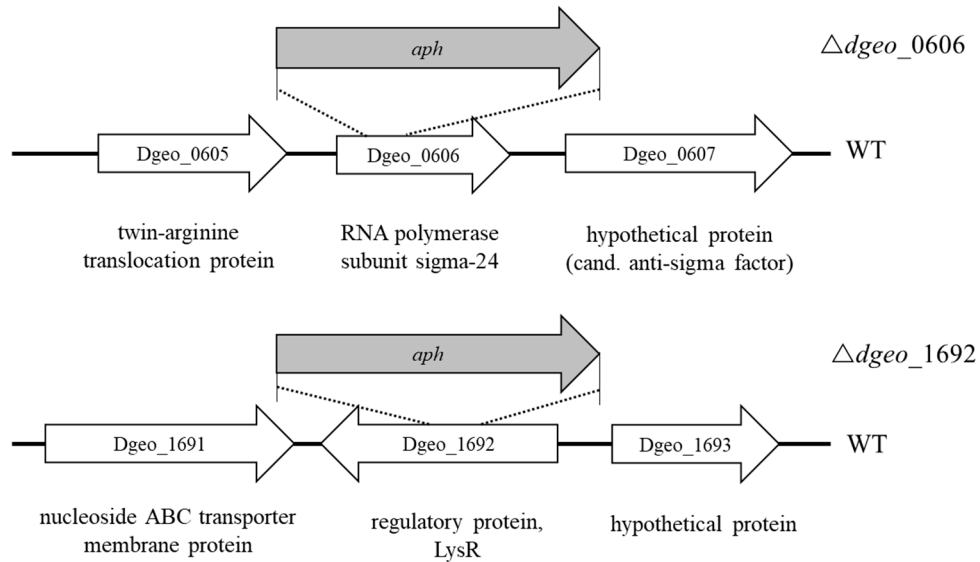
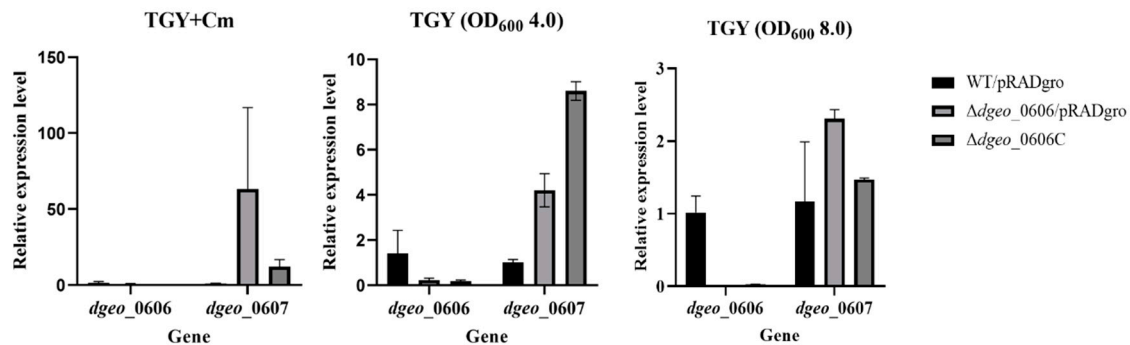


## Supplementary data

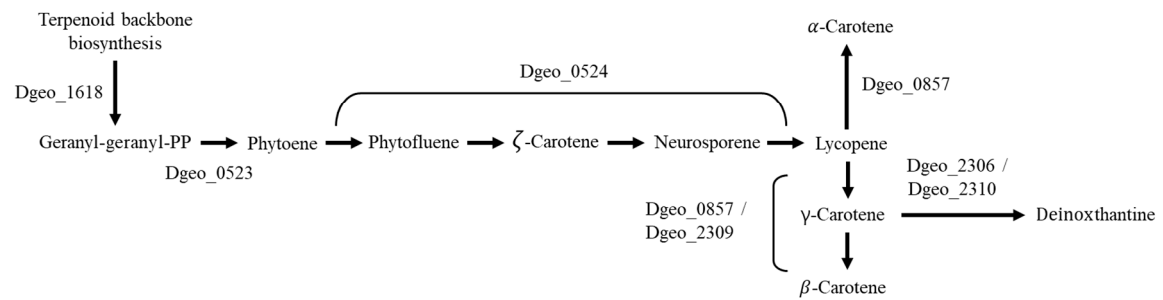


**Figure S1.** Scheme for construction of the  $\Delta dgeo\_0606$  and  $\Delta dgeo\_1692$  mutants by homologous recombination using kanamycin-resistant selection using pKATAph vector which was explained in materials and methods. *aph* is a kanamycin-resistant gene.

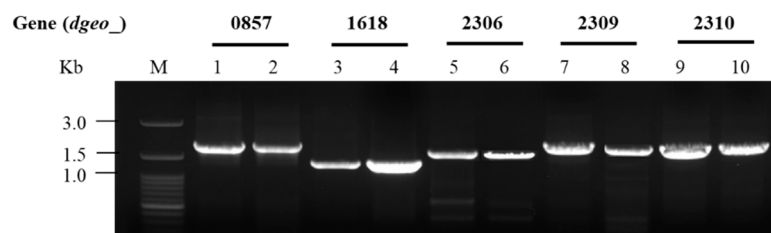


**Figure S2.** Expression levels of *dgeo\_0606* and *dgeo\_0607* by qRT-PCR at different growth condition (chloramphenicol present or absent) and phases (OD<sub>600</sub> of 4.0 or 8.0). Chloramphenicol was added with 3  $\mu$ g/mL. The relative expression levels were normalized to 1.0 of *dgeo\_0606* expression level in WT/pRADgro strain.

**A**



**B**



**Figure S3.** (A) Scheme of carotenoid biosynthesis pathway in *D. geothermalis*. (B) PCR detection of five carotenoid pathway involved genes (except *dgeo\_0523* and *dgeo\_0524*) for IS transposition in  $\Delta dgeo_1692hw$ .

**Table S1.** Analysis of specific IS type inserted in transposition loci of IS in  $\Delta dgeo\_0606gw$  and  $\Delta dgeo\_1692gw$  mutants under gamma irradiation.

Strain	Non-Pigments	OD <sub>600</sub>	Gamma-Radiation	Transposase Type	Direction	Loci
$\Delta dgeo\_0606$	<i>gw1/6/8</i>	4.0	5 kGy	IS5 family ISDge6	–	8 <sup>th</sup> of <i>dgeo_0524</i>
$\Delta dgeo\_0606$	<i>gw4</i>	4.0	5 kGy	IS5 family ISDge6	+	319 <sup>th</sup> of <i>dgeo_0524</i>
$\Delta dgeo\_0606$	<i>gw3/9</i>	2.0	5 kGy	IS1 family ISDge2	–	1289 <sup>th</sup> of <i>dgeo_0524</i>
$\Delta dgeo\_1692$	<i>gw1</i>	4.0	5 kGy	IS5 family ISDge7	–	1673 <sup>rd</sup> of <i>dgeo_0524</i>
$\Delta dgeo\_1692$	<i>gw2</i>	4.0	5 kGy	IS701 family ISDge5	+	612 <sup>nd</sup> of <i>dgeo_0524</i>

**Table S2.** Analysis of specific IS type inserted in transposition loci of IS in *WThw* and  $\Delta dgeo\_0606hw$  mutant under hydrogen peroxide treatment.

Strain	Non-Pigments	OD <sub>600</sub>	H <sub>2</sub> O <sub>2</sub> (mM)	Transposase Type	Direction	Loci
WT	<i>hw1/2</i>	2.0	80	IS5 family ISDge6	–	8 <sup>th</sup> of <i>dgeo_0524</i>
$\Delta dgeo\_0606$	<i>hw1</i>	2.0	80	IS5 family ISDge6	+	723 <sup>rd</sup> of <i>dgeo_0524</i>
$\Delta dgeo\_0606$	<i>hw2</i>	2.0	100	IS5 family ISDge7	–	1403 <sup>rd</sup> of <i>dgeo_0524</i>
$\Delta dgeo\_0606$	<i>hw3</i>	2.0	100	IS701 family ISDge5	–	1450 <sup>th</sup> of <i>dgeo_0524</i>