dw) collected in an area in eastern Washington away from roads to have little effect from traffic (**Flett et al., 2021**), suggesting some anthropic atmospheric contamination of Pr in Leicester city and surrounding areas, derived from different sources.**

✓**However, the toxic risks derived from the ingestion and dermal contact of Pr present in topsoils in Leicester city is likely to be minimal.**

REFERENCES

Flett, L., McLeod, C. L., McCarty, J. L., Shaulis, B. J., Fain, J. J., & Krekeler, M. P. (2021). Monitoring uranium mine pollution on Native American lands: Insights from tree bark particulate matter on the Spokane Reservation, Washington, USA. Environmental Research, 194, 110619.

Guéguen, F., Stille, P., & Millet, M. (2011). Air quality assessment by tree bark biomonitoring in urban, industrial and rural environments of the Rhine Valley: PCDD/Fs, PCBs and trace metal evidence. Chemosphere, 85(2), 195-202.

Minganti, V., & Drava, G. (2018). Tree bark as a bioindicator of the presence of scandium, yttrium and lanthanum in urban environments. Chemosphere, 193, 847-851.

Peña-Fernández, A., Higueras, M., Evans, M. D., & Bedmar, M. C. L. (2023, September). Environmental contamination and exposure to praseodymium in Leicestershire (UK). In ISEE Conference Abstracts (Vol. 2023, No. 1).

CONCLUSIONS

The presence of Pr in air in Leicester could be affected by different anthropic sources that should be investigated to reduce its presence, studies that should include the monitoring of the content of Pr in particularly matter in Leicester city.