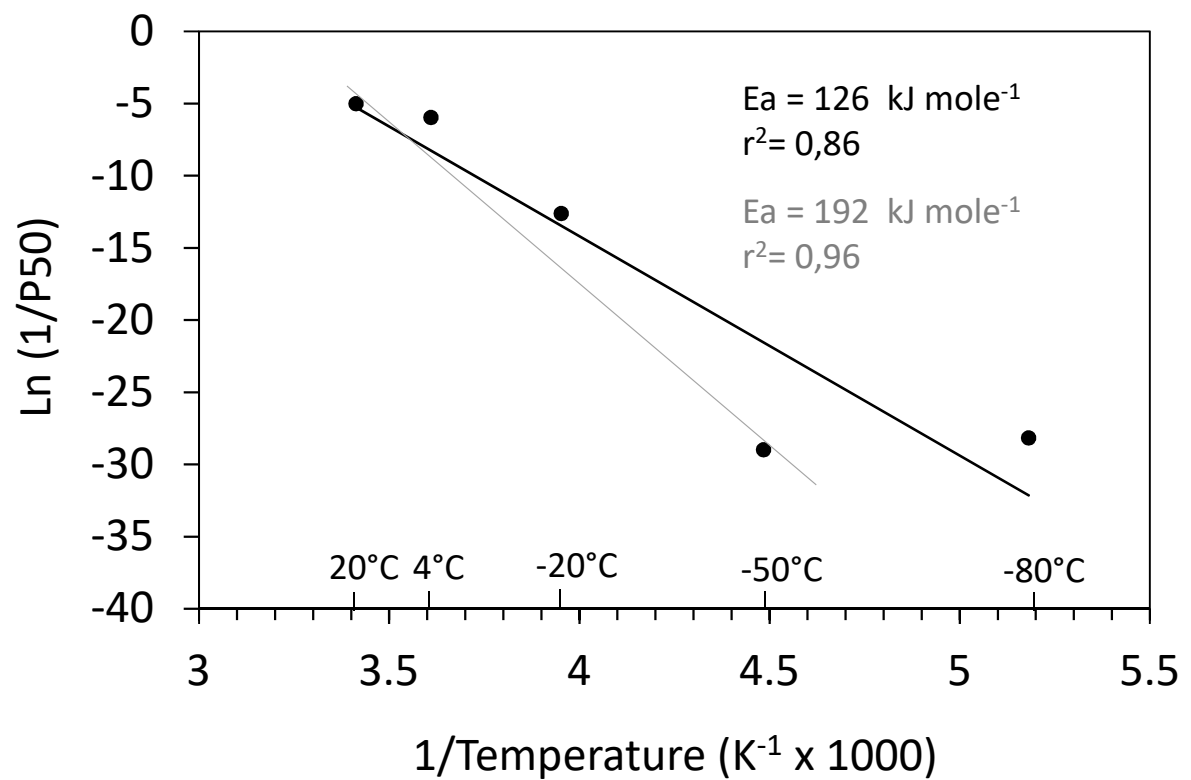
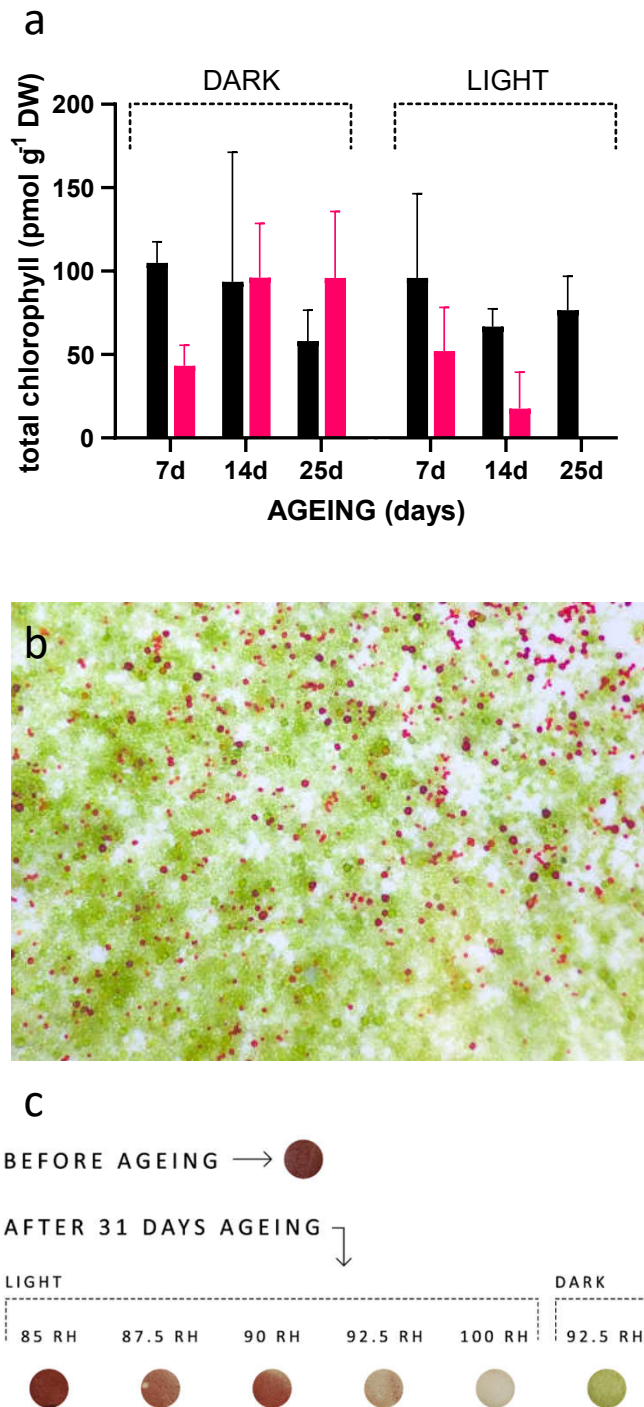


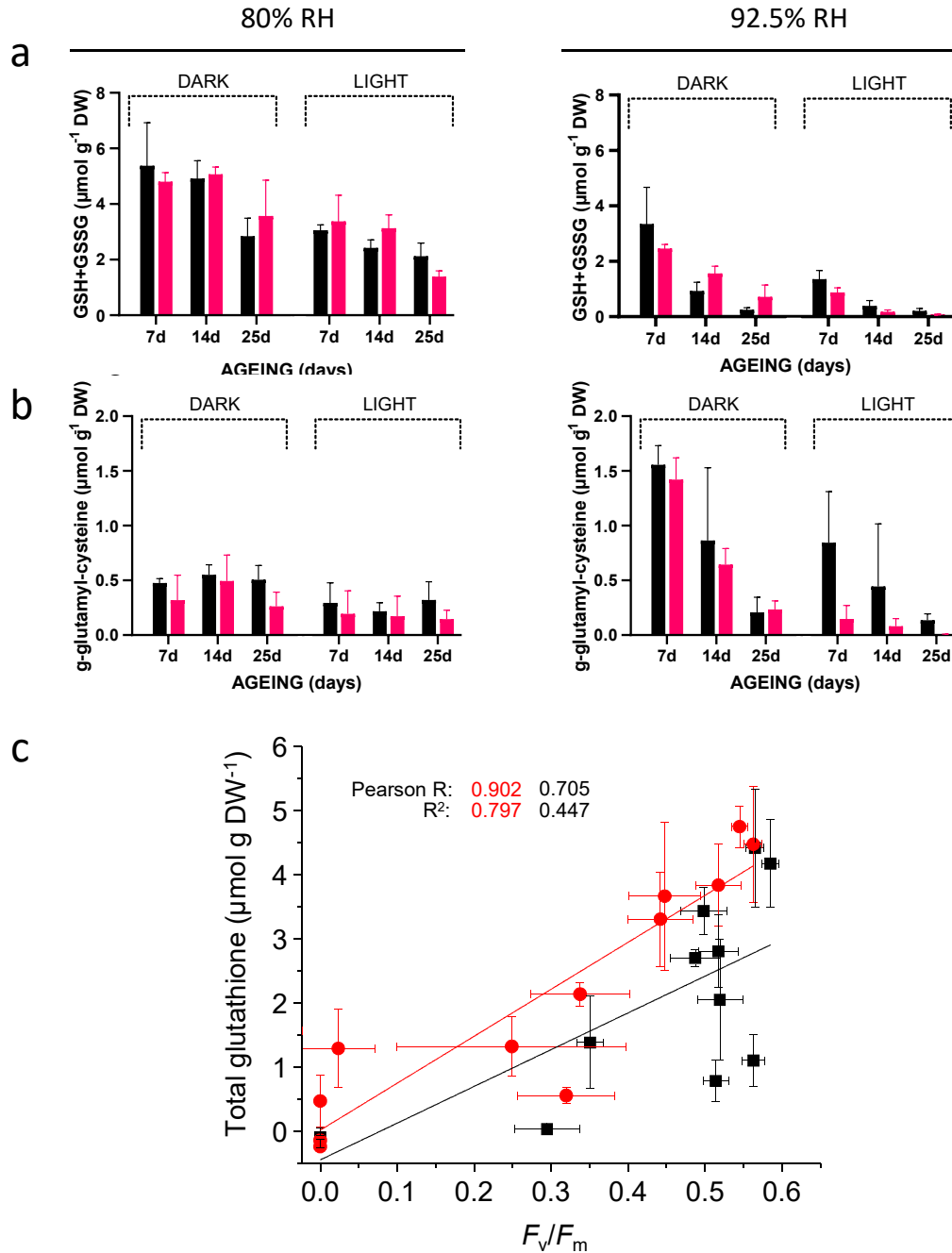
**Figure S1.** Profile of first order transitions in cooling and heating DSC scans of *H. lacustris* cells in both the cooling (blue) and heating (red) scan.



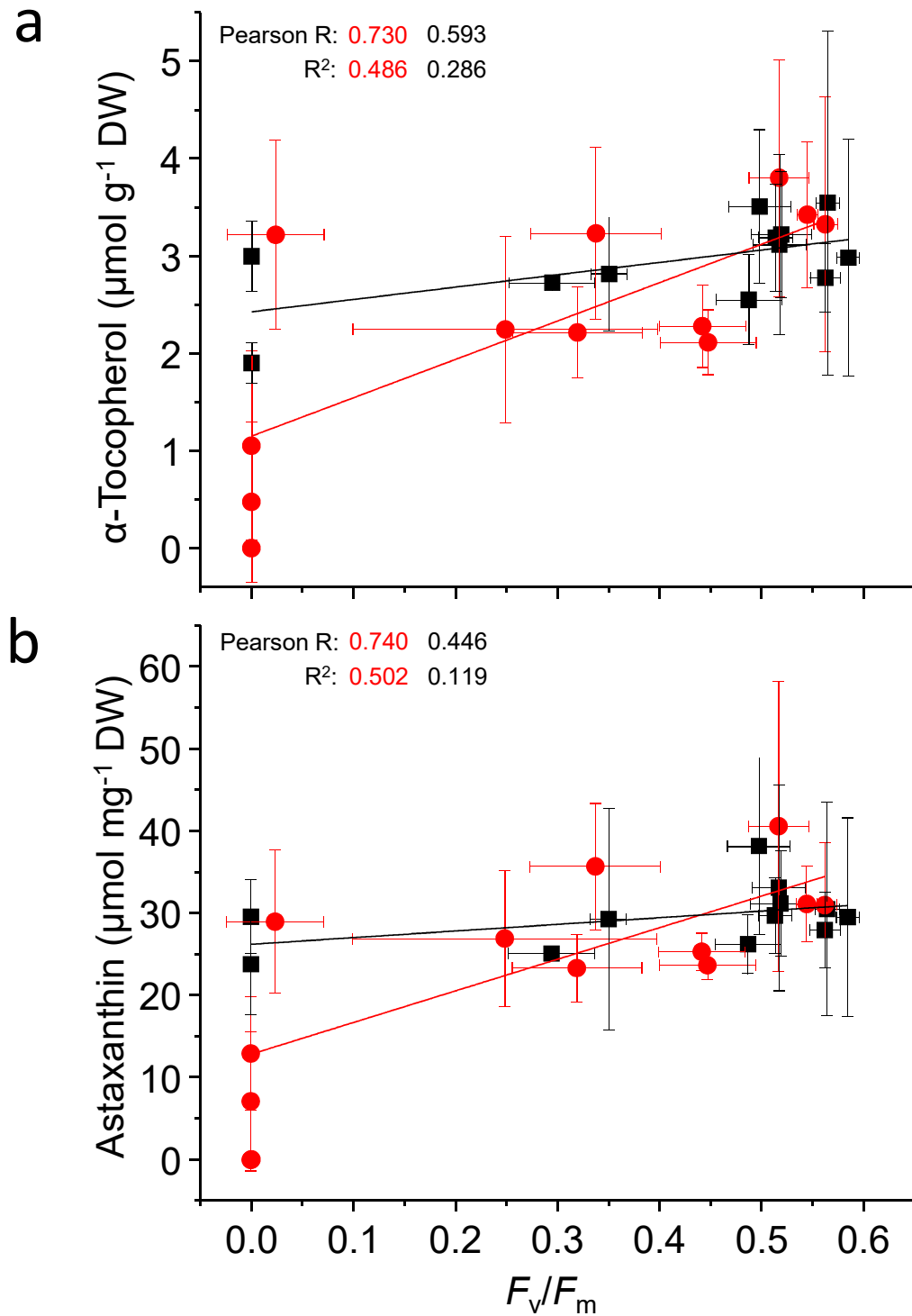
**Figure S2.** Arrhenius plot describing the effect of temperature on the ageing rate of *H. lacustris* cells stored at 50% RH under ambient oxygen in the dark. The plot is linear for storage temperatures between 20°C and -80°C, but the correlation coefficient is better when considered the range between 20°C and -80°C. The slope of the Arrhenius plots was used to calculate an apparent activation energy ( $E_a$ ) of about 126 and 192 kJ mole<sup>-1</sup> depending on the storage range used for the calculation: 20°C and -80°C or 20°C and -50°C (black or grey line, respectively).



**Figure S3.** Effect of ageing in light dark, 80.0% and 92.5% RH and high and low oxygen tension on chlorophyll concentrations. **(a)** Concentrations of total chlorophyll in cells during storage (ageing) at 92.5% RH for 7, 14 and 25 days, under dark (left) or light (right), and in a high (red) or low (black) oxygen tension. **(b)** Reflective microscope image of cells of the filter after storage for 25 days at 92.5% RH in dark under a high oxygen tension. **(c)** Images of whole filters holding cells stored for 31 days in 85-100% RH in the light or 92.5% RH in the dark under ambient oxygen cocnetration.



**Figure S4.** Effect of ageing in light dark, 80.0% and 92.5% RH and high and low oxygen tension on glutathione and  $\gamma$ -glutamyl-cysteine concentrations, and correlation with viability. Concentrations of total **(a)** glutathione (GSH+GSSG), and **(b)**  $\gamma$ -glutamyl-cysteine, in dry cells during storage (ageing) at 80.0% RH (left) and 92.5% RH (right) for 7, 14 and 25 days, under dark or light, as indicated above columns, and in a high (red) or low (black) oxygen tension. **(c)** Correlation of total glutathione concentrations in (a) with  $F_v/F_m$  values of 48 h rehydrated cells, as used as a viability indicator. Data points are of average values,  $n=3\pm\text{SD}$ .



**Figure S5.** Effect of ageing in light dark, 80.0% and 92.5% RH and high and low oxygen tension on correlation of (a)  $\alpha$ -tocopherol and (b) astaxanthin concentrations in dry with viability. Cells were stored at 80% and 92.5% RH for 7, 14 and 25 days, under dark or light, and in a high (red) or low (black) oxygen tension.  $\alpha$ -tocopherol and astaxanthin were measured in dry cells, and  $F_v/F_m$  values are after 48 h rehydration, as used as a viability indicator. Data points are of average values,  $n=3\pm\text{SD}$ .