Supplementary data
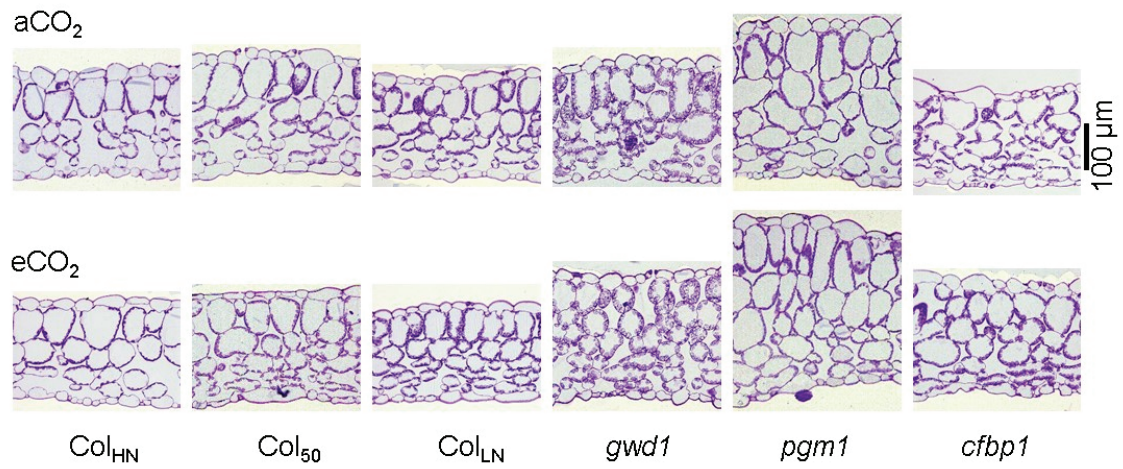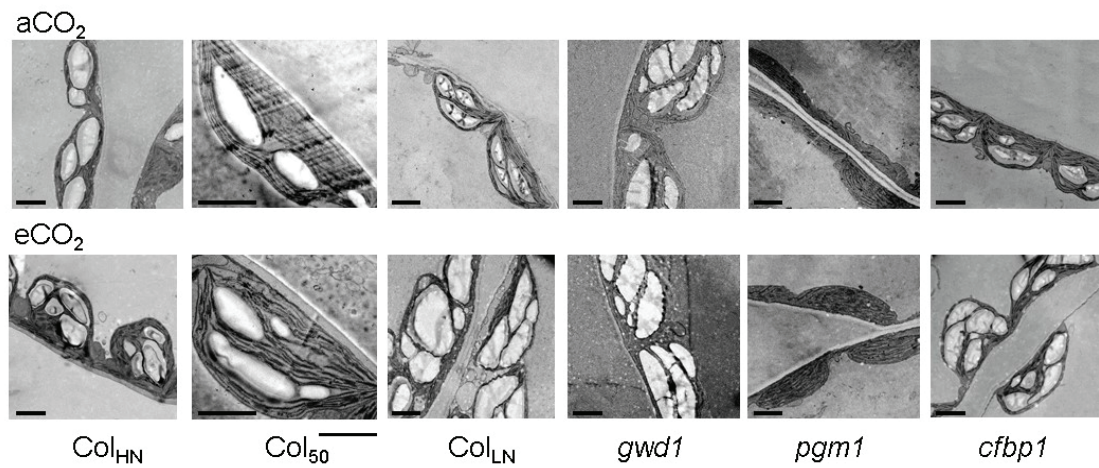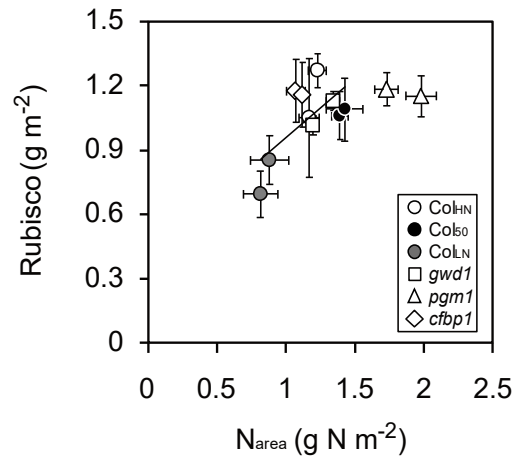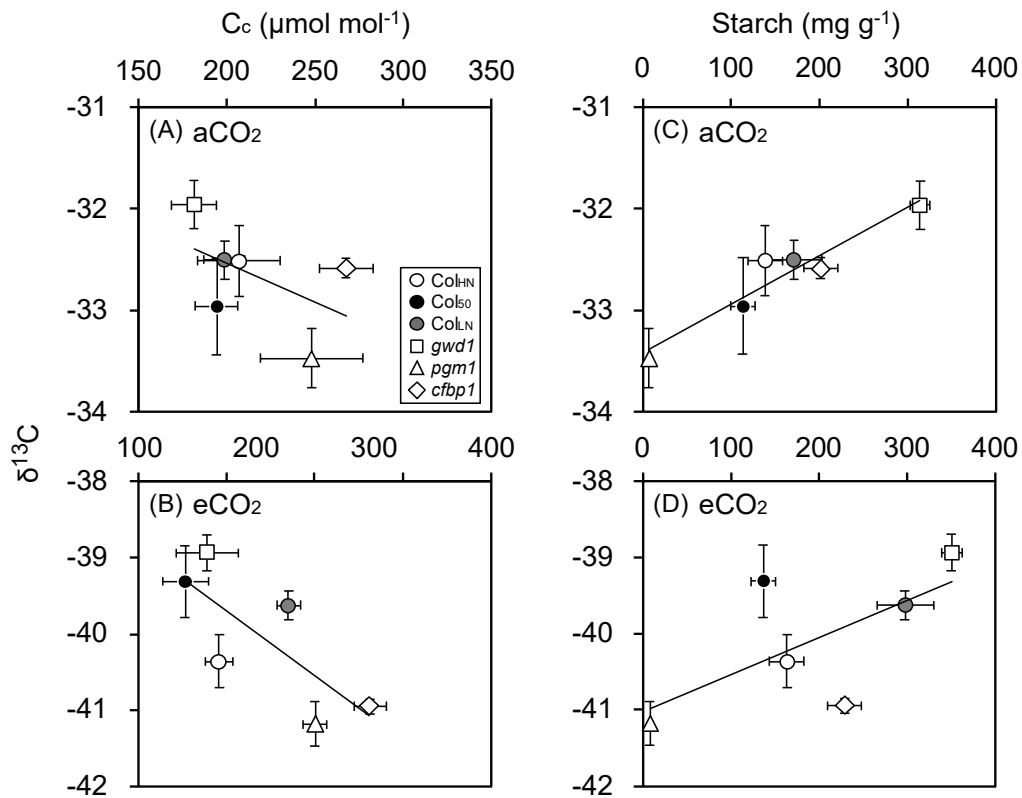

Figure S1 Cross-sections of the leaves of *Arabidopsis thaliana* Col_{HN}, Col_{50}, Col_{LN}, *gwd1*, *pgm1*, and *cfbp1* grown under ambient CO_2 (aCO_2, 400 ppm) or elevated CO_2 (eCO_2, 800 ppm). Scale bar indicates $100\,\mu$ m.

aCO$_2$

eCO$_2$

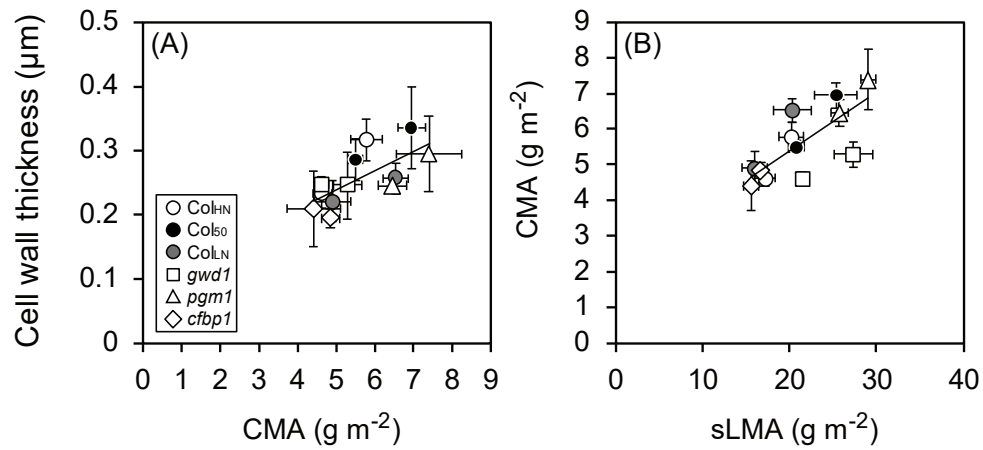| Col$_{HN}$ | Col$_{50}$ | Col$_{LN}$ | gwd1 | pgm1 | cfbp1 |

Figure S2 Electron microscopy of the leaves of *Arabidopsis thaliana* Col$_{HN}$, Col$_{50}$, Col$_{LN}$, *gwd1*, *pgm1*, and *cfbp1* grown under ambient CO$_2$ (aCO$_2$, 400 ppm) or elevated CO$_2$ (eCO$_2$, 800 ppm). Scale bars indicate 2 μ m.

Fig. S3 Relationship between Rubisco content per area and leaf nitrogen content per area (N_{area}) in the leaves of *Arabidopsis thaliana* Col_{HN}, Col_{50}, Col_{LN}, *gwd1*, *pgm1*, and *cfbp1* grown under ambient CO_2 (aCO_2, 400 ppm) or elevated CO_2 (eCO_2, 800 ppm). Values are means $\pm$ SD (n = 4). Solid line is a regression line for Col_{HN}, Col_{50}, Col_{LN}, and *gwd1*, and *cfbp1* ($R^2 = 0.45$).

Figure S4 Relationships between CO_2 concentration at chloroplast (C_c) and $\delta^{13}C$ at ambient CO_2 (aCO_2, 400 ppm) (A) and elevated CO_2 (eCO_2, 800 ppm) (B) and those between starch content and $\delta^{13}C$ at aCO_2 (C) and at eCO_2 (D). Open circles, filled circles, grey circles, open triangles, open squares, and open diamonds represent Col_{HN}, Col_{50}, Col_{LN}, *gwd1*, *pgm1*, and *cfbp1* grown under ambient aCO_2 or eCO_2, respectively. Values are means $\pm$ SD (n = 4). Solid lines are regression lines for all the lines in (A) ($R^2 = 0.26$) and (B) ($R^2 = 0.58$) (C) ($R^2 = 0.92$) and (D) ($R^2 = 0.43$).

Fig. S5 Relationship between cell wall thickness and cell wall mass per area (CMA) (A) and that between CMA and structural leaf mass per area (sLMA) (B) in the leaves of *Arabidopsis thaliana* Col_{HN}, Col_{50}, Col_{LN}, *gwd1*, *pgm1*, and *cfbp1* grown under ambient CO_2 (aCO_2, 400 ppm) or elevated CO_2 (eCO_2, 800 ppm). Values are means $\pm$ SD (n = 4). Solid lines are regression lines for all the lines in (A) ($R^2 = 0.50$) and (B) ($R^2 = 0.55$).
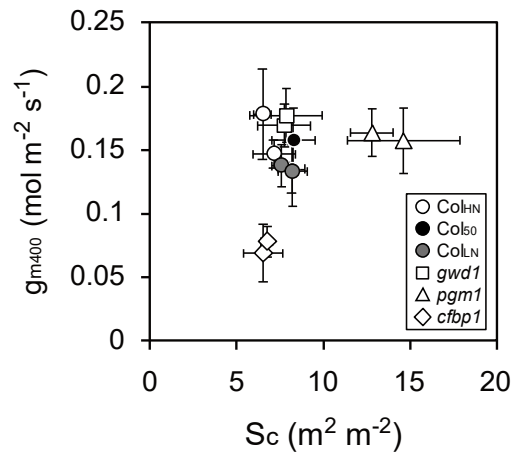
Fig. S6 Relationship between mesophyll conductance measured at 400 ppm CO_2 (g_{m400}) and the chloroplast surface area exposed to intercellular space (S_c) for plants grown under ambient CO_2 (aCO_2, 400 ppm) or elevated CO_2 (eCO_2, 800 ppm). Open circles, filled circles, grey circles, open triangles, open squares, and open diamonds represent Col$_{HN}$, Col$_{50}$, Col$_{LN}$, *gwd1*, *pgm1*, and *cfbp1* grown under aCO_2 or eCO_2, respectively. Values are means $\pm$ SD (n = 4).