

A Tale of Two Cities: Comparison of metals and Pb isotopes in honey from Vancouver, Canada, and Brussels, Belgium, during the COVID-19 lockdown

BROOKE HOPPSTOCK-MATTSON¹, JOSEPHINE MATON², DOMINIQUE WEIS¹, KATE E. SMITH¹ AND NADINE MATTIELLI²

¹University of British Columbia

²Université Libre de Bruxelles

Presenting Author: bhoppmatt@eoas.ubc.ca

The use of honey and other hive products from *Apis mellifera* (Western honeybee) as biomonitors for pollutants is a well-established approach for environmental monitoring. Recent studies have included the use of lead (Pb) isotopes, in addition to metal concentrations, in bees and hive products to elucidate Pb source apportionment^{1,2}. Notably, honey was used to assess the impact of an acute Pb pollution event following the fire at Notre-Dame cathedral, Paris³. In our study, we analyzed honey from Vancouver, Canada, and Brussels, Belgium, to measure changes in metal concentrations and Pb isotope compositions as a result of the COVID-19 lockdown from May to October 2020. The comparison of a relatively young, small North American city (Vancouver, Canada) to a typical European city with an extensive history of Pb use (Brussels, Belgium) provided the opportunity to test the sensitivity of honey during lockdown events in two, contrasting settings with different Pb sources and transit patterns. Consistent with previous reports, metal concentrations and Pb isotope compositions of honey varied geospatially as a function of land use (urban, suburban, and agricultural/rural) and distance from pollution point sources^{3,4}. In both cities, the metal concentrations showed more relative variation than Pb isotope trends as a function of lockdown changes. Observed metals trends are congruent with COVID-19 air pollution studies; metals in honey remained mostly stable during lockdown, with some periods of decreased metal concentrations⁴. The data collected in this study contributes to the multi-year dataset of honey from Vancouver and numerous other locations². This work was possible through collaboration with local apiarists in Vancouver and Brussels and exemplifies the importance of community science in scientific inquiry.

[1] Zhou et al. (2018) *Env. Sci. & Tech.* **52** 991-1001

[2] Smith et al. (2019) *Nat. Sustain* **2** 223-232; Smith and Weis (2020) *GeoHealth*. **4**; Smith et al. (2021) **195** 110800

[3] Smith et al. (2020) **7** 753-759

[4] Jean-Philippe Bonardi *et al* 2021 *Environ. Res. Lett.* **16** 074010