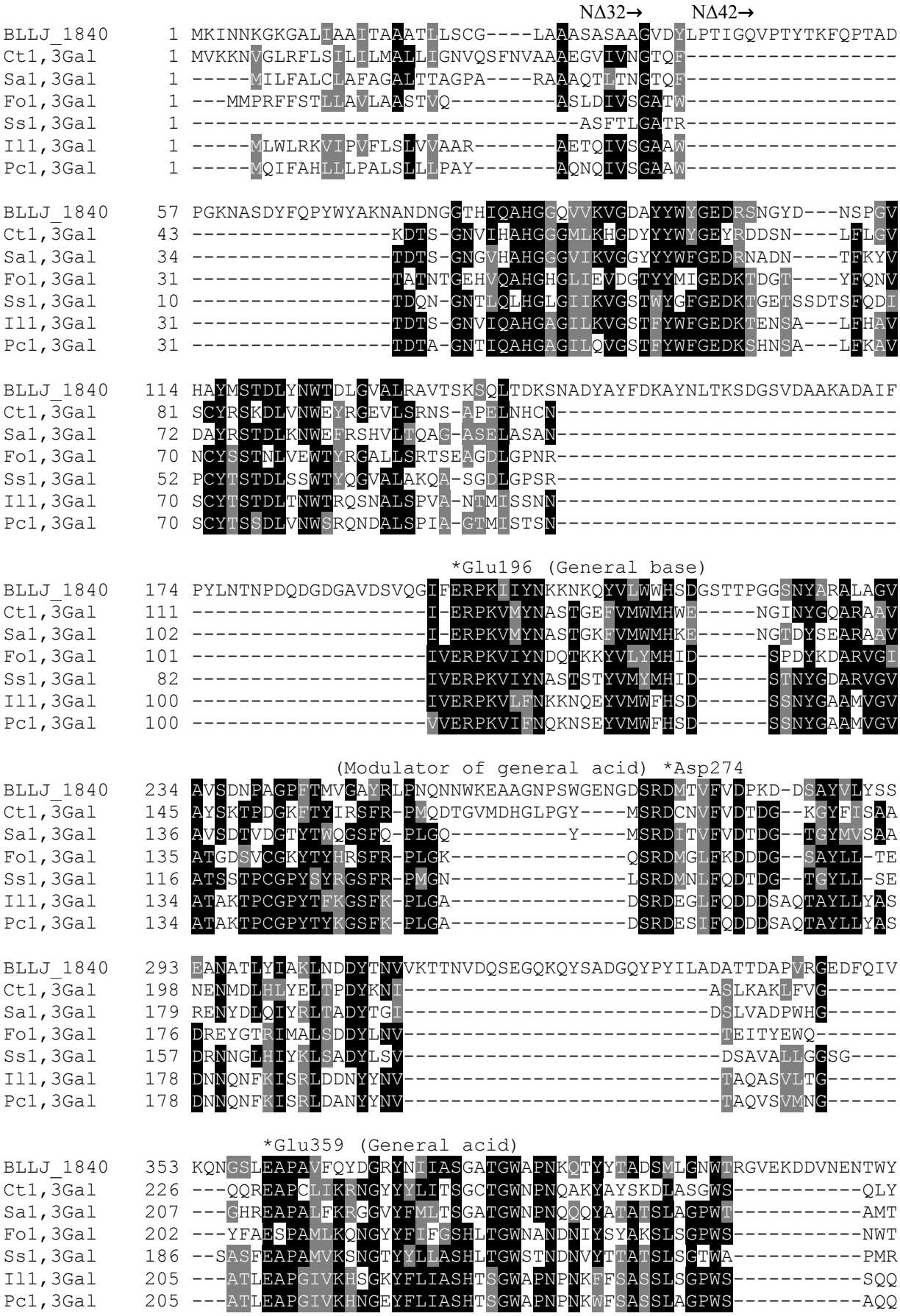

Fig. S1. (Continued)

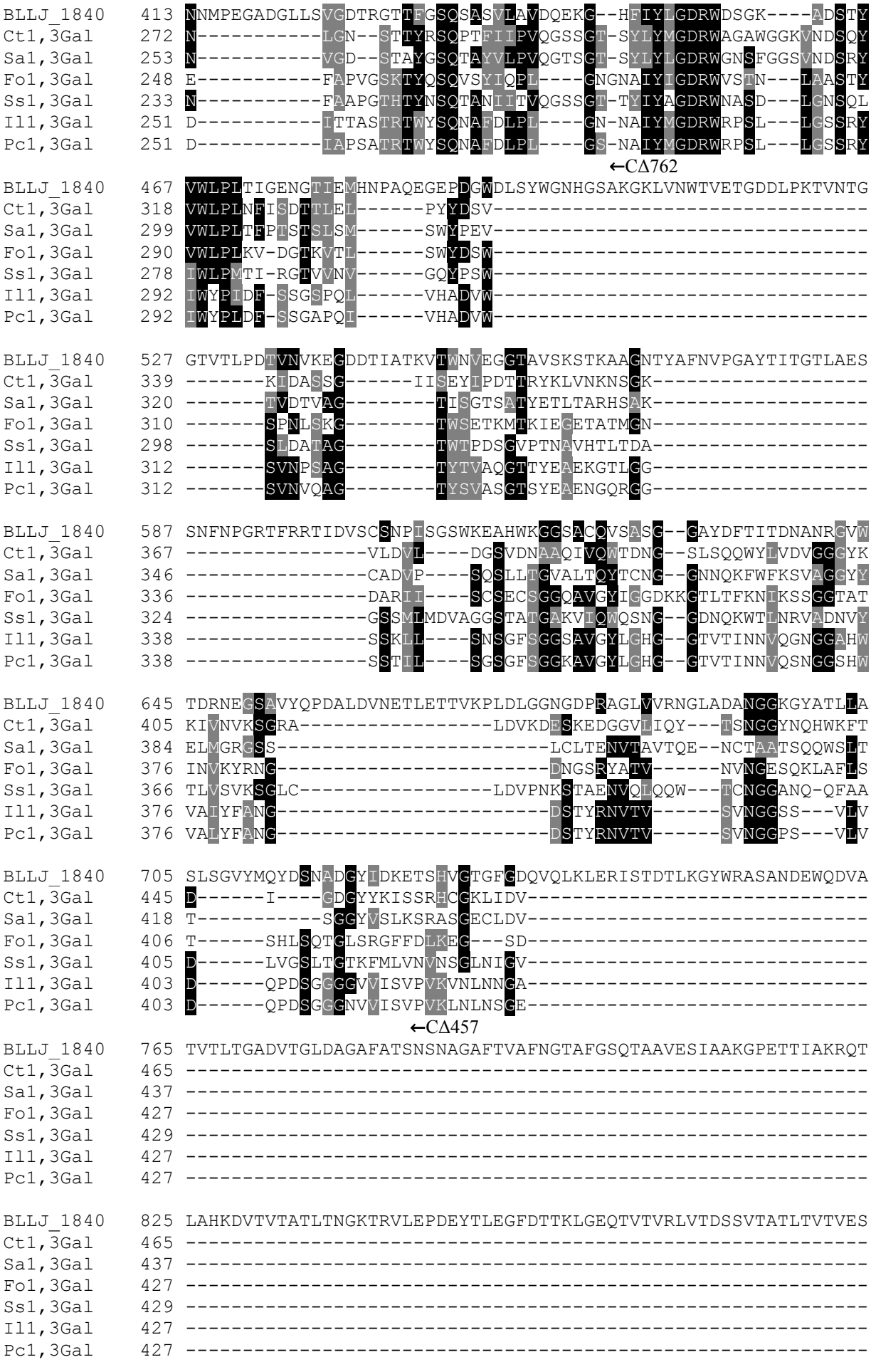

Fig. S1. (Continued)

Fig. S1. Multiple sequence alignment of BLLJ_1840 and characterized exo-β-1,3-galactanases. The alignment was created using the MUSCLE program (http://www.ebi.ac.uk/Tools/msa/muscle/) and BoxShade 3.21 (http://www.ch.embnet.org/software/BOX_form.html). Identical residues and conservative substitutions are highlighted in black and dark gray, respectively. Asterisks indicate the predicted catalytic residues for BLLJ_1840. The *arrows* indicate the deleted position of deletion mutants.

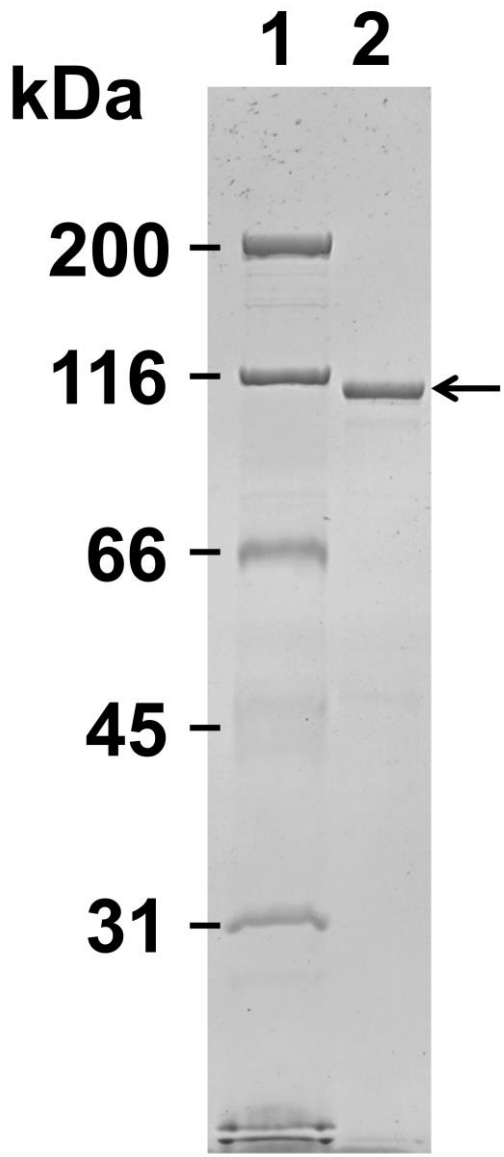

Fig. S2. SDS-PAGE analysis of recombinant BLLJ_1840. Purified BLLJ_1840-NΔ42CΔ257 was electrophoresed on a 10% polyacrylamide gel and stained with Coomassie Brilliant Blue R-250. Lane 1, molecular size markers; lane 2, purified enzyme;. The *arrow* indicates the band that corresponds to BLLJ_1840-NΔ42CΔ257.

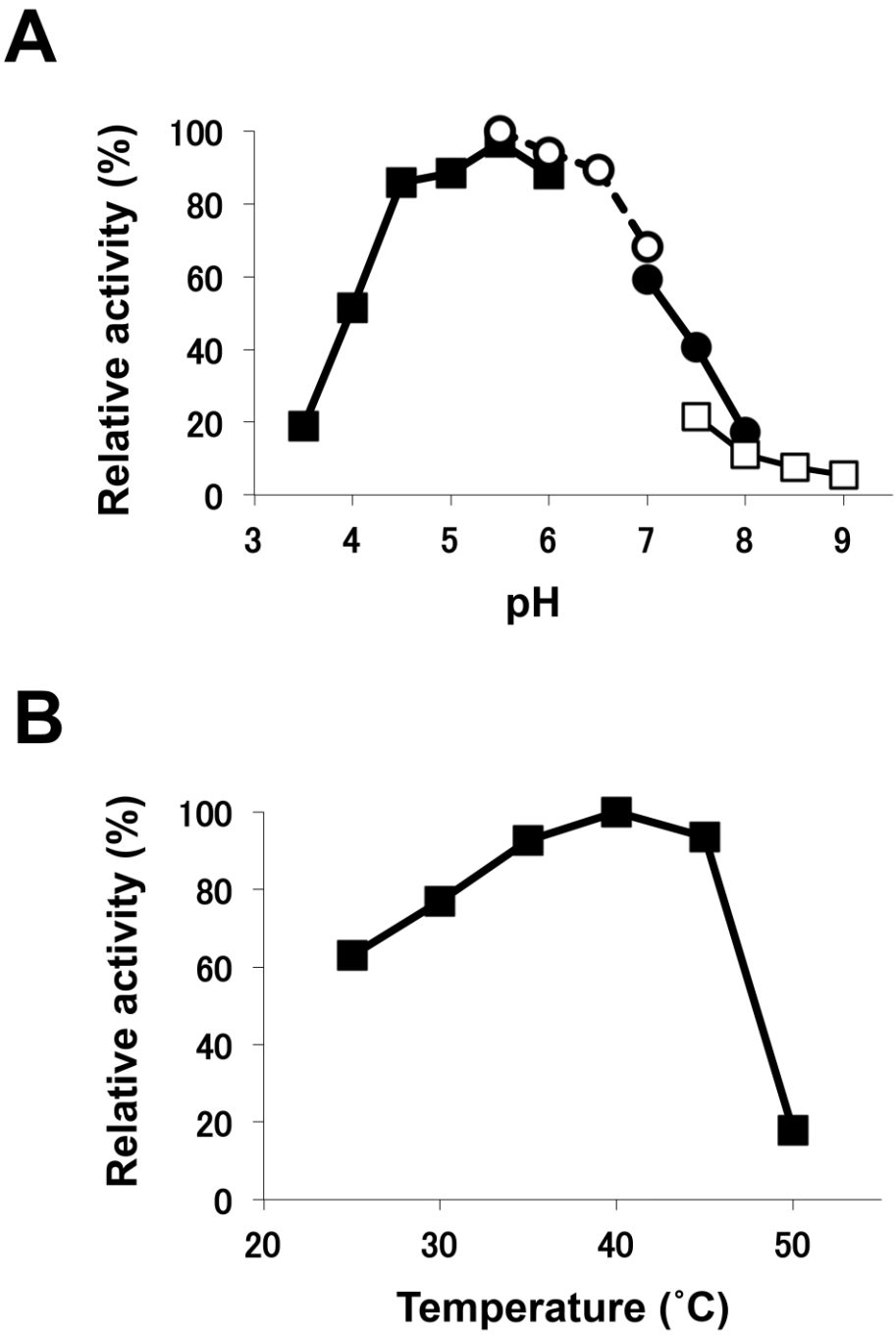

Fig. S3. Effects of pH and temperature on the activity of BLLJ_1840. (A) pH dependence of BLLJ_1840 activity in various buffers at 40°C for 20 min. Enzyme activities were expressed as the percentage of activity in MES buffer at pH 5.5. (B) Temperature dependence of BLLJ_1840 activity for 20 min. The enzymatic activities were expressed as the percentage of the activity at 40°C. Buffers: sodium acetate (closed square), MES (open circle), HEPES (closed circle), Tris-HCl (open square).

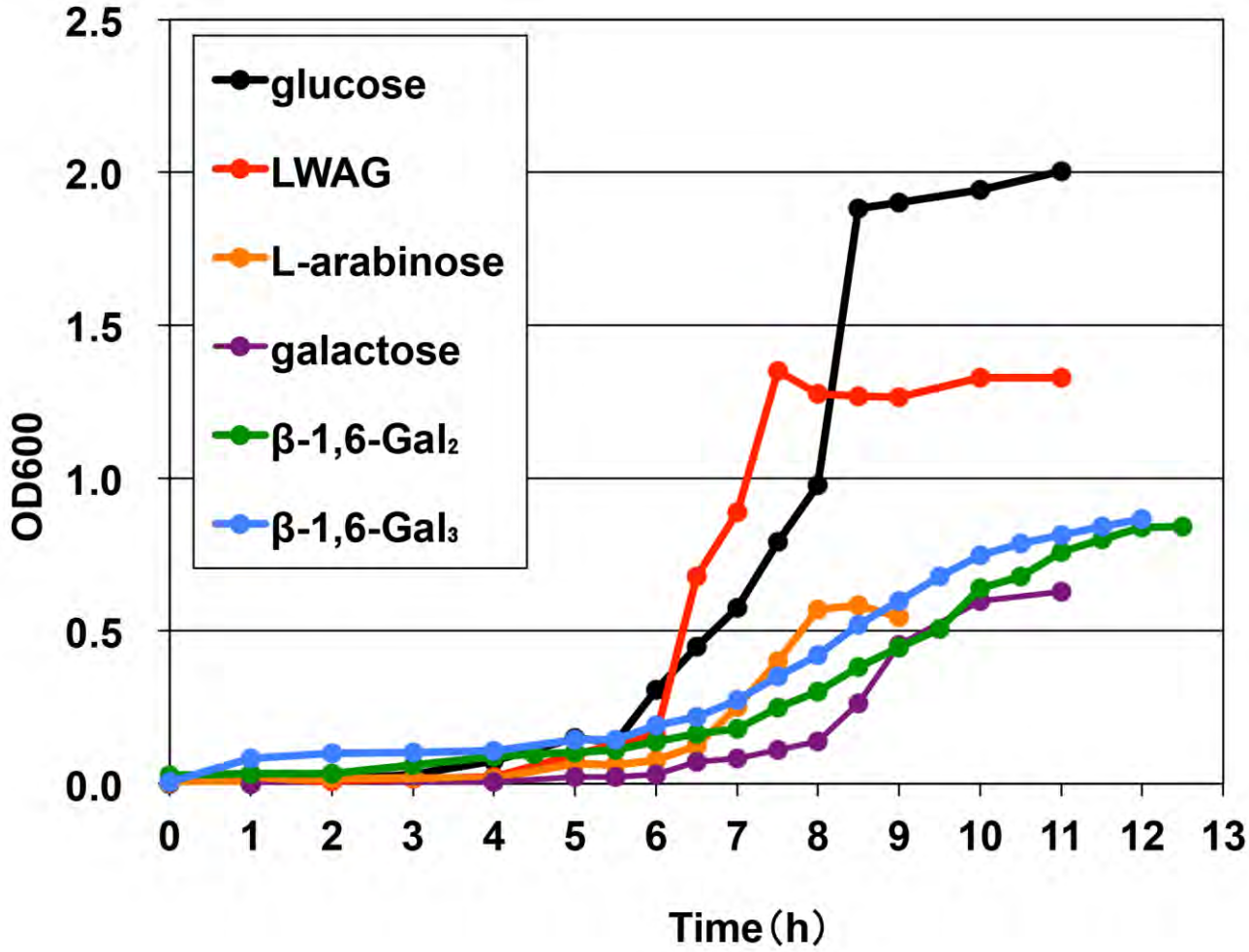

Fig. S4. Growth curves of *B. longum* JCM1217 using several carbohydrate sources. *B. longum* JCM1217 was grown on PYF medium containing 1.0% L-arabinose, glucose, galactose, β-1,6-Gal_2, β-1,6-Gal_3, or LWAG.

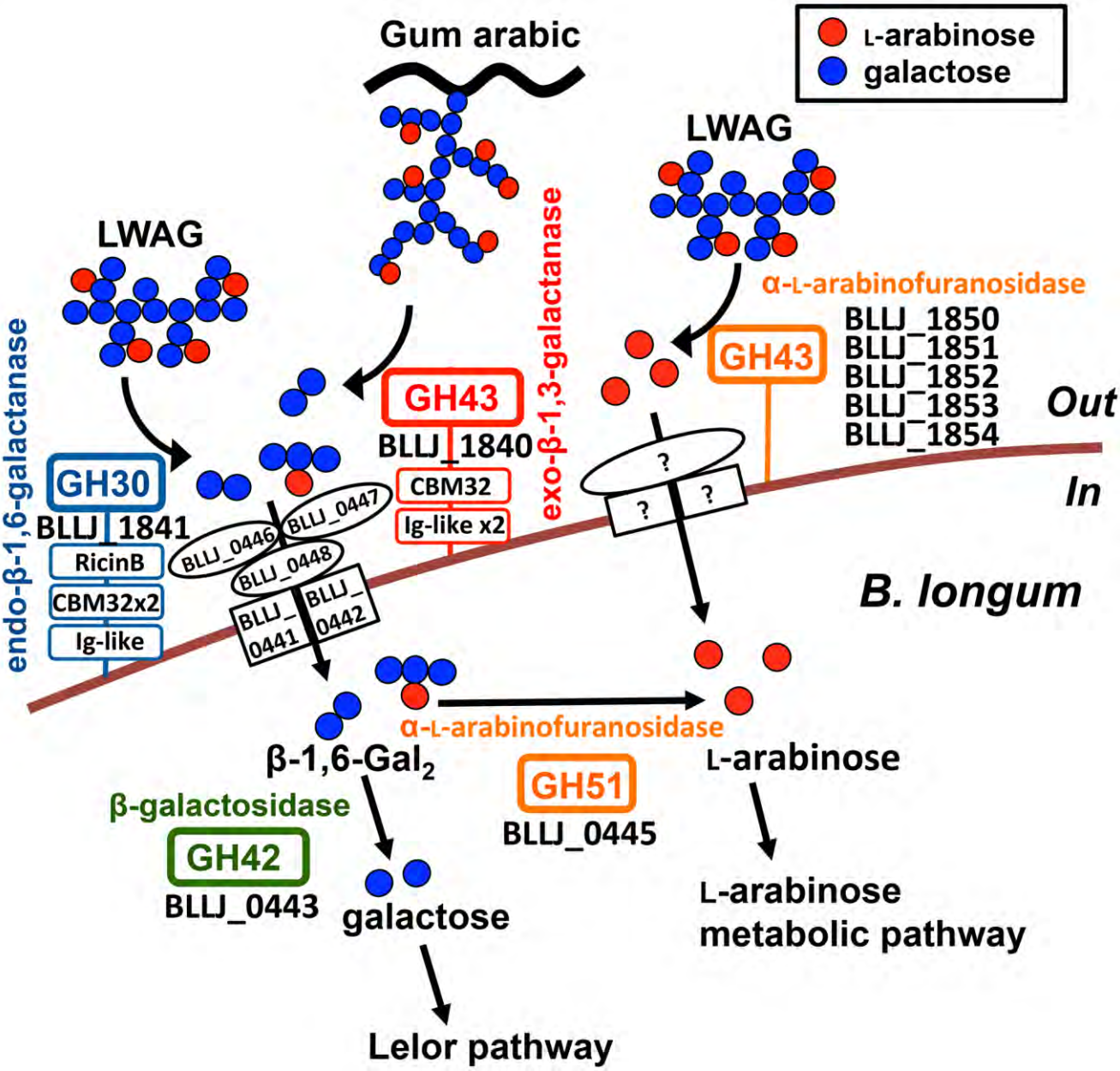

Fig. S5. Schematic AG-II metabolic pathway in *B. longum* subsp. *longum*.

Table S1. The primers used for deletion mutagenesis and quantitative real-time PCR.

Primers	Sequence of oligonucleotide primers
NΔ reverse[a]	5'- CATGGTATATCTCCTTCTTAAAGTT -3'
NΔ42 forward[a]	5'- CAAGTGCCGACATACACCAAGTTCC -3'
CΔ forward[a]	5'- CTCGAGCACCACCACCACCACCACTG -3'
CΔ257 reverse[a]	5'- TTCAGCGATCTTGGCATAGTCATTGC -3'
CΔ457 reverse[a]	5'- ACCGAACGCAGTGCCGTTGAAGGCCAC -3'
CΔ762 reverse[a]	5'- GCCGGTTTCCACAGTCCAGTTGACCA -3'
rpoB forward[b]	5'- CGTCGACGATATCGATCACTTC -3’
rpoB reverse[b]	5'- CGCAGCTGGTTCTGAATCAG -3’
BLLJ_1840 forward[b]	5'- GCACCATCGAAATGCACAAT -3’
BLLJ_1840 reverse[b]	5'- GGTTGCCCCAATAGCTCAGA -3’
BLLJ_1841 forward[b]	5'- CACAGTCGGCACGAAGGTT -3’
BLLJ_1841 reverse[b]	5'- TTACATTGCGCAGAGTCCATGT -3’

[a]The primers used for deletion mutagenesis.
[b]The primers used for quantitative real-time PCR.