**Supporting Information Tables S1 & S2 and Figs S1 & S2**

**Table S1 *P*-values of one-way analysis of variance (ANOVA) Holm-Sidak from Fig 1. a**, Magnesium (Mg). **b**, Molybdenum (Mo). **c**, Lead (Pb). **d**, Vanadium (V).

**a**

| Mg | P-value |
|---|---|
| UWT/WT | <0.001 |
| UWT/ALG | 0.328 |
| UWT/CEP | <0. 001 |
| WT/ALG | <0.001 |
| WT/CEP | 0.466 |
| ALG/CEP | <0.001 |

**b**

| Mo | P-value |
|---|---|
| UWT/WT | 0.433 |
| UWT/ALG | 0.018 |
| UWT/CEP | <0.001 |
| WT/ALG | 0.083 |
| WT/CEP | <0.001 |
| ALG/CEP | <0.001 |

**c**

| Pb | P-value |
|---|---|
| UWT/WT | <0.001 |
| UWT/ALG | <0.001 |
| UWT/CEP | <0.001 |
| WT/ALG | 0.51 |
| WT/CEP | 0.432 |
| ALG/CEP | 0.742 |

**d**

| V | P-value |
|---|---|
| UWT/WT | 0.218 |
| UWT/ALG | 0.799 |
| UWT/CEP | <0.001 |
| WT/ALG | 0.262 |
| WT/CEP | <0.001 |
| ALG/CEP | <0.001 |

**Table S2 Content and ratio of vanadium (V) and aluminium (Al) for different compartments of *P. aphthosa***: V and Al contents are expressed in $\mu g_{element} \cdot g_{ODWlichen}^{-1}$, V:Al (mol:mol) molar ratios from paired samples with paired t-test (only thalli with all compartments represented were kept, *n*=23,) and correlation factor ($r^2$) from linear regression of Al : phosphorus (P) (mol:mol) ratio and V: P (mol:mol) ratio.

| | | Cephalodia | | Algae | | Washed thalli | | Exposition | |
|---|---|---|---|---|---|---|---|---|---|
| | | Al | V | Al | V | Al | V | Al | V |
| **Metal content (ppm)** | **Content** | 37.86[a] | 0.41[A] | - | - | 47.31[a] | 0.15[B] | 53.92[a] | 0.21[B] |
| | *SE* | *5.15* | *0.04* | - | - | *5.26* | *0.01* | *7.11* | *0.02* |
| **Paired-ratio (mol:mol)** *n*=23 | **Ratio V / Al** | 8.14E-03[a] | | 2.15E-03[bc] | | 2.01E-03[c] | | 2.33E-03[b] | |
| | *SE* | *1.08E-03* | | *2.47E-04* | | *1.27E-04* | | *1.54E-04* | |
| **Linear regression** | $R^2$ | 0.23 | | 0.29 | | 0.95 | | 0.69 | |
| | *n* | 27 | | 26 | | 29 | | 28 | |

**Fig. S1 Localisation (stars) of the sampling sites in Québec, Canada, Alaska, USA, and Siberia, Russia; as well as a picture of the tri-membered lichen *Peltigera aphthosa* taken in the field.** Seven sites were sampled in Québec compare to one site in Alaska and Siberia, respectively. Most of the thallus is formed by the mycobiont. The green color comes from the green alga *Coccomyxa*, and the small black dots on the surface of the thallus are cephalodia containing the $N_2$ fixing cyanobacterium *Nostoc*.

**Scheme 1**

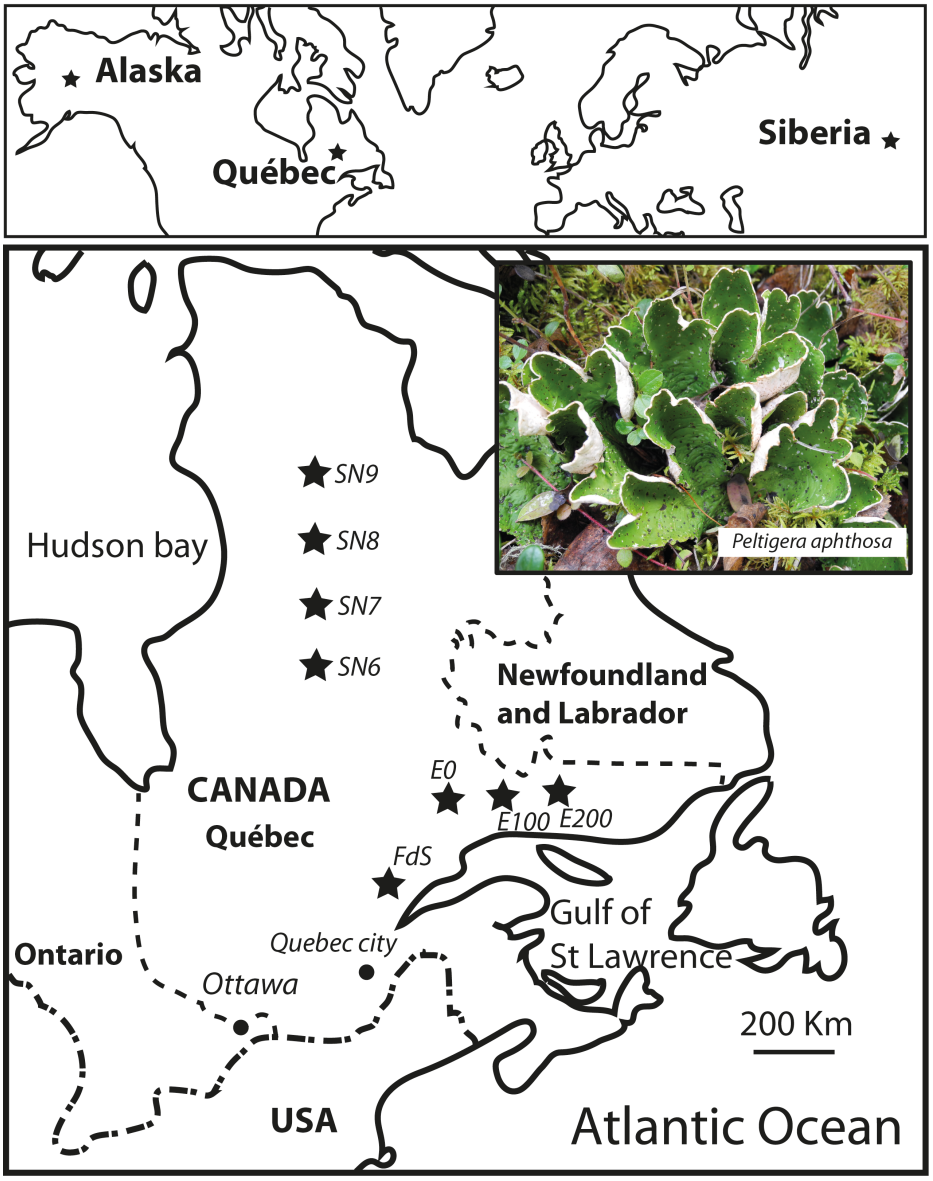

**Fig S2 Comparison of metals content in ppm ($\mu g_{metal} \cdot g_{dryweight}^{-1}$) between unwashed lichens, (i.e., exposition) (UWT), Ox/EDTA-washed lichen thalli (WT) and cephalodia (CEP).** Metal are **a**, Magnesium (Mg). **b**, Molybdenum (Mo). **c**, Lead (Pb) and **d,** Vanadium (V). Error bars are standard error, $n$ = 28, 29 and 27 for UWT, WT and CEP, respectively. Identical letters indicate no significant difference according to a one-way analysis of variance (ANOVA), Holm-Sidak, $P < 0.001$.