Figure S1 Droplet long-term storage in a Petri dish filled with de-ionised water.

Figure S2 The monodispersity of microdroplets and their long-term stability at 25 ± 2°C. FC-40 with 2% Raindance EA surfactant was used as the oil phase.

Figure S3 Distribution of D. tertiolecta cells in droplets after encapsulation when F_{oil} = 1000 µl/h and F_{qua} = 200 µl/h.
Figure S4 Growth curves of *C. reinhardtii* in microdroplets of 268 pl, 572 pl, 904 pl and 1766 pl with initial one cell per droplet at 25 ± 2°C under continuous illumination of 55 μmol photons/m²/s.

Figure S5 Bright-field images showing the different growing conditions of *Chlamydomonas reinhardtii* in microdroplets of 30 μm, 41 μm, 48 μm and 71 μm after 2 or 6 days with initial one cell per droplet at 25 ± 2°C under continuous illumination of 55 μmol photons/m²/s.