

## Supplementary data

**Table 1S:** NMR data of analyzed carotenoids

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### A. Flavuxanthin

<sup>1</sup>H NMR (600 MHz, CDCl<sub>3</sub>, selected signals): 1.63 (*s*, 3H, H-17), 1.67 (*s*, 3H, H-4''), 1.80 (*s*, 3H, H-18), 1.97 (*s*, 6H, H-19 and H-20), 2.01 (*m*, 2H, H-4), 2.08 (*m*, 1H, H-2), 2.10 (*m*, 2H, H-1''), 4.00 (*s*, 2H, H-5''), 4.70 (*s*, 1H, H-16), 4.78 (*s*, 1H, H-16), 5.36 (*m*, 1H, H-2''), 5.93 (*d*, *J* = 11 Hz, 1H, H-6), 6.18 (*d*, *J* = 11.4 Hz, 1H, H-10), 6.24 (*d*, *J* = 15 Hz, 1H, H-8), 6.26 (*m*, 1H, H-14), 6.36 (*d*, *J* = 14.8 Hz, 1H, H-12), 6.48 (*dd*, *J* = 15, 11 Hz, 1H, H-7), 6.64 (*m*, 2H, H-11 and H-15). <sup>13</sup>C NMR (150 MHz, CDCl<sub>3</sub>, selected signals): 12.8 (C-19 and C-20), 14.0 (C-4''), 16.8 (C-18), 18.5 (C-17), 31.7 (C-1''), 37.9 (C-4), 47.0 (C-2), 69.1 (C-5''), 111.9 (C-16), 124.7 (C-7), 124.8 (C-2''), 125.0 (C-11), 125.7 (C-6), 130.0 (C-15), 135.2 (C-8), 137.4 (C-12), 147.1 (C-1).

### B. Sarcinaxanthin

<sup>1</sup>H NMR (600 MHz, CDCl<sub>3</sub>): 0.72 (*s*, 3H, H-17), 0.95 (*s*, 3H, H-16), 1.19 (*m*, 1H, H-3), 1.28 (*m*, 1H, H-2), 1.66 (*s*, 3H, *Me*-3''), 1.71 (*m*, 1H, H-1''), 1.73 (*m*, 1H, H-3), 1.97 (*s*, 3H, H-20), 1.98 (*s*, 3H, H-19), 2.03 (*m*, 1H, H-4), 2.25 (*m*, 1H, H-1''), 2.35 (*ddd*, *J* = 13.3, 4.2, 2.6 Hz, 1H, H-4), 2.48 (*d*, *J* = 9.9 Hz, 1H, H-6), 4.03 (*s*, 2H, H-4''), 4.53 (*s*, 1H, H-18), 4.76 (*s*, 1H, H-18), 5.43 (*t*', *J* = 7 Hz, 1H, H-2''), 5.83 (*dd*, *J* = 15.6, 9.9 Hz, 1H, H-7), 6.12 (*m*, 2H, H-8 and H-10), 6.24 (*d*', *J* = 8 Hz, 1H, H-14), 6.34 (*d*, *J* = 14.9 Hz, 1H, H-12), 6.62 (*m*, 1H, H-11), 6.63 (*m*, 1H, H-15). <sup>13</sup>C NMR (150 MHz, CDCl<sub>3</sub>): 12.8 (C-20), 13.2 (C-19), 13.8 (*Me*-C-3''), 15.3 (C-17), 27.2 (C-16), 28.4 (C-1''), 28.9 (C-3), 36.3 (C-4), 39.3 (C-1), 48.5 (C-2), 58.5 (C-6), 69.1 (C-4''), 108.1 (C-18), 124.9 (C-11), 126.2 (C-2''), 128.4 (C-7), 130.0 (C-15), 130.7 (C-10), 132.4 (C-14), 135.2 (C-3''), 135.4 (C-9), 136.4 (C-13), 137.4 (C-12), 137.6 (C-8), 150.4 (C-5).

### C. Decaprenoxanthin

<sup>1</sup>H NMR (600 MHz, CDCl<sub>3</sub>): 0.74 (*s*, 3H, H-17), 0.93 (*s*, 3H, H-16), 1.36 (*m*, 1H, H-2), 1.53 (*s*, 3H, H-18), 1.66 (*m*, 1H, H-3), 1.67 (*s*, 3H, *Me*-3''), 1.81 (*m*, 1H, H-1''), 1.93 (*s*, 3H, H-19), 1.97 (*s*, 3H, H-20), 2.06 (*m*, 1H, H-3), 2.26 (*m*, 1H, H-1''), 2.44 (*d*, *J* = 10 Hz, 1H, H-6), 4.01 (*s*, 2H, H-4''), 5.43 (*t*', *J* = 7 Hz, 1H, H-2''), 5.45 (*m*, 1H, H-4), 5.53 (*dd*, *J* = 15, 10 Hz, 1H, H-7), 6.14 (*d*, *J* = 12 Hz, 1H, H-10), 6.16 (*d*, *J* = 15 Hz, 1H, H-8), 6.25 (*m*, 1H, H-14), 6.36 (*d*, *J* = 15 Hz, 1H, H-12), 6.62 (*m*, 1H, H-11), 6.63 (*m*, 1H, H-15). <sup>13</sup>C NMR (150 MHz, CDCl<sub>3</sub>, selected signals): 12.8 (C-20), 13.2 (C-19), 13.8 (*Me*-C-3''), 16.3 (C-17), 23.1 (C-18), 26.7 (C-16), 28.0 (C-1''), 28.7 (C-3), 36.0 (C-1), 44.2 (C-2), 56.6 (C-6), 69.2 (C-4''), 121.4 (C-4), 124.9 (C-11), 126.1 (C-2''), 130.0 (C-15), 130.3 (C-7), 130.4 (C-10), 132.4 (C-14), 135.2 (C-9), 135.3 (C-3''), 137.3 (C-12), 138.1 (C-8).

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