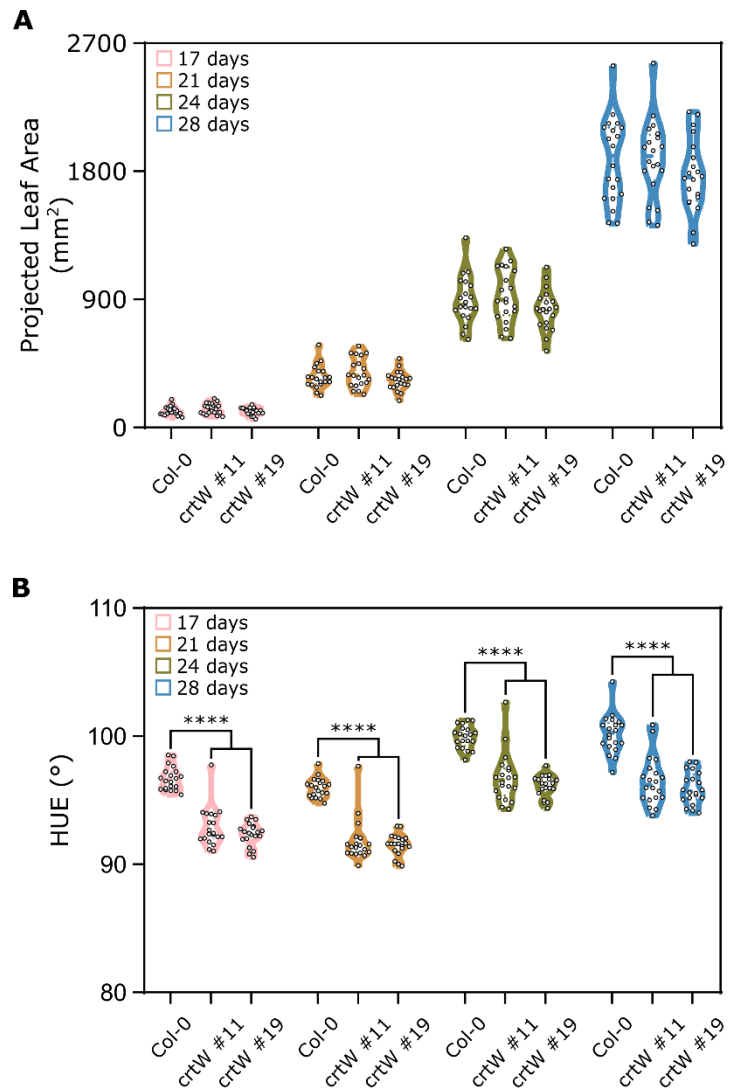


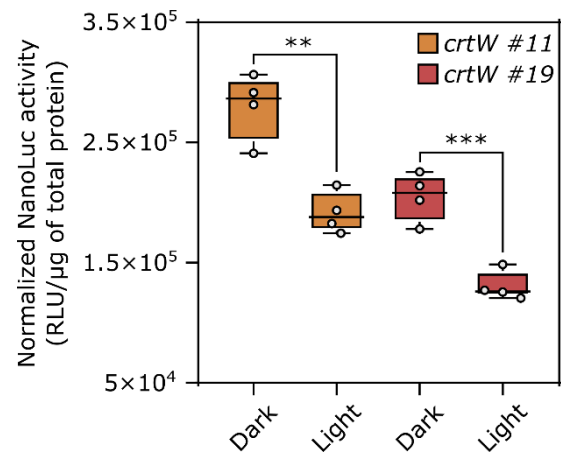
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AmOCP	MPFTIDTARSIFPETLAADVVPATIARFKQLSAEDQLALIWFAYLEMGKTITIAAPGAAN	60
	* **:.***** .*:.** : *:.*****.***** ** ** ** **	
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AmOCP	MQFAENTLQEI RQMTPLQQTQAMCDLANRTDTPICRTYASWSPNIKLGFWYELGRFMDQG	120
	* **:.** :*:.** : **.*.*** *:.*****:*:. *:.*****.**:.**	
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AmOCP	PQEMSQRTKVQIEGVTNSTVLQYMDNLNANDFDNLISLFAEDGALQPPFQKPIVGKENTL	240
	*: : : *:*.* ** : * **.*:* ** :. :*****.*****.***:* **	
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AmOCP	RFFREECQNLKLI PERGVSEPTEDGYTQIKVTGKVQTPWFGNVGMNIAWRFLN PENKV	300
	:***** .*****:***:*.*:***.******.*****.***:***:	
FtOCP2	FFVAIDVLATPQELLNMGFIQ 319	
AmOCP	FFVAIDLLASPKE LLNL---- 317	
	*****:***:***:	

Supplemental Figure S1. Alignment of the *Fischerella thermalis* OCP2 (FtOCP2) and *Arthrospira maxima* OCP (AmOCP). Asterisks residue indicate identity between the two sequences; ‘:’ and ‘.’ indicate similar physical-chemical properties of residues.



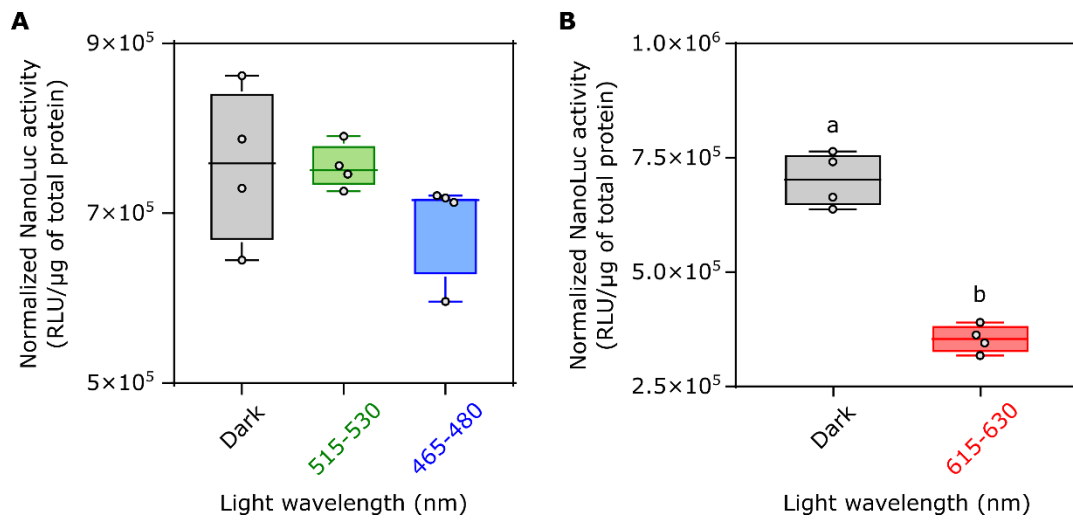
Supplemental Figure S2. Phenotypic comparison between Col-0 and keto-carotenoid producing plants.

A, Comparison in plant size, calculated as the Projected Leaf Area (PLA) and, B, comparison in the HUE-value between Col-0, *crtW*#11 and *crtW*#19. The analysis was made on 20 replicates, and repeated at different time points: 17, 21, 24 and 28 days after germination. Asterisks indicate statistical differences calculated from one-way ANOVA followed by Tukey's post-hoc test (****, $p \leq 0.0001$).



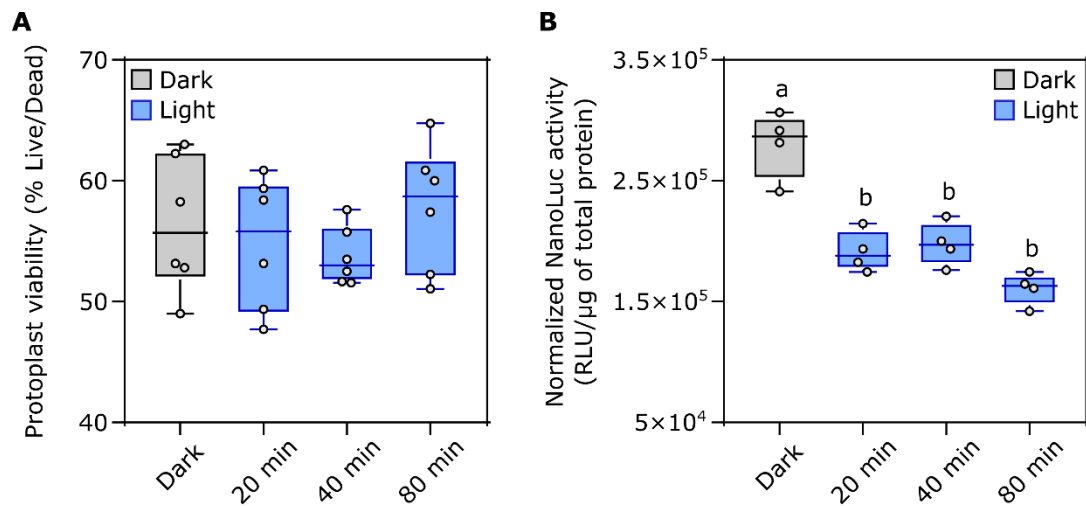
Supplemental Figure S3. Comparison of split-NlucOCP2 activity in two different *crtW* lines.

Light response in *Arabidopsis crtW*#11 and *crtW*#19 isolated protoplasts. Protoplasts were treated with either dark or blue light ($350 \mu\text{mol} \mu\text{m}^{-2} \text{s}^{-1}$) for 20 min. In the box plots, dots represent biological replicates, the black line marks the median, and the box indicates the interquartile range (IQR). Whiskers extend to data points below 1.5 X IQR away from the box extremities. A statistic Student t-test was used to assess significant differences. Asterisks indicate statistical differences (***, $p \leq 0.001$, **, $0.001 < p \leq 0.01$, $n=4$).



Supplemental Figure S4. Effect of different light spectra on the activity of a synthetic NanoLuc.

The activity of a synthetic NanoLuc was assessed in *crtW#11* isolated protoplasts under different light regimes. Samples were treated with 350 $\mu\text{mol } \mu\text{m}^{-2} \text{ s}^{-1}$ light for 20 min. A, Green and blue light treated protoplasts compared with dark treated samples. B, Comparison between dark and red light treated samples. In the box plots, dots represent biological replicates, the black line marks the median, and the box indicates the interquartile range (IQR). Whiskers extend to data points below 1.5 X IQR away from the box extremities. A statistic Student t-test was used to assess significant differences ($p \leq 0.05$, $n=4$) and they were indicated marked with different letters, when present.



Supplemental Figure S5. Comparison between protoplast vitality and NanoLuc activity in light treated samples.

Protoplasts were treated with either dark or blue light ($350 \mu\text{mol } \mu\text{m}^{-2} \text{ s}^{-1}$) for 20, 40 and 80 min. A, Protoplast viability, expressed as % Live/Dead, in dark and light treated samples. B, NanoLuc activity measured in the samples used for vitality check. In the box plots, dots represent biological replicates, the black line marks the median, and the box indicates the interquartile range (IQR). Whiskers extend to data points below $1.5 \times \text{IQR}$ away from the box extremities. Different letters indicate statistical differences ($P \leq 0.05$) calculated from one-way ANOVA ($n=6$) followed by Tukey's post-hoc test.

Sig2	RSLDQKIGMNQNLKPSEVIADPEAVTSEDILIKEFMRQDLKVLDSLGTREKQVIRWRFG	521
RpoD	ISMETPIGDDEDSHLDGFIEDTLELPLDSATTESLRAATHDVLAGLTAREAKVLRMRFG	564
	*:: ** ::: : ..* * * . * : * . . ** . * : ** : * . * **	
Sig2	MEDGRMKTLEIGEMMGVSRERVRQIESSAFRKLKNKRNHLQQYLVAQS	572
RpoD	IDMNTDYTLEEVGKQFDVTRERIRQIEAKALRKLRHPSRSEVLRSEFLDD--	613
	:: . **:*:*: :.*:***:***:.*:***:~ .*.~ *:.~*	

Supplemental Figure S6. Multialignment of the 4.3 region (shaded in grey) of *A. thaliana* Sig2 and *E. coli* RpoD.

RpoD residues involved in AsiA contact are shown in red. Asterisks below a residue indicate identity between the two sequences; ‘.’ and ‘~’ indicate similar physical-chemical properties of residues.

Supplemental Table S1. Comparison of the carotenoid content in *crtW* and wild-type Arabidopsis plants.

Data are percentages of each pigment relative to the total carotenoid content per each line. Data are reported as average of three independent replicates. Errors are reported as standard deviation, shown per each group of lines. A Student T-test was used to assess significant differences between *crtW* and Col-0 genotypes. Different letters between rows represent differences in carotenoid content ($p < 0.05$).

Genotype	Neoxanthin	Violaxanthin	Lutein	β -carotene	Astaxanthin	Canthaxanthin
Col-0	14.0% \pm 0.3% ^a	14.0% \pm 0.3% ^a	14.0% \pm 0.3% ^a	14.0% \pm 0.3% ^a	n.d.	n.d.
<i>crtW11</i>	14.0% \pm 0.3% ^b	5.3% \pm 1.7% ^b	49.0% \pm 1.2% ^b	14.0% \pm 0.3% ^a	12.5% \pm 6.6% ^b	1.1% \pm 0.6% ^b
<i>crtW19</i>	6.6% \pm 0.6% ^c	3.6% \pm 0.6% ^b	44.8% \pm 2.0% ^c	14.0% \pm 0.3% ^a	23.6% \pm 5.2% ^b	1.8% \pm 0.3% ^b

Supplemental Dataset S1. Nucleotide sequences of the constructs used in this work

>PLS-*crtW*

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